

# PROJECT MANUAL

## Office for the State Public Defender District 8 Office Building For



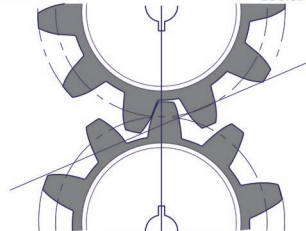
### CDMorgan

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A PROFESSIONAL ENGINEERING AND ARCHITECTURAL  
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May 15<sup>th</sup>, 2026

OFFICE OF THE STATE PUBLIC DEFENDER  
DISTRICT 8 OFFICE BUILDING  
Winn Parish Public Defender  
111 West Main  
Winnfield, La 71483

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SECTION ADV - 00020

ADVERTISEMENT FOR BIDS

Notice is hereby given that sealed bids (one original and one copy) will be received by State of Louisiana Office of the State Public Defender District 8, located at 111 West Main Winnfield, La 71483. Delivery to any other department is unacceptable and may result in non-consideration of the bid. Bids will be received until 2:00 P.M., on Thursday, June 18<sup>th</sup>, 2026, and opened in public, in the District 8 Public Defenders Office.

A Non-Mandatory Pre-Bid Conference will be held on Thursday, June 4<sup>th</sup>, 2026, at 10:00 A.M in the District 8 Public Defenders Office, located at 111 West Main Winnfield, La 71483.

For construction of the following project as delineated on the Bid Proposal Form:

**Office of the State Public Defender District 8 Office Building  
for  
State of Louisiana Office of the State Public Defender District 8  
111 West Main  
Winnfield, La 71483**

**SUMMARY DESCRIPTION OF PROJECT:**

The project will be bid so as to include a Base Bid:

For all labor, materials, equipment, fees, and transportation to complete the Work described by the Contract Documents dated May 15<sup>th</sup>, 2026, for the Office of the State Public Defender District 8 Office Building for State of Louisiana Office of the State Public Defender District 8, 111 West Main Winnfield, La 71483.

Complete Bidding Documents for this project are available in electronic form and may be obtained without charge and without deposit from [www.aeplans.com](http://www.aeplans.com) and are available to your local plan rooms and reprographers. Bidders must register through the web site to be notified of addenda. The bidder is responsible for periodically checking the site. Printed copies are not available from the Project Designer but arrangements can be made to obtain them through most reprographic firms. When the designer of record issues bid documents in electronic form, prime bidders shall be given the option of receiving the documents in paper form in accordance with LARS 38:2212 A (i) (e). Reproduction cost on the first paper plan set acquired by bona fide prime bidders will be fully refunded by the design professional upon return of the documents no later than ten days after receipt of the bids. Printed copies may be ordered from reprographic companies through the website or by contacting a reprographer directly. Downloaded plans may be printed on the plan holder's equipment. Plan holders are responsible for their own reproduction costs.

Each bid must be accompanied by a certified check, cashier's check, or Bid Bond payable to the Winn Parish Public Defender, the amount of which shall be five percent (5%) of the amount of the proposed Base Bid. Money Orders will not be accepted. This shall be given as guarantee that the bidder will execute the contract, if it is awarded to him, in conformity with the Contract Documents. If a Bid Bond is used, it must meet the requirements according to R.S. 38:2218.

The successful Bidder shall be required to furnish a Performance and Payment Bond in an amount equal to 100% of the Contract, written by a company licensed to do business in Louisiana, and who is currently on the U.S. Department of the Treasury Financial Management Service List, or by a Louisiana domicile insurance company with at least an A-rating in the latest printing of the A.M. Best's Key Rating Guide to write individual bonds up to ten percent of policy holder's surplus as shown in the A.M. Best's Key Rating Guide and complies with R.S. 38:2219 (R.S. 28:2218 Bid Bond). The bond shall be countersigned by a person who is under contract with the surety company or bond issuer as agent of the company and who is licensed as an insurance agent in this State, and who is residing in this State.

Bids shall be accepted only from contractors who are licensed by the State of Louisiana for Building Construction. No bid may be withdrawn for a period of forty-five (45) days after receipt of bids, except under the provisions of La. R.S. 38:2214.

The successful bidder shall supply all required insurance with carrier(s) acceptable to the State of Louisiana Office of the State Public Defender District 8.

The owner reserves the right to reject any and all bids for just cause. In accordance with La. R.S. 38:2212 (A) (1) (b), the provisions and requirements of this action, those stated in the Advertisement for Bids, and those required on the bid form shall not be considered as informalities and shall not be waived by any public entity.

#### **State of Louisiana Office of the State Public Defender District 8**

Mr. Chris L. Bowman, Attorney at Law, Esquire

#### **Advertisement Dates:**

**May 20<sup>th</sup>, 2026**

**May 27<sup>th</sup>, 2026**

**June 3<sup>rd</sup>, 2026**

**June 10<sup>th</sup>, 2026**

## INSTRUCTION TO BIDDERS

### ARTICLE 1 - DEFINITIONS

The Bidding Documents include the following:

Advertisement for Bids  
Instruction to Bidders  
Contract  
Bid Form  
General Conditions of the Contract for Construction  
Supplementary Conditions  
Specification Sections, Table of Contents, Division 15

All definitions set forth in the General Conditions of the Contract for Construction, AIA Document A201, or in other Contract Documents are applicable to the Bidding Documents.

Addenda are written or graphic instructions issued by the Engineer prior to the opening of Bids which modify or interpret the Bidding Documents by addition, deletions, clarifications or corrections.

A Bid is a complete and properly signed proposal to do the work or designated portion thereof for the sums stipulated therein, supported by data called for by the Bidding Documents.

Base Bid is the sum stated in the Bid for which the Bidder offers to perform the work described as the base, to which work may be added or deleted for sums stated in Alternate Bids.

A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials or services as described in the Contract Documents.

A Bidder is one who submits a Bid for a prime contract with the Owner for the work described in the proposed Contract Documents.

A Sub-Bidder is one who submits a Bid to a Bidder for materials or labor for a portion of the work.

### ARTICLE 2 - BIDDER'S REPRESENTATION

Each Bidder by making his Bid represents that:

He has read and understands the Bidding Documents, and his Bid is made in accordance therewith.

He has visited the site and has familiarized himself with the local conditions under which the work is to be performed. The bidder shall inspect all existing conditions and space

limitations at the site and shall include in his bid all required special adjustments because of site conditions.

His Bid is based upon the materials, systems and equipment described in the Bidding Documents, without exceptions.

The Bidder must be fully qualified under any state or local licensing law for Contractors in effect at the time and at the location of the work before submitting his Bid. In the State of Louisiana, only the Bids of Contractors and Sub-Contractor duly licensed under Louisiana Revised Statutes 37:2151, et seq., will be considered, if applicable. The Contractor shall be responsible for determining that all of his Sub-Bidders or prospective Sub-Contractors are duly licensed.

### ARTICLE 3 - BIDDING DOCUMENTS

#### Copies:

Complete Bidding Documents will be distributed as stated in the Advertisement for Bid.

Complete sets of Bidding Documents shall be used in preparing Bids; neither the Owner nor the Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

The Owner or Engineer, in making copies of the Bidding Documents available on the above terms, does so only for the purpose of obtaining Bids on the work, and does not confer a license or grant for any other use.

#### Interpretation or Correction of Bidding Documents:

The Bidder shall promptly notify the Engineer of any ambiguity, inconsistency, or error which they may discover upon examination of the Bidding Documents, or of the site and local conditions.

Any clarification or interpretation of the Bidding documents shall be made by addendum. Interpretations, corrections, or changes of the Bidding Documents made in any other manner will not be binding. Bidders shall not rely upon such interpretations, corrections, and changes.

#### Substitutions:

The materials, products and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution.

No substitution will be considered unless a written request for approval has been received by the Engineer at least seven (7) days prior to the date for receipt of Bids. Each such request shall include the name of the material or equipment for which it is to be



substituted, and a complete description of the proposed substitute, including drawings, cuts, performance and test data, and any other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment or work that incorporation of the substitute would be required shall be included. The burden of proof of the merit of the proposed substitute is upon the proposer. The Engineer's decision of approval or disapproval of a proposed substitution shall be final. Disapprovals shall be in writing. See Division #1.

If the Engineer approves any proposed substitution, such approval will be set forth in an addendum. Bidders shall not rely upon approvals made in any other manner.

#### Addenda:

Addenda will be mailed or delivered to all who are known by the Engineer to have received a complete set of Bidding Documents.

Copies of addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.

Each Bidder shall ascertain from the Engineer prior to submitting his Bid that he has received all addenda issued, and he shall acknowledge their receipt on the Proposal Form.

### ARTICLE 4 - BIDDING PROCEDURE

#### Form and Style of Bids:

Bids shall be submitted on the forms provided by the Engineer.

All blanks on the Bid form shall be filled in by typewriter or manually in ink.

Where so indicated by the makeup of the Bid form, sums shall be expressed in both words and figures, and in case of discrepancy between the two, the written amount shall govern.

Any interlineation, alteration or erasure must be initialed by the signer of the Bid.

Bidders are cautioned to complete all Alternates and Unit Prices, should such be required in the Bid form; failure to submit Alternates and Unit Prices will render the proposal informal and may cause its rejection.

Bidder shall make no additional stipulations on the Bid form, nor qualify his Bid in any other manner.

The Bid shall include the legal name of Bidder and statement whether Bidder is a Sole Proprietor, a Partnership, a Corporation, or any other legal entity, and the Bid shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid

submitted by an agency shall have a current Power Of Attorney attached, certifying agent's authority to bind Bidder.

Contractor shall certify that he is licensed under R.S. 37:5484-2163 and show his license number of the Bid above his signature or the signature of his duly authorized representative, and on the outside of the envelope.

#### Submission of Bids:

Bids shall be sealed in an opaque envelope and will be received until the time specified and at the place specified.

It shall be the specific responsibility of the Bidder to deliver his sealed bid to **Office of the State Public Defender District 8 Winn Parish Public Defender Attn: Mr. Chris D. Morgan, P.E.** Late delivery of a Bid for any reason, including late delivery by United States Mail, may disqualify the Bid. **The bid envelope shall be identified as:**

**Office Building for the Winn Parish District 8 Office of the State Public Defender  
For  
State of Louisiana Office of the State Public Defender District 8**

**OPENING DATE: THURSDAY, June 18<sup>th</sup>, 2026**

**OPENING TIME: 2:00 PM**

**LOCATION: Winn Parish Public Defender Office  
111 West Main Street  
Winnfield, La 71483**

**The envelope shall also include the name, address, and license number of the bidder.**

**If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope, with the notation "Bid Enclosed" on the face thereof.**

Bids shall be deposited at the designated location prior to the time of the date for receipt of Bids, or any extension thereof made by addendum. Bids received after the time and date for receipt of Bids will be returned unopened.

Bidder shall assume full responsibility for timely delivery at location designated for receipt of Bids. Oral, telephonic, or telegraphic Bids are invalid and will not receive consideration; nor will notations on the envelope for amending the Bid.

#### Modification or Withdrawal of Bid:

A Bid may not be modified, withdrawn, or cancelled by the Bidder for a period of forty-five (45) days following the time and date designated for the receipt of Bids, and Bidder so agrees in submitting his Bid.

Prior to the time and date designated for receipt of Bids, Bids submitted early may be modified or withdrawn only by notice to the party receiving Bids at the place and prior to the time designated for receipt of Bids.

Withdrawn Bids may be resubmitted up to the time designated for the receipt of Bids, provided they are then fully in conformance with these Instructions to Bidders.

## ARTICLE 5 - CONSIDERATION OF BIDS

### Opening of Bids:

The properly identified Bids received on time will be opened publicly and will be read aloud, and a tabulation abstract of the amount of the Base Bid and major Alternates, if any, will be made available to Bidders.

### Rejection of Bids:

The Owner shall have the right to reject any or all Bids.

### Acceptance of Bid:

The Owner shall have the right to waive any informality or irregularity in any Bid received.

It is the intent of the Owner to award a contract to the lowest responsible Bidder, provided the Bid has been submitted in accordance with the requirements of the Bidding Documents, is judged to be reasonable, and does not exceed the funds available.

It is the intention of the Owner to work with the low Bidder to optimize project costs.

Alternates quoted on Bid Forms will be exercised as Owner option. The Owner will award alternates in the order listed unless it does not affect the award of the contract. Accepted alternates will be listed in Owner-Contractor Agreement.

### Tax Free Status:

**NO SALES TAX** – The hospital is exempt from State and Local Sales Tax. Prepare Bid Proposals accordingly. WINN PARISH PUBLIC DEFENDER Office of the State of Louisiana Public Defender Service District is a tax-exempt entity. Contractors and sub-contractors are expected to purchase materials as agents of the WINN PARISH PUBLIC DEFENDER Service District and comply with all requirements for maintaining tax-free status. The WINN PARISH PUBLIC DEFENDER Service District will provide documentation and assistance for tax-free purchasing agency. **All contractors and sub-contractors should calculate their bids on a tax-free basis and will bear the loss should they fail to comply with the law concerning tax-free entities.**

Contingency:

**Contractor shall include Ten Thousand Dollars and Zero Cents (\$10,000.00) in bid price to be returned to Owner if not used.**

#### ARTICLE 6 - POST BID INFORMATION

Submissions:

The Bidder shall, prior to the award of a contract for the work, submit the following information to the Engineer.

The proprietary names and the suppliers of principal items or systems of material and equipment proposed for the work.

A list of names of the Sub-Contractors or other persons or organization (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the work.

The Bidder shall be required to establish to the satisfaction of the Engineer and the Owner the reliability and responsibility of the proposed Sub-Contractors to furnish and perform the work described in the sections of the Specifications pertaining to such proposed Sub-Contractors' respective trades.

Prior to the award of the contract, the Engineer will notify the Bidder if either the Owner or the Engineer, after due investigation, has reasonable and substantial objection to any person or organization of the Contractor's list of proposed Sub-Contractors.

Sub-Contractors and other persons and organizations proposed by the Bidder and accepted by the Owner and the Engineer must be used on the work for which they were proposed and accepted and shall not be changed except with written approval of the Owner and the Engineer. The owner shall be exempt from state sales tax.

#### ARTICLE 7 - PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND

Bonds Required

Bid Bond:

The bids shall be accompanied by a security deposit as follows:

1. Bid Bond in the amount of no less than five (5) percent of the project base bid.

Performance Bond:

The Contractor shall furnish and pay for a performance and a payment bond written by a company licensed to do business in Louisiana, each in an amount equal to 100% of the contract sum.

#### Time of Delivery and Form of Bonds:

The Bidder shall deliver the required bonds to the Owner simultaneously with the execution of the contract.

Bonds shall be in the form furnished by the Owner, entitled CONTRACT BETWEEN OWNER AND CONTRACTOR AND PERFORMANCE AND PAYMENT BOND, a copy of which is included in the Contract Documents.

The Bidder shall require the Attorney-in-Fact who executes the required bonds on behalf of the Surety to affix thereto a certified and curry copy of his Power of Attorney.

#### ARTICLE 8 - FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

Form of the contract to be used shall be furnished by Owner, a copy of which is bound in the Bidding Documents.

#### Award:

Before awarding the contract, the successful Bidder shall furnish to the Owner a certified copy of the minutes of the Corporation or Partnership meeting which authorized the party executing the Bid to sign on behalf of Contractor.

#### ARTICLE 9 - COMPLETION TIME AND LIQUIDATED DAMAGES

The completion of the contract must be within the time stated below, subject to such extensions as may be granted under Paragraph 8.3, Delays and Extensions of Time in the General Conditions, or the Contractor will be subject to pay to the Owner Liquidated Damages in the amount as stated in the bid documents.

**COMPLETION TIME:** The Bidder hereby agrees to commence work under this contract on a date specified in a written "Notice to Proceed" by the Owner and to fully complete the project within **One Hundred Eighty-Three (183) consecutive calendar days** or within the time as may be extended as stipulated in the Contract Documents.

**LIQUIDATED DAMAGES:** The Bidder hereby also agrees to pay as Liquidated Damages the sum of **FIVE HUNDRED DOLLARS AND ZERO CENTS (\$500.00)** for each consecutive calendar day which the work is not complete beginning with the first day beyond the completion time stated above. The Owner reserves the right to terminate the contract in the event of Contractor failure to timely perform.

If the Bidder is notified of the acceptance of the bid within forty-five (45) days of the opening of the bids, he agrees to execute a Contract for the work accepted, in the Standard Contract form currently used by the Owner, within ten (10) days after notice from the Owner that the instrument is ready for signature.

END OF SECTION

## CONTRACT

### Standard AIA Forms

Contract, Form A-101, 2017 Standard form of agreement between owner and contractor where the basis of payment is a stipulated sum.

Edition of The American Institute of Architects are hereby made a part of this specification to the same extent as if bound herein. Copies of the Standard form of Agreement Between Owner and Contractor Where the Basis of Payment is a Stipulated Sum may be examined at the Engineer's office or obtained from The American Institute of Architects, Washington, D.C. 2006, or the Louisiana Architects Association, 521 America Street, Baton Rouge, Louisiana, 70802.

## SUPPLEMENTARY CONDITIONS

These supplementary Conditions modify, change, delete from or add to the General Conditions of the Contract for Construction, AIA Document A201, 2017 edition. Where any Article of the General Conditions is modified or any Paragraph, Sub-Paragraph, or Clause thereof is modified or deleted by these supplements, the unaltered provisions of that Article, Paragraph, sub-Paragraph or Clause shall remain in effect.

Articles, Paragraphs, Sub-Paragraphs or Clauses modified or deleted have the same numerical designation as those occurring in the General Conditions.

### ARTICLE 1 GENERAL PROVISIONS

#### 1.1 DEFINITIONS

The Contract Documents

(In sub-section 1.1.1, delete the third sentence, and add the following sentence:)

The Contract Documents shall include the Bidding Documents as listed in the Instructions to Bidders, and any modifications made thereto by Addenda.

Engineer will furnish Contractor 2 complete sets of Contract Documents for construction, Contractor paying reproduction costs for additional sets required by him.

### ARTICLE 3 CONTRACTOR

#### 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

(Add the following as Sub-Section 3.3.5.)

The Superintendent shall remain on the project during normal work hours, unless the job is closed down due to a general strike or conditions beyond the control of the Contractor or until Termination of the Contract in accordance with the Contract Documents. The Superintendent shall be approved by the Owner. Should the approved Superintendent be unable to complete project his replacement(s) shall also be approved by the Owner.

#### 3.17 ROYALTIES AND PATENTS

(Delete this section and substitute the following:)

The Contractor shall pay all royalties, licenses, and fees, and defend all suits or claims for infringement of any patent rights and save the Owner and Engineer harmless on account thereof, and shall protect and indemnify the Owner against any and all present and future royalties or claims for infringement or damage of any nature whatsoever resulting from the installation or utilization by the Contractor during the course of this work of any patent, articles, processes and designs.

### ARTICLE 4

## ADMINISTRATION OF THE CONTRACT

### 4.2 ENGINEER'S ADMINISTRATION OF THE CONTRACT

(Add the following sentence to the end of Sub-Section 4.2.1:)

The Owner shall not be responsible for any explanation or interpretation of the Contract Documents.

### 4.3 CLAIMS AND DISPUTES

4.3.8.2 Delete this paragraph and substitute the following:

“If adverse weather conditions are the basis for a claim for additional time, the Contractor shall document that weather conditions had an adverse effect on the scheduled construction and critical path of construction activities. An increase in the contract time due to weather shall not be cause for an increase in the contract sum.”

Note: Adverse weather conditions shall not be considered as a basis of claim for additional time involving interior work.

## ARTICLE 7 CHANGES IN THE WORK

### 7.2 CHANGE ORDERS

(Delete 7.2.2 and substitute the following:)

The cost to the Owner resulting from a change in the work shall be the sum of:

Material and Labor Cost  
Sub-Contract Costs  
Overhead and Profit.

The credit to the Owner resulting from a change in the work shall be the sum of:

Material and Labor Cost  
Sub-Contract Costs  
Credit will not be required for Overhead and Profit.

Before a Change Order is prepared, the Contractor shall provide and deliver to the Engineer the following information within 10 days after being notified to prepare said Change Order:

An itemized list of material costs and labor costs for all Sub-Contract work.

An itemized list of material costs and labor costs for all contractor's work.

Overhead and Profit shall be computed by one of the following methods:



- .1 When all of the work is General Contract work; 15% of the cost of the work as defined hereafter, up to a total Change Order price of less than \$20,000.00.
- .2 When the work is all Sub-Contract work; 15% of the cost of the work for Sub-Contractor's Overhead and Profit, plus 10% of the cost of the work for General Contractor's Overhead and Profit, up to a total Change Order price of less than \$20,000.00.
- .3 When the work is a combination of General Contract work and Sub-Contract work; 15% of the cost of Sub-Contract work for Sub-Contractor's Overhead and Profit, plus 10% of the cost of the Sub-Contract work for General Contractor's Overhead and Profit, plus 15% of the cost of General Contract work for General Contractor's Overhead and Profit, up to a total Change Order price of less than \$20,000.00.

When the total Change Order price exceeds \$20,000.00, Subcontractor's mark-up shall be 10% and 5% of subcontract work for General Contractor's overhead and profit, and the General Contractor's mark-up shall be 8% for overhead and profit for general contract work.

The Contractor shall include extensions in time with Change Order requests.

Cost of the work for the purpose of Change Orders shall be costs necessarily incurred in performance of the work and paid by the Contractor, which shall consist of:

- .1 Wages paid for Labor at cost consistent with those prevailing in the area.
- .2 Cost of all materials and supplies at cost consistent with those prevailing in the area.
- .3 Cost of necessary machinery and equipment rental, exclusive of labor, used at the site of the work at rental charges consistent with those prevailing in the area.
- .4 Cost of applicable taxes, insurance, fringe benefits under collective bargaining, unemployment compensation, social security, old age and unemployment contributions and additional premiums for all bonds.

Sub-contract cost shall consist of the items in above, plus Overhead and Profit as defined in above.

Cost of the work, whether General Contract cost or Sub-Contract cost, shall not apply to the following:

Salaries or other compensation of the Contractor's personnel at the Contractor's principal office and branch offices.

Expenses of the Contractor's principal office, branch office, and the field office.

Any part of the Contractor's capital expenses, including interest on the Contractor's capital employed for the work.

Overhead and general expenses of any kind, or the cost of any item not specifically and expressly included above in the Cost of Work.

Costs due to the negligence of the Contractor, any Sub-Contractor, anyone directly employed by any of them, or for whose acts any of them may be liable, including but not limited to the correction of defective or non-conforming work, disposal of materials and equipment wrongly supplied, or making good any damage to property.

When applicable, as provided by the contract, the cost to the Owner for Change Orders shall be determined by quantities and unit prices. The quantity of any item shall be as submitted by the Contractor and approved by the Engineer. Unit prices shall cover cost of Material, Labor, Equipment, Overhead and Profit.

## ARTICLE 8 TIME

### 8.1 DEFINITIONS

(Delete Sub-Section 8.1.2, and substitute the following:)

The date of commencement of the Work is the date established in a “Written Notice to Proceed”. If there is no Notice to Proceed, it shall be the date of the Owner-Contractor Agreement or such other date as may be established therein.

### 8.2 PROGRESS AND COMPLETION

(Delete Sub-Section 8.2.1, and substitute the following:)

Time is of the essence and completion of the work must be within the time stated in the contract, subject to such extensions as may be granted under Section 8.3, and the Contractor waives and dispenses with any requirement for a putting in default. The Contractor agrees to commence work not later than 10 days after the date of Written Notice to Proceed from the Owner, and to substantially complete the project within the time stated in the contract. The Owner will suffer financial loss if the project is not substantially complete in the time set forth in the Contract Documents. The Contractor and his Surety shall be liable for and shall pay to the Owner the sum stated in the Contract Documents as fixed, agreed and Liquidated Damages for each consecutive calendar day (Saturdays, Sundays and holidays included) of delay until the work is substantially complete.

### 8.3 DELAYS AND EXTENSIONS OF TIME

8.3.1 On line 10 after the word “may” delete “determine” and add the following: recommend, subject to Owner’s approval of Change Order. If the claim is not made within the limits of subsection 4.3.2, all rights for future claims for that month are waived.”

Any request for extensions of time based on “Rain Days” must indicate how these conditions had an adverse effect on subject project and the project’s overall critical path. The Contractor shall make every effort to restructure schedule as not to cause an extension of the critical path.

Extensions of time will not be considered for interior work.

## ARTICLE 9

## PAYMENTS AND COMPLETION

### 9.2 SCHEDULES OF VALUES

(Delete Sub-Section 9.2.1, and substitute the following:)

At the pre-construction conference, the Contractor shall submit to the Owner and the Engineer a Schedule of Values, prepared as follows:

The Schedule of Values form of submittal shall be on 8-1/2" x 11" sheets of white paper.

Use the Table of Contents of this Specification as a basis for format for listing costs of work for Sections under DIVISION 1 through 16. Use each Section Number under each DIVISION for sub-titles. Each Section shall be a separate line item (with overhead and profit).

Round off cost figures to the nearest ten (10) dollars. The total of all items shall equal the total contract sum. This Schedule, when approved by the Owner and Engineer, only shall be used as a basis for the Contractor's Application for Payment.

### 9.3 APPLICATIONS FOR PAYMENT

(Delete Sub-Section 9.3.1, and substitute the following:)

The Contractor shall submit to the Engineer an itemized Application for Payment, notarized if required, supported by such data substantiating the Contractor's right to payment as the Owner or the Engineer may require. Application for Payment shall be submitted on or about the first of each month for 90% of the value of labor and materials incorporated in the work, and materials suitably stored at the site as of the 25th day of the preceding month. The 10% normal retainage shall not be due the Contractor until expiration of the 30-day lien period and submission to the Engineer of a Clear Lien Certificate.

(In Sub-Section 9.3.2, make the following changes:)

Delete the second sentence.

In the third sentence, delete the words "...or off," and the last phrase, "... and shall include applicable insurance, storage and transportation to the site for such materials and equipment stored off the site."

### 9.5 DECISIONS TO WITHHOLD CERTIFICATION

(Add the following Sub-Section 9.5.3:)

The Owner shall have the right to act as agent for the Contractor in disbursing funds withheld pursuant to this Article, to the party or parties entitled to payment. The Owner will render to the Contractor an account of funds so disbursed.

### 9.8 SUBSTANTIAL COMPLETION

9.8.1 Delete on Line 1 "or designated portion thereof".

9.8.2 On Line (5) after "corrected" add the following sentence:

“Prior to inspection by the Engineer, the Contractor shall notify the Engineer that the project is ready for inspection by the State Fire Marshal’s office.” The Engineer shall determine if the project is substantially complete in accordance with Subparagraph 9.8.1.”

Delete the words “or designated portion thereof” wherever they appear in Subparagraph 9.8.2 above. Add the following clause 9.8.2.1:

9.8.2.1 “Upon the recommendation of the Engineer, the Owner may issue a Notice of Acceptance or Substantial Completion of Building Contract which the Contract will record with the Clerk of Court in the Parish in which the work has been performed. If the notice of Acceptance has not been recorded (7) days after issuance, the Owner may record the acceptance at the Contractor’s expense.”

Add the following clause 9.8.2.2:

9.8.2.2 A “punch list of “exceptions” and the dollar value related there-to will be prepared by the Engineer. A monetary value will be assigned to this list, which is to be twice the estimated actual value of the work. Cost of these items shall be prepared in the same format as the scheduled of values. None of these funds shall be due the Contractor until all punch list items are completed and are accepted by the Engineer. If the dollar value of the punch list exceeds the amount of funds, less the retainage amount in the remaining balance of the Contract, then the project shall not be accepted as substantially complete. “If funds remaining are less than that required to complete the work, the Contractor shall pay the difference.” If delivery of material or equipment, required as part of the punch list work, that is beyond the control of the Contractor, the Contractor’s completion time shall be extended and his surety so notified. If all punch list items have not been completed by the end of the 30 day lien period, through no fault of the Engineer or Owner, the Owner may hold the Contractor in default. If the Owner finds the Contractor is in default, the Surety shall be notified. If within 60 days after notification, the surety has not taken reasonable steps to complete the punch list, the Owner may, at his option, contract to have the balance of the work completed, and pay for such work with the unpaid funds remaining in the Contract sum.

(Add the following as Sub-Section 9.8.4:)

Upon recommendation of the Engineer, the Owner will issue a Notice of Acceptance of Building Contract for the Contractor to record with the Clerk of Court in the Parish in which the work has been performed.

(Add the following as Sub-Section 9.8.5:)

A “Punch List” of “exceptions”, and the dollar value related thereto, will be prepared. A monetary value will be assigned to each item so that a “special” retainage can be withheld in addition to the normal 10% retainage for exceptions to acceptance.

## 9.10 FINAL COMPLETION AND FINAL PAYMENT

9.10.1 On Line 12 after “payable” add the following:

“If the Engineer does not find the work acceptable under the Contract Documents, he shall make one additional inspection; if the work is still not acceptable, the Engineer shall be paid \$150.00/hour for his time and each of this principal consultants for time at project site, for each

additional inspection to be withheld from the unpaid funds remaining in the Contract sum.” The payment shall be made by the owner and deduction from the construction contract funds.

(In Sub-Section 9.10.2, completely deleted the part of the sentence following (5) and substitute the following:)

The Contractor shall record the Acceptance in the Parish in which the work has been performed, and shall furnish a Clear Lien Certificate from the Clerk of Court 30 days after recordation of Acceptance.

## ARTICLE 11 INSURANCE

### 11.1 CONTRACTOR’S LIABILITY INSURANCE

(Add the following to Sub-Section 11.1.2:)

The Contractor shall, before commencing any work to be conducted under this contract, procure Workmen’s Compensation and Employer’s Liability Insurance with an insurance company authorized to write such policies of insurance in the State of Louisiana. It shall be the further responsibility of the Contractor to require that all Sub-Contractors have in full force and effect a policy of Workmen’s Compensation and Employer’s Liability Insurance before proceeding with any of the work required under this contract. Further, the Contractor shall procure and maintain, during the life of this contract, Public Liability and Property Damage Insurance, (including products and completed operations coverage) and additionally will insure the operation of motor vehicles, with limits as hereinafter provided, which will cover the Contractor’s, the Owner’s, and the Engineer’s legal liability arising out of the work performed by the Contractor and any Sub-Contractor, and by anyone directly or indirectly employed by either of them for claims for damages for personal injury, including accidental death, as well as claims for property damages, which may arise from operations under this contract. Insurance shall be with a reliable company (having A-Vill or B+X or better rating in Best’s Key Rating Guide, and it also must currently be in the Treasury Financial Management Service list) of the Contractor’s choice, acceptable to and approved by the Owner’s and authorized to do business in the State of Louisiana.

Contractor shall provide a Certificate of Insurance naming Winn Parish Public Defender and the ENGINEER as an additional insured for automobile policies herein required for this particular project.

Insurance coverage specified in the General Conditions (AIA Document A201, 2007 edition) to be provided by the Contractor, and any other insurance described below, shall be furnished with the following minimum limits:

Workmen’s Compensation (Clause 11.1.1.1)	
Applicable State	Standard Louisiana
Employer’s Liability	\$500,000

Contractor’s Liability Insurance (Clauses 11.1.1.2, 11.1.1.3, and 11.1.1.4), including Contractual Liability (Sub-Paragraph 11.1.3): Form of insurance shall be Comprehensive General Liability.

Bodily Injury, Proper Damage, and Personal Injury:  
Each Occurrence                      \$1,000,000  
Aggregate                              \$1,000,000 per construction location

Automobile Liability (Owned, Non-Owned, Hired)  
Combined Single Limit              \$500,000

XCU Coverage - Remove Exclusions

Umbrella Policy - Contractor shall procure and maintain during the life of this contract an Umbrella Policy in the amount of \$2,000,000.

#### 11.2 OWNER'S LIABILITY INSURANCE

(Delete in its entirety and Substitute the following:

The Contractor shall purchase and maintain until final acceptance of the work, and Owner's Protective Liability Policy on behalf of Winn Parish Public Defender covering this project specifically in which the Engineer and his consultants shall be named as an additional insured, protecting the insured against liability arising from operations under this Contract. This Policy shall be maintained in the same company as the Contractor's General Comprehensive Liability Policy referred to in this Article 11. This policy shall not cover liability arising from errors in Drawings and Specifications prepared by the Engineer. The policy shall provide the same minimum limits as the Contractor's Comprehensive General Liability Policy for bodily injury and property damage, including the limits of the Umbrella Policy. Unless it is otherwise specified in the Contract Documents, the contractor will indemnify the Owner for any sums that the Owner may be called upon to pay by reason of the deductible clause contained within the said Owner's Protective Liability Policy."

#### 11.3 PROPERTY INSURANCE

(Delete 11.3.1, 11.3.1.1, 11.3.1.2, 11.3.1.3, 11.3.1.4 and substitute the following:)

The Owner shall provide and pay for Builder's Risk Insurance to protect the Owner, Contractor and their Sub-Contractors, as their interests may appear. The policy is subject to a \$2,500 deductible per claim for loss or damage, which will be paid by the Contractor.

This policy insures against direct loss or damage caused by fire, lightning, windstorm, cyclone, tornado, hail, explosion, riot attending a strike, civil commotion, vehicles, aircraft or objects falling from aircraft, smoke due to sudden faulty and unusual operation of any heating or cooling unit on the premises insured, vandalism and malicious mischief, discharge-leakage-or overflow of water from a plumbing system-overhead tanks-hot water heating pipes-radiators-standpipes for fire hose-sprinkler systems-or by bursting water pipes-boilers-or tanks within the premises, and against all risks of physical loss or damage to the property covered while in transit, subject to certain exclusions.

#### 11.4 PERFORMANCE BOND AND PAYMENT BOND

(Delete Sub-Section 11.4.1 and 11.4.2 in its entirety, and substitute the following:)

11.4.1 The Contractor shall furnish and pay for a Performance Bond and Labor and Material Payment Bond of a company qualified to do business in the State of Louisiana, which is acceptable to and in form approved by the Owner, each bond in an amount equal to 100% of the contract sum, as security for the true and faithful performance of the contract, and the payment in full of all Sub-Contractors and persons performing labor, services, materials, machinery and fixtures in connection with the work.

The Surety Bond shall be bound in solido with the Contractor. The executed bonds, together with the bonding agent's Power of Attorney, shall be furnished to the Owner along with the executed contract, and the number of copies reasonably required by him. The bonds shall provide that the surety waives the requirement of notice of any change in the work which does not exceed 20% of the contract amount, and of any extension of time granted to the Contractor. The Contractor shall deliver the required bonds to the Owner no later than the date of execution of the contract.

The Contractor may, at his option and cost, effect additional insurance which will protect the interests of himself and his Sub-Contractors in the work. If not covered under the insurance provided in the Contract Documents.

(Add the following Sub-Section 11.4.2:)

11.4.2 Recordation of Contract and Bond

The Contractor shall record the Contract Between Owner and Contractor, and Performance and Payment Bond with the Clerk of Court in the Parish or County in which the work is to be performed.

ARTICLE 13

MISCELLANEOUS PROVISIONS

13.2 SUCCESSORS AND ASSIGNS

(Eliminate the second and third sentences in Sub-Section 13.2.1 and substitute the following:)

There shall be no assignment of the contract.

13.5 TESTS AND INSPECTIONS

(Add to Sub-Section 13.5.2.) The Contractor is responsible for concrete design mixes specified under DIVISION 3 of the Contract Documents.

13.6 INTEREST

(Delete Sub-Section 13.6.1, and substitute the following:)

There shall be no payment of interest on money owed.

ARTICLE 14

TERMINATION BY THE OWNER

14.2 TERMINATION BY THE OWNER

(Add the following Sub-Section:)

14.25 If an agreed sum of Liquidated Damages has been established, termination by the Owner under this Article will not relieve the Contractor of his obligations under the Liquidated Damages provisions, and the Contractor shall be liable to the Owner for per diem Liquidated Damages as stated on the Bid Proposal Form.

END OF SECTION SC



# LOUISIANA UNIFORM PUBLIC WORK BID FORM

**TO:** State of Louisiana Office of the Public  
Defender District 8 Winn Parish  
111 West Main  
Winnfield, La 71483  
*(Owner to provide name and address of owner)*

**BID FOR:** Office Building  
For Winn Parish Public Defender  
*(Owner to provide name of project and other identifying information)*

The undersigned bidder hereby declares and represents that she/he; a) has carefully examined and understands the Bidding Documents, b) has not received, relied on, or based his bid on any verbal instructions contrary to the Bidding Documents or any addenda, c) has personally inspected and is familiar with the project site, and hereby proposes to provide all labor, materials, tools, appliances and facilities as required to perform, in a workmanlike manner, all work and services for the construction and completion of the referenced project, all in strict accordance with the Bidding Documents prepared by: C.D. Morgan & Associates, Inc. and dated: May 15<sup>th</sup>, 2026. *(Owner to provide name of entity preparing bidding documents.)*

Bidders must acknowledge all addenda. The Bidder acknowledges receipt of the following **ADDENDA:** (Enter the number the Designer has assigned to each of the addenda that the Bidder is acknowledging) \_\_\_\_\_.

**TOTAL BASE BID:** For all work required by the Bidding Documents (including any and all unit prices designated "Base Bid" \* but not alternates) the sum of:

Dollars (\$ \_\_\_\_\_)

**ALTERNATES:** For any and all work required by the Bidding Documents for Alternates including any and all unit prices designated as alternates in the unit price description.

**Alternate No. 1** *(Owner to provide description of alternate and state whether add or deduct)* for the lump sum of:

\_\_\_\_\_ Dollars (\$ \_\_\_\_\_)

**Alternate No. 2** *(Owner to provide description of alternate and state whether add or deduct)* for the lump sum of:

\_\_\_\_\_ Dollars (\$ \_\_\_\_\_)

**Alternate No. 3** *(Owner to provide description of alternate and state whether add or deduct)* for the lump sum of:

\_\_\_\_\_ Dollars (\$ \_\_\_\_\_)

**NAME OF BIDDER:** \_\_\_\_\_

**ADDRESS OF BIDDER:** \_\_\_\_\_

**LOUISIANA CONTRACTOR'S LICENSE NUMBER:** \_\_\_\_\_

**NAME OF AUTHORIZED SIGNATORY OF BIDDER:** \_\_\_\_\_

**TITLE OF AUTHORIZED SIGNATORY OF BIDDER:** \_\_\_\_\_

**SIGNATURE OF AUTHORIZED SIGNATORY OF BIDDER \*\*:** \_\_\_\_\_

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

**THE FOLLOWING ITEMS ARE TO BE INCLUDED WITH THE SUBMISSION OF THIS LOUISIANA UNIFORM PUBLIC WORK BID FORM:**

\* The Unit Price Form shall be used if the contract includes unit prices. Otherwise, it is not required and need not be included with the form. The number of unit prices that may be included is not limited and additional sheets may be included if needed.

\*\* **A CORPORATE RESOLUTION OR WRITTEN EVIDENCE** of the authority of the person signing the bid for the public work as prescribed by LA R.S. 38:2212(B)(5).

**BID SECURITY** in the form of a bid bond, certified check or cashier's check as prescribed by LA R.S. 38:2218(A) attached to and made a part of this bid.

## SECTION 01005

### ADMINISTRATIVE PROVISIONS

#### PART 1 - GENERAL

##### 1.1 REQUIREMENTS INCLUDED

- A. Title of work, and type of contract.
- B. Work Sequence.
- C. Contractor Use of Premises.
- D. Reference Standards.
- E. Disposal of Material.
- F. Demolition.
- G. Coordination.
- H. Drawings.

##### 1.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. Work of this Contract comprises general construction including mechanical and electrical of Office Building for Winn Parish Public Defender - CDMorgan & Associates, Inc.

##### 1.3 CONTRACT METHOD

- A. Construct the Work under a single lump sum contract.

##### 1.5 WORK SEQUENCE

- A. Construct work during specified work hours and accommodate Owner's occupancy requirements during the construction period. Coordinate construction schedule and operations with Engineer.

##### 1.6 CONTRACTOR USE OF PREMISES

- A. The Owner must have limited use of existing facilities at all times during construction.
- B. Electrical shut-downs if necessary, must be scheduled in advance with the Owner and shall be done during non-critical times designated by the Owner.

- C. The Contractor shall be responsible for overtime work necessary to accomplish shut downs at non-critical times, and no extra compensation will be allowed.
- D. Contractor shall keep the site and building clean at all times.
- E. Contractor's personnel shall not use any of the Owner's restrooms, lobbies at any time.
- F. Disposal of volatile wastes (such as mineral spirits, oil, or paint thinner) in storm or sanitary sewer systems or into streams or waterways is not permitted.
- G. Emergency and fire exits shall be maintained at all times.
- H. Contractor shall be cognizant of the nature of the Owner's facility and shall devote special attention to the need for safety.
- I. No use of Tobacco Products shall be allowed within facility by any employees of the Contractor. Contractor shall dismiss those found violating this regulation.
- J. Access to the building shall be limited to areas as determined by the Owner prior to beginning construction.
- K. Contractor may place a dumpster only at designated area near service drive to be determined by Owner.
- L. Conflicts: Where a conflict exists between codes, standards, Contract Documents, or any combination of, the most stringent requirements shall apply. Should requirements for any item or method appear in any one area or category of Construction Documents, the item or method shall be incorporated into the Work even if not appearing in any other document.
- M. Contractor shall verify all measurements of any existing condition and shall be responsible for their correctness.
- N. The demolished equipment shall be disposed of by the Contractor. Contractor shall pay for all associated fees.
- 1.7 COORDINATION
  - A. Coordinate work of the various Sections of Specifications to assure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items installed later.
  - B. Verify characteristics of elements of interrelated operating equipment are compatible; coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

- C. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduits, as closely as practicable; make runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. In finished areas except as otherwise shown, conceal pipes, ducts, and wiring in the construction. Coordinate locations of fixtures and outlets with finish elements.
- E. Execute cutting and patching to integrate elements of Work, uncover ill-timed, defective, and non-conforming work, and provide openings for penetrations of existing surfaces. Seal penetrations through floors, walls, and ceilings.
- F. Asbestos: If Contractor uncovers any asbestos, they are to notify the Owner via the Engineer for its removal. Contractor will coordinate with Asbestos Contractor if required.

#### 1.8 REFERENCE STANDARDS

- A. For products specified by association or trade standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. The date of the standard is that in effect as of the bid date unless noted specifically otherwise.
- C. Obtain copies of standards when required by Contract Documents. Maintain copy at job site during progress of the specific work.

#### 1.9 DISPOSAL OF MATERIAL

- A. The Owner shall have first salvage rights to any material or equipment removed from site.
- B. All salvable material that is not scheduled for re-use in this contract shall become the property of the Contractor and shall be removed from the site by the Contractor.
- C. Non-salvable material, debris and rubble shall be hauled to the City Disposal Area by the Contractor at his cost.
- D. Removals shall be disposed of as soon as practical, and material shall not be allowed to accumulate whether inside or outside the building.
- E. Salvable material shall be relocated by the Contractor as directed by Owner within the boundaries of the facility.

## 1.10 DEMOLITION

- A. The Contractor shall perform all demolishing necessary or required to complete the work shown on the drawings or described in the specifications. Take special precautions to protect existing work which is to remain in place or to replace or repair any damage to such work. Maintain existing fire ratings accordingly.

## PART 2 - PRODUCTS

Not Used.

## PART 3 - EXECUTION

Not Used.

END OF SECTION 01005

## SECTION 01065

### GENERAL REQUIREMENTS

#### PART 1 – GENERAL

- A. Approval of working surface: Any contractor or subcontractor performing work over the work of other contractors or subcontractor shall notify the Engineer of any unsatisfactory condition. Beginning of work by any contractor or subcontractor shall constitute his acceptance of the previous work by other contractors.
- B. Checking Dimensions at Site: Before ordering any materials or doing any work, verify all measurements of the building and be responsible for the correctness of them. No extra will be allowed by variations from drawings in existing conditions or for work performed under this contract. Any discrepancies found shall be submitted to the Engineer for instructions before proceeding.
- C. Cutting and Patching: No excessive cutting will be permitted, nor shall any structural members be cut without the approval of the Engineer. Each Contractor shall leave all chases and openings necessary for the proper installation of his and/or other contractor's work. After such work has been installed, he shall carefully fit around, close up, repair, patch and point up same as directed, to the entire satisfaction of the Engineer.
- D. Inspection and Tests: Engineer and his representatives shall at all times have access to the work whether it is in preparation or progress. Provide proper and safe facilities for such access and inspection. Make all inspections and tests in connection with this entire contract as required by the Engineer.
- E. Temporary Protection:
  - 1. Provide temporary protection as may be required to protect humans and property from injury during all phases of construction. Such protection shall provide access to the building during all normal scheduled work hours. The Contractor shall be responsible for any injury or damages resulting from improper protection.
  - 2. Provide temporary protection as may be required to protect existing building and contents while new work is being performed. Under no circumstances will any existing work or existing contents be left unprotected from weather or construction while new work is in progress. Be responsible for any damage to trees and shrubs to building or contents resulting from improper protection.

- F.     Cleaning Up: Leave all areas in clean condition; remove from the site all waste material, lumber, debris, etc.
- G.     Manufacturer's Recommendation: Manufacturer's recommendations shall be strictly adhered to. If for any reason, they cannot be followed, the Contractor shall notify the Engineer in writing. The Contractor shall not proceed with that portion of the work until he has received written authorization from the Engineer; which will be made promptly, so as not to cause undue delay in the completion schedule.
- H.     Overlapping Requirements: Where compliance with 2 (or more) sets of requirements is drawn or specified, and overlapping of those requirements establishes 2 different levels or minimums for a particular quality, the more stringent level will be enforced (which is generally the more costly of the 2 levels). Refer instances of different-but-equal requirements to the Engineer for decision. Refer instances of uncertainty as to which of 2 levels of quality is more stringent to the Engineer for decisions.
- I.     Specification Minimum: In every instance, the specified requirements is the minimum to be performed or fulfilled. Except as otherwise specifically indicated, the actual work may either comply exactly with that minimum (within specified tolerances), or may exceed that minimum within reasonable limits. In complying with minimum requirements, the indicated numeric values are either minimums or maximums as noted or as appropriate for the context of the requirements. Refer instances of uncertainty to the Engineer for decision.
- J.     Pre-Construction Conference: The Engineer shall notify the Owner and the Contractor in writing of the time and place of a pre-construction conference to be held within seven (7) days after the signing of the contract. The contractor will submit three (3) copies of the following not later than the time of the pre-construction conference:
1.   List of material suppliers
  2.   Construction Cost Breakdown (Schedule of Values)
  3.   Construction Schedule
  4.   Insurance Certificate
- K.     Notice to Proceed: Upon satisfactory completion of the pre-construction conference along with the approval of the above referenced information the Contractor will be sent a written Notice to Proceed with construction from the Engineer.

- L. Project Meetings: The Engineer shall establish and conduct a meeting, to be held on the job site ten days into the project. The Owner shall be notified of such a meeting, and may be authoritatively represented. The purpose of this meeting is to assess realistically the current status and progress of the work so that the project can be completed within the contract time.
- M. Workmanship Standards: Comply with the recognized workmanship quality standards within the industry as applicable to each unit of work, including ANSI standards where applicable. It is a requirement that each category of tradesman or installer performing the work be pre-qualified, to the extent to being familiar with the applicable and recognized quality standards for his category of work, and being capable of workmanship complying with those standards.
- N. Product Delivery - Storage - Holding: Handle, store and protect materials and products, including fabricated components, by methods and means which will prevent damage, deterioration and losses (and resulting delays) thereby ensuring highest quality results as the performance of the work progresses. Control delivery schedules so as to minimize unnecessary long-term storage at the project site prior to installation.
- O. Contractor: Furnish, install and maintain temporary air conditioning within the limits of construction. Portacool units are allowed. 72°F must be maintained.
- P. Dust Containment: Temporary metal stud and sheet rock partition shall be constructed in corridor at the location indicated on the construction documents. Contractor shall utilize and maintain a 1000 CFM with variable speed capacity and HEPA filtration ducted to and through outside wall to create a negative air pressure in the construction zone. Door shall have closure panic hardware.

END OF SECTION 01065



## SECTION 01 26 00

### CONTRACT MODIFICATION PROCEDURES

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

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

##### 1.2 SUMMARY

- A. This section specifies administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Sections: The following sections contain requirements that relate to this section:

##### 1.3 MINOR CHANGES IN THE WORK:

- A. The Architect will issue supplemental instructions authorizing minor changes in the Work, not involving an adjustment to the Contract Sum or Contract Time, on AIA Form G 710, Architect's Supplemental Instructions.

##### 1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Proposed changes in the Work that will require adjustment to the Contract Sum or Contract Time will be issued by the Architect with a detailed description of the proposed change and supplemental or revised Drawings and Specifications, if necessary.
  - 1. Proposal Requests issued by the Architect are for information only. Do not consider them an instruction either to stop work in progress, or to execute the proposed change.
  - 2. Unless otherwise indicated in the proposal request, within 14 days of receipt of the Proposal Request, submit to the Architect for the Owner's review a quotation estimating costs necessary to execute the proposed change.
    - a. Include a list of quantities of products required or eliminated and unit costs, along with the total amount of purchases and credits to be made. Where 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 a statement indicating the effect the proposed change in the Work will have on the Contract Time. Use available total float before requesting an extension of Contract Time.
- B. Contractor-Initiated Change Order Proposal Requests: When latent or other unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the Architect.

1. Include a statement outlining the 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 Contract Time.
  2. Include a list of quantities of products required or eliminated and unit costs along with the total amount of purchases and credits to be made. Where 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 relationships. Use available total float before requesting an extension of the Contract Time.
  6. Comply with requirements of Division 1 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.
- C. Proposal Request Form: Use AIA Document G 709 for Change Order Proposal Requests.

#### 1.5 CHANGE ORDER PROCEDURES

- A. Upon the Owner's approval of a Change Order Proposal Request, the Architect will issue a Change Order for signatures of the Owner and Contractor on AIA Form G 701.

#### 1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: When the Owner and Contractor are not in total agreement on the terms of a Change Order Proposal Request, the Architect may issue a Construction Change Directive on AIA Form G 714, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
1. The Construction Change Directive will contain a complete description of the change in the Work and designate the method to be followed to determine change in the Contract Sum or 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 the change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 26 00

## SECTION 01 32 33

### PHOTOGRAPHIC DOCUMENTATION

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

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

##### 1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for project meetings including but not limited to:
  - 1. Pre-Construction photographs.
  - 2. Periodic Construction photographs
  - 3. Pre-Construction videotapes.
- B. Related Sections include the following:
  - 1. Division 01 Section "Demonstration and Training" for submitting video recordings of demonstration of equipment, systems, and training of Owner's personnel at Project completion.
  - 2. Division 02 Section "Selective Demolition" for photographic documentation before selective demolition operations commence.

##### 1.3 SUBMITTALS

- A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph or videotape. Indicate elevation or story of construction. Include same label information as corresponding set of photographs or videotape.
- B. Construction Photographs: Submit two prints of each photographic view within seven days of taking photographs.
  - 1. Size of photographs shall be sufficient to show necessary detail in question however in no case shall the size of photographs be less than 4" x 6".
  - 2. Mount on linen or card stock or within enclosed plastic sleeves.
  - 3. Identify each print with applied label on reverse or rubber-stamped impression with the following information:
    - a. Name of Project.
    - b. Date photograph was taken if not date stamped by camera.
    - c. Unique sequential identifier.
  - 4. Digital Images: If digital images are used, submit a complete set of digital images on electronic file on CD-Rom in JPEG format. Identify electronic media with date photographs were taken.

- C. Videotapes: Submit two copies of each videotape with protective sleeve or case within seven days of recording. Remove safety tab to prevent accidental re-recording.
  - 1. Identification: On each copy, provide an applied label with the following information:
    - a. Name of Project.
    - b. Date videotape was recorded.
    - c. Description of vantage point, indicating location, direction, and elevation of story or construction.

#### 1.4 COORDINATION

- A. General: Cooperate with photographer and provide auxiliary services requested including access to Project site and use of temporary facilities, including temporary lighting required to produce clear, well-lit photographs without obscuring shadows.

#### 1.5 USAGE RIGHTS

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

### PART 2 - PRODUCTS

#### 2.1 PHOTOGRAPHIC MEDIA

- A. Digital Images: Provide images in uncompressed JPEG format, produced by a digital camera with minimum sensor size of 8.0 megapixels, and at an image resolution of not less than 3200 by 2400 pixels.
- B. Videotape Format: Provide high-resolution, digital video disc in format acceptable to Architect.

### PART 3 - EXECUTION

#### 3.1 CONSTRUCTION PHOTOGRAPHS (**ADA1.4.4**)

- A. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alterations, manipulation, editing, or modifications using image-editing software.
  - 1. Date and time: Indicate date and time in file name for each image.
  - 2. Field Office Images: maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in same manner as those submitted to Architect.
- B. Preconstruction Photographs: Before commencement of any demolition operations or any construction operations on site, schedule a pre-construction site survey with a Jackson Parish Hospital representative so that any such elements needing repair, or which has already been damaged in any manner, may be properly identified, described, and recorded with Jackson Parish Hospital.
  - 1. If no such damage is recorded, then any structures over which has been crossed during construction which are later found to be damaged shall be considered to have been so damaged by him and shall be repaired and/or replaced by the Contractor as necessary to return them to their original condition to the satisfaction of Jackson Parish Hospital at no cost to the Owner.

2. Take color digital photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, to effectively document conditions of existing components in immediately vicinity of new work to occur.
3. Take photographs to show existing conditions adjacent to property before starting Work.
4. Take photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
5. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.
6. Record and document fully all measures of tree protection and erosion and sedimentation control measures established at the commencement of the Project.

### 3.2 CONSTRUCTION VIDEO RECORDINGS

- A. Preconstruction Videotape: Before commencement of any demolition operations or any construction operations on site, record video of Project site and surrounding properties from different vantage points, to effectively document conditions of existing components in immediately vicinity of new work to occur.
  1. Flag construction limits before recording construction video recordings.
  2. Show existing conditions adjacent to Project site before starting the Work.
  3. Show existing buildings either on or adjoining Project site to accurately record physical conditions at start of the Project.
  4. Show protection efforts by Contractor.

END OF SECTION 01 32 33

## SECTION 01 50 00

### 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. This Section includes requirements for construction facilities and temporary controls, including temporary utilities, support facilities, and security and protection.
- B. Related Sections include the following:
  - 1. Division 01 Section "Summary" for limitations on utility interruptions and other work restrictions.
  - 2. Division 01 Section "Execution" for progress cleaning requirements.
  - 3. Division 02 thru 49 Sections for temporary heat, ventilation, and humidity requirements for products in those Sections.
- C. Temporary utilities include, but are not limited to, the following:
  - 1. Water service and distribution.
  - 2. Temporary electric power and light.
  - 3. Temporary heat.
  - 4. Ventilation.
  - 5. Telephone service.
  - 6. Sanitary facilities, including drinking water.
- D. Support facilities include, but are not limited to, the following:
  - 1. Field offices and storage sheds.
  - 2. Temporary enclosures.
  - 3. Temporary project identification signs and bulletin boards.
  - 4. Waste disposal services.
  - 5. Rodent and pest control.
  - 6. Construction aids and miscellaneous services and facilities.
- E. Security and protection facilities include, but are not limited to, the following:
  - 1. Temporary fire protection.
  - 2. Barricades, warning signs, and lights.
  - 3. Environmental protection.

##### 1.3 INFORMATIONAL SUBMITTALS

- A. Erosion and Sedimentation Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

## 1.4 QUALITY ASSURANCE

- A. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:
  - 1. Building code requirements.
  - 2. Health and safety regulations.
  - 3. Utility company regulations.
  - 4. Police, fire department, and rescue squad rules.
  - 5. Environmental protection regulations.
- B. Standards: Comply with NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations," ANSI A10 Series Standards for "Safety Requirements for Construction and Demolition," and NECA Electrical Design Library "Temporary Electrical Facilities."
  - 1. Electrical Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 "National Electric Code."
- C. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

## 1.5 PROJECT CONDITIONS

- A. Temporary Utilities: At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of permanent service.
- B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the Work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.
- C. 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 the Owner's acceptance, regardless of previously assigned responsibilities.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. General: Provide new materials. If acceptable to the Architect, the Contractor may use undamaged, previously used materials in serviceable condition. Provide materials suitable for use intended.
- B. Lumber and Plywood: Comply with requirements in Division 6 Section "Rough Carpentry."
  - 1. For signs and directory boards, provide exterior-type, Grade B-B high-density concrete form overlay plywood of sizes and thicknesses indicated.
- C. Paint: Comply with requirements of Division 9 Section "Painting."
  - 1. For sign panels and applying graphics, provide exterior-grade alkyd gloss enamel over exterior primer.
- D. Water: Provide potable water approved by local health authorities.

- E. Short-Term Open Mesh Fencing: Provide orange open mesh, co-polymer fabric safety fencing 6-feet high with galvanized steel pipe posts, 1-1/2" I.D. for line posts and 2-1/2" I.D. for corner posts. Safety fence material shall have aperture size of approximately 1.5 inch x 1.5 inch. Minimum tensile strength shall not be less than 600 pounds per foot of width. Material shall be fully stabilized for ultraviolet light resistance.
- F. Dust-Control Adhesive-Surface Walk-Off Mats: Provide mats minimum 36 by 60 inches.

## 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 construction personnel and to accommodate Project meetings. 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 board.
  - 3. Drinking water and private toilet.
  - 4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
  - 5. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.
- 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. General: Provide new equipment. If acceptable to the Architect, the Contractor may use undamaged, previously used equipment in serviceable condition. Provide equipment suitable for use intended.
- B. Water Hoses: Provide 3/4-inch (19-mm), heavy-duty, abrasion-resistant, flexible rubber hoses 100 feet (30 m) long, with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge.
- C. Electrical Outlets: Provide properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-Volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment.
- D. Electrical Power Cords: Provide grounded extension cords. Use hard-service cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
- E. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered-glass enclosures where exposed to breakage. Provide exterior fixtures where exposed to moisture.
- F. 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. Provide temporary heating units that have been tested and labeled by UL, FM, or another recognized trade association related to the type of fuel being consumed.
  - 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 Section 01 77 00 "Closeout Procedures."
- G. Temporary Toilet Units: Provide self-contained, single-occupant toilet units of the chemical, aerated recirculation, or combustion type. Provide units properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.
- H. Fire Extinguishers: Provide hand-carried, portable, UL-rated, with class and extinguishing agent as required by locations and classes of fire exposures.
  1. Comply with NFPA 10 and NFPA 241.
- I. De-Humidifier Units: Provide packaged de-humidifier units at areas of work during the course of the project to establish and maintain a consistent humidity level through the course of the Project. Continue use and operation of units until design humidity and temperature levels can be consistently maintained.
  1. Provide sufficient quantities of packaged de-humidifier units(s) relative to the area of work occurring to maintain conditions at or below a relative humidity of 50%.
  2. Provide units with minimum water removal capacity of 100 pints per day.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Use qualified personnel for installation of temporary facilities.
- B. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- C. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. 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: Engage the appropriate local utility company to install temporary service or connect to existing service. Where company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with company recommendations.
  1. Arrange with company and any existing users for a time when service can be interrupted, if necessary, to make connections for temporary services.
  2. Provide adequate capacity at each stage of construction.
  3. Installation, Use, and Removal Charges: Payment for temporary utilities, with the exception of telephone service, shall be under the following terms:
    - a. Installation, maintenance, and removal costs are the Contractor's responsibility and are not chargeable to the Owner or Architect. Neither the Owner nor Architect will accept these costs as a basis of claims for Change Orders.
    - b. Usage charges for water and electricity for temporary facilities will be paid for by the Contractor.
    - c. Usage charges for temporary telephone service shall be paid for by the Contractor.
- B. Water Service: Install water service and distribution piping of sizes and pressures adequate for construction until permanent water service is in use.
  1. Install branch piping as necessary, with taps located so that water is available throughout the Project by the use of hoses. Protect pipes and fittings against freezing.

2. Where water service is required maintain leak-proof hose connections and outlet valves. Where installations or in-place construction might be damaged by spillage or leakage, provide a drip pan of suitable size and relief drain to minimize water damage. Drain any accumulated water promptly from pans.
  3. Sterilization: Sterilize temporary water piping prior to use.
- C. Temporary Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnects, automatic ground-fault interrupters, and main distribution switch gear.
1. Install electric power service underground.
  2. Install circuit and branch wiring, with area distribution boxes located so that power and lighting is available throughout the construction by the use of construction-type power cords. Install where least exposed to damage. Where permitted, wiring circuits not exceeding 125 Volts, AC 20 ampere rating, and lighting circuits may be nonmetallic sheathed cable where overhead and exposed to view for surveillance.
- D. Temporary Lighting: When overhead floor or roof deck has been installed, provide temporary lighting with local switching.
1. Install and operate temporary lighting that will fulfill security and protection requirements without operating the entire system. Provide temporary lighting that will provide adequate illumination for construction operations and traffic conditions.
- E. Temporary Heat: Provide temporary heat required by construction activities for curing or drying of completed installations or for protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.
- F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing and 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 the ambient condition required and minimize consumption of energy.
1. Provide dehumidification systems when required to reduce substrate moisture levels to the level required to allow installation or application of finishes.
- G. Heating Facilities: Except where the Owner authorizes use of the permanent system, provide vented, self-contained, LP-gas or fuel-oil heaters with individual space thermostatic control.
- H. Temporary Telephones: Provide temporary telephone service throughout the construction period for all personnel engaged in construction activities. Install telephone on a separate line for each temporary office.
1. At each fixed telephone location, post a list of important telephone numbers.
  2. Provide a facsimile machine within the main site office for use in sending information between parties.
  3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

- I. Electronic Communication Service:
  - 1. Provide a desktop computer in the primary field office adequate for use by Architect and Owner to access Project electronic documents and maintain electronic communication.
- J. Sanitary facilities include temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs and as approved by the Owner.
  - 1. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted nor will use of any existing campus facilities in any adjacent building.
    - a. Provide toilet tissue, paper towels, paper cups and similar disposal materials for each facility. Provide covered waste containers for used materials.
- K. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up for a healthy and sanitary condition. Dispose of drainage properly. Supply cleaning compounds appropriate for each condition.
- L. Drinking-Water Facilities: Provide containerized, tap-dispenser, bottled-water drinking-water units, including paper supply.

### 3.3 SUPPORT FACILITIES INSTALLATION

- A. Locate field offices, storage sheds, and other temporary construction and support facilities for easy access.
  - 1. Maintain support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.
- B. Provide incombustible construction for offices, shops, and sheds located within the construction area or within 30 feet (9 m) of building lines or other existing buildings. Comply with requirements of NFPA 241.
- C. Traffic Controls: Comply with requirements of authorities having jurisdiction.
  - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
  - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- D. Parking: Provide temporary parking areas for construction personnel. Do not allow any parking of vehicles beneath drip line of existing trees.
- E. Field Offices: Provide insulated, weathertight temporary offices of sufficient size to accommodate required office personnel at the Project Site. Keep the office clean and orderly for use for small progress meetings.
- F. Storage and Fabrication Sheds: Install storage and fabrication sheds sized, furnished, and equipped to accommodate materials and equipment involved, including temporary utility service. Sheds may be open shelters or fully enclosed spaces within the building or elsewhere on-site.
- G. Dewatering Facilities and Drains: For temporary drainage and dewatering facilities and operations not directly associated with construction activities included under individual Sections, comply with dewatering requirements of applicable Division 2 Sections. Where feasible, utilize the same facilities. Maintain the site, excavations, and construction free of water. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.

- H. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities.
1. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
  2. Install tarpaulins securely, with incombustible framing and other materials. Close openings of 25 sq. ft. (2.3 sq. m) or less with plywood or similar materials.
  3. Close openings through floor or roof decks and horizontal surfaces with load-bearing construction.
- I. Project Identification and Temporary Signs: Prepare project identification and other signs. Install signs where required to inform the public and persons seeking entrance to the Project and to provide directional assistance to persons required to detour around the construction areas. Support on posts or framing of preservative-treated wood or steel. Do not permit installation of any other additional or unauthorized signs.
1. Identification Signs: Provide project identification signs 4' x 8' in size at a location as directed by Architect (one required).
    - a. Architect will furnish copy for sign.
  2. Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors.
  3. Maintain and touch-up signs so they are legible at all times.
- J. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F (27 deg C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material lawfully.
1. Adjacent medical office building dumpsters shall NOT be used for the disposal of construction debris.
  2. Disposal of any debris related to this project into adjacent medical office building facilities or into any other adjacent building facilities shall result in the cost of removal being billed to the Contractor.
- K. De-Humidifier Units: Provide de-humidifier units as required by construction activities for temporary control of excessive moisture and humidity levels in unconditioned areas or for protecting installed construction from adverse effects of high moisture levels or high humidity. Select equipment that will not have a harmful effect upon completed installation or elements being installed.
1. Determine appropriate quantities of units and space throughout the areas affected based upon individual unit ratings.
- L. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.
- M. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

### 3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted or that other undesirable effects might result. Avoid use of tools and equipment that produce harmful noise. Restrict use of other loud noise-making tools and equipment to hours that will minimize complaints from persons or firms near the site.
- C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to erosion and sedimentation control Drawings or requirements of authorities having jurisdiction, whichever is more stringent.
  - 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree-or plant protection zones.
  - 2. Inspect, repair, and maintain erosion-and sedimentation-control measures during construction until permanent vegetation has been established.
  - 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from 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 authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains. Comply with requirements specified in Division 2 Section "Site Clearing."
- 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. Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer, as requested by the Architect.
- G. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers" and NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations."
  - 1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
  - 2. Store combustible materials in containers in fire-safe locations.
  - 3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for fighting fires. Prohibit smoking in hazardous fire-exposure areas.
  - 4. Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of fire ignition.
- H. Permanent Fire Protection: At the earliest feasible date in each area of the Project, complete installation of the permanent fire-protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.

- I. Enclosure Fencing: Project length will determine the type of protective barrier to be put in place. When fencing is required, it will surround the entire construction activity and be kept in place throughout the construction activity and not removed until the need has ceased, and the area made safe.
  - 1. Extent of Fence: As determined by Contractor.
    - a. Two weeks minimum notice is to be provided to Facilities Management before any construction fencing erected.
    - b. Install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
    - c. Placement of any fencing needs to respect the surrounding area and acknowledge the presence of local environmental conditions – access or pathways, stairs, trees or vegetation, weather, equipment, working inside or outside etc. Placement also needs to recognize the difficulties that individuals with sight impairment face and not place them in danger through unexpected changes in travel routes or placement of obstacles. Placement of any construction fencing shall be in compliance with “Interim Life Safety Measures” protocols.
    - d. Where required, warning lights (i.e. orange flashing lights) may be required for safety reasons. Placement to be in accordance with OSHA standards.
    - e. Where construction activity interferes with vehicle access, IDOT signs are to be provided indicating “reduced lane width ahead” or other appropriate message. Signs must not interfere with pedestrian movements and be compliant with IDOT and ADA standards.
  - 2. Opaque woven fabric shall be permanently attached at all points and remains secure and taught.
    - a. Fabric shall not be allowed to have any message or text beyond that of product manufacturer or other text as approved by the Architect and Owner.
    - b. Contractor and Architects logo shall be incorporated into fence fabric printing.
      - 1) Camera ready art work shall be provided for Architects logo
  - 3. Contractor shall immediately replace any component that is damaged, removed, or lost due to theft, ultraviolet degradation or removal by any means.
- J. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting, including flashing red or amber lights.
- K. Temporary Enclosures: Provide temporary enclosures for protection of existing construction to remain and new construction in progress, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
- 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; manage fire-prevention program.
  - 1. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.

2. 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 on methods and procedures. Post warnings and information.

### 3.5 MOISTURE AND MOLD CONTROL

- A. 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. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
    - a. Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.

### 3.6 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
  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.

2. Protection: Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- C. Termination and Removal: Unless the Architect requests that it be maintained longer, remove each temporary facility when the need has ended, when 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 the 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 the Contractor's property. The Owner reserves the right to take possession of project identification signs.
  2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt, and other petrochemical products or compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks, at temporary entrances, as required by authorities having jurisdiction.
  3. At Substantial Completion, clean and renovate permanent facilities used during the construction period including, but not limited to, the following:
    - a. Replace air filters and clean inside of ductwork and housings.
    - b. Replace significantly worn parts and parts subject to unusual operating conditions.
    - c. Replace lamps burned out or noticeably dimmed by hours of use.
  4. Comply with final cleaning requirements specified in Section 01 77 00 "Closeout Procedures."

END OF SECTION 01 50 00



## SECTION 01 56 50

### ENVIRONMENTAL PROTECTION

#### 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. This Section establishes basic requirements governing environmental protection efforts during the course of Construction.

##### 1.3 DEFINITIONS

- A. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties", "systems," "structures," "finishes," "accessories," and similar terms. Such terms are self-explanatory and have well recognized meanings in the construction industry.
  - 1. "Environmental Pollution" is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances or importance to human life; affect other species of importance to man; or degrade the utility of the environment for aesthetic or recreational purposes. The control of environmental pollution requires consideration of, but is not limited to, air, water, and land, and involves noise, solid and liquid waste management and management of radioactive and other hazardous materials.

##### 1.4 APPLICABLE REGULATIONS

- A. Pollution Control and Abatement: To the fullest extent possible, provide for the abatement and control of any environmental pollution arising from the construction activities of the Contractor and any subcontractors in the performance of this Contract. Comply with all applicable federal, state, and local laws, and regulations concerning environmental pollution control and abatement.

##### 1.5 PROTECTION OF LAND RESOURCES

- A. It is intended that the land resources within the Project boundaries and outside of the limits of permanent work performed under this Contract be preserved in their present condition or be restored to a condition after completion of construction that will not appear to be unnatural and not distract from the appearance of the Project.
- B. Insofar as possible, the Contractor shall confine construction activities to areas defined by the plans or specifications, to areas to be cleared for other operations, or to approved waste areas.
- C. Develop and maintain conformance to the Erosion and Sedimentation Control Plan established for this Project.

- D. In all instances the restored areas shall be well drained to prevent the accumulation of standing water.
- E. Contractor shall not deface, injure, or destroy trees or shrubs, nor remove or cut them without special authority.
  - 1. Restoration of Landscape Damage: Any trees or other landscape feature scarred or damaged by the Contractor's equipment or operations, shall be restored as nearly as possible to its original condition at the Contractor's expense. The Architect/. Engineer will decide what method of restoration shall be used and whether damaged trees shall be treated and healed, or removed and replaced.
  - 2. Post-Construction Cleanup or Obliterations: The Contractor shall remove all signs of temporary construction facilities used in the course of the Project. Any disturbed areas shall be graded and filled as required, and topsoil shall be spread to a depth of approximately four inches over the entire repaired area and the entire area shall be seeded. Restoration to original contours is required unless otherwise directed by the Architect.

#### 1.6 PROTECTION OF WATER RESOURCES

- A. The Contractor shall not pollute streams, drainage channels, or drainage structures with fuels, oils, bitumens, calcium chloride, acids, paint residue, or other harmful materials. It is the responsibility of the Contractor to monitor and investigate and comply with all applicable federal, state, parish, and municipal laws concerning pollution of water streams.
- B. In no event shall paint residue, cleaning solutions, pollution, or other pollutants be deposited into any catch basin, open ditch, or any structure or subsurface drainage system component.
  - 1. Spillages: Special measures shall be undertaken to prevent chemicals, fuels, oils, grease, waste washings, and paint components from entering surface or ground waters. In the event of any spillages, Contractor shall take immediate containment measures to prevent the spill from entering the drainage system.

#### 1.7 DISPOSAL OF REMOVED MATERIALS

- A. All removed materials shall be disposed of offsite and shall be in accordance with all applicable federal, state, parish, and municipal laws.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 56 50

## SECTION 01 73 00

### 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. General: This Section specifies general 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. Coordination of Owner-installed products.
  - 5. Progress cleaning.
  - 6. Starting and adjusting.
  - 7. Protection of installed construction.
  - 8. Correction of the Work.

##### 1.1 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

#### PART 2 - PRODUCTS (Not Applicable)

#### PART 3 - EXECUTION

##### 3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, underground and other utilities, and other 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 elevations at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.

- B. Examination and Acceptance of Conditions: Before proceeding with each component of Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
  - 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
  - 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
  - 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
  - a. Description of the Work.
  - b. List of detrimental conditions, including substrates.
  - c. List of unacceptable installation tolerances.
  - d. Recommended corrections.
- D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner and any applicable local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

### 3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
  - 1. Work from lines and levels established by the property survey.
  - 2. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of the Project.
  - 3. Calculate and measure required dimensions within indicated or recognized tolerances. Do not scale Drawings to determine dimensions.
  - 4. Advise entities engaged in construction activities of marked lines and levels provided for their use and lines and levels to which they must comply.
  - 5. At Contractor's option, as construction proceeds, check every major element for line, level, and plumb.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.

- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Surveyor's Log: Maintain a surveyor's log of control and other survey work. Make this log available for reference.
  - 1. Record deviations from required lines and levels and advise the Architect when deviations that exceed indicated or recognized tolerances are detected. On Project Record Drawings, record deviations that are accepted and not corrected.
- F. Building Lines and Levels: Locate and lay out for structures and floor levels required.

### 3.4 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
  - 1. Make vertical work plumb and make horizontal work level.
  - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
  - 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
  - 4. Maintain minimum headroom clearance of 8 feet in spaces without a suspended ceiling.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachments: Provide blocking and attachment plates and anchors and of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
  - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
  - 2. Allow for building movement, including thermal expansion and contraction.
  - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

### 3.5 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
  - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
  - 2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F/27 deg C.
  - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
  - 1. Remove liquid spills promptly.
  - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

### 3.6 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 1 Section "Quality Requirements."

### 3.7 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.

### 3.8 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 1 Section "Cutting and Patching."
  - 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 01 73 00

## SECTION 02 41 00

### SELECTIVE STRUCTURE DEMOLITION

#### 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. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.
4. Disconnecting, capping, or sealing, abandoning in place, and/or removing site utilities.

###### B. Related Requirements:

1. Division 01 Section "Summary" for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.
2. Division 01 Sections "Cutting and Patching" and "Execution" for cutting and patching procedures.
3. Division 01 Section "Photographic Documentation" for pre-construction photos taken before selective structure demolition operations commence.
4. Division 31 Section "Site Clearing" for site clearing and removal of above- and below-grade improvements.

##### 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. It is the intent of the Owner to remove all materials of salvageable value prior to commencement of work operations.
- B. Unless otherwise indicated, any waste as a result of demolition operations shall become property of Contractor and shall be removed from the site.
- C. 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 PRE-DEMOLITION MEETINGS

- A. Pre-demolition 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 SUBMITTALS

- A. 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 if it will be necessary to interrupt utility services to any adjacent areas or buildings.
    - a. Coordination for shutoff, capping, and continuation of utility services.
  - 3. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.
  - 4. Pre-demolition Photographs or Video: Submit before Work begins.
  - 5. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

## 1.7 CLOSEOUT SUBMITTALS

- A. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

## 1.8 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition operations. Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

## 1.9 PROJECT CONDITIONS

- A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- C. Before selective demolition, Owner will remove the following items:
  - 1. Furniture and administrative supplies within any casework or millwork items.
    - a. Millwork and casework anchored to structure shall remain and be considered as materials to be removed and/or salvaged at Owner's discretion.

- D. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- E. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
  - 1. Hazardous materials will be removed by Owner before start of the Work.
  - 2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- F. Storage or sale of removed items or materials on-site is not permitted.
- G. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
- H. Maintain fire-protection facilities in service during selective demolition operations.

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Contractor may 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. 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.
- F. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

### 3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
  - 1. Comply with requirements for existing services/systems interruptions specified in Division 01 Section "Summary."
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
  - 1. Arrange to shut off indicated utilities with utility companies.
  - 2. 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 buildings serviced by any components of this building.
  - 3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.
  - 4. Cut off pipe or conduit a minimum of 24 inches below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.

- C. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
- D. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
- E. Equipment to Be Removed: Disconnect and cap services and remove equipment.
- F. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
- G. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
- H. Refrigerant: Remove refrigerant from mechanical equipment to be selectively demolished according to 40 CFR 82 and regulations of authorities having jurisdiction.

### 3.3 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
  - 1. Comply with requirements for access and protection specified in Division 01 Section "Temporary Facilities and Controls."
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
  - 1. Provide protection to ensure safe passage of people around selective demolition area.
  - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces, 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. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 01 Section "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.
- D. Temporary Protection:
  - 1. Protect adjacent buildings and facilities from damage due to demolition activities and operations.
  - 2. Protect existing site improvements, appurtenances, and landscaping to remain.
  - 3. Erect a plainly visible fence around drip lines of individual trees and at perimeter of existing parking areas where trees exist to prevent construction traffic beneath exposed root zones.
  - 4. Provide temporary barricades to ensure safe passage of people around building demolition area and to and from adjacent buildings. It is not intended that student and pedestrian traffic will traverse project site or areas within construction boundaries established by perimeter fencing.
  - 5. Protect walls, windows, roofs, and other adjacent exterior construction that is to remain and that will be exposed to building demolition operations.
  - 6. Erect and maintain dustproof partitions and temporary enclosures to limit dust, noise, and dirt migration to occupied portions of adjacent buildings.

- E. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

### 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.
  - 5. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
  - 6. Maintain adequate ventilation when using cutting torches.
  - 7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
  - 8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
  - 9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
  - 10. Dispose of demolished items and materials promptly.
- B. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
  - 1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
  - 2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
- C. Use of explosives is not permitted.
- D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

### 3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.

- B. Concrete Slab on Grade: Saw-cut perimeter of area to be demolished, then break up and remove.
- C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- D. Roofing: Remove no more existing roofing than extent that can be covered in one day by new roofing and so that building interior remains watertight and weathertight. See Division 7 Sections for new roofing requirements over existing areas.
- E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.

### 3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be 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.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

### 3.7 SITE RESTORATION

- A. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with satisfactory soil materials according to backfill requirements in Division 31 Section "Earth Moving."

### 3.8 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 02 41 00

## SECTION 03 30 00

### CAST IN PLACE CONCRETE

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

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

##### 1.2 SUMMARY

- A. Provide all materials, labor, equipment and incidental services required to complete all concrete work in the Contract.
- B. All concrete work shall conform to all requirements of ACI 301, Standard Specifications for Structural Concrete and ACI 318, Building Code Requirements for Reinforced Concrete, published by the American Concrete Institute, Detroit, Michigan, except as modified by the requirements of these Contract Documents.
- C. All references herein to standards of the American Concrete Institute (ACI) and the American Society for Testing Materials (ASTM) apply to the latest revisions thereof.
- D. Cooperate with the Testing Laboratory in its performance of services pertaining to concrete work as specified elsewhere in these Specifications.
- E. Related References: This Specification Section shall also be applicable to and contain General, Products, and Execution references and requirements.

#### PART 2 - PRODUCTS

- 2.1 Portland Cement shall conform to ASTM Specification C150 Type I.
- 2.2 Fly ash conforming to ASTM 618 Class C and/or slag may be used in quantities not exceeding 15% by weight of cementitious material.
- 2.3 Aggregates shall conform to ASTM Specification C33. The maximum size of aggregate shall be no larger than one-fifth (1/5) of the narrowest dimension between sides of forms within which the concrete is to be cast nor larger than three-fourths (3/4) of the minimum clear spacing between reinforcing bars, or between reinforcing bars and forms.
- 2.4 Mixing water for concrete shall conform to ASTM C94.
- 2.5 A water reducing admixture shall be used. Admixture shall conform to ASTM C494 Type A or Type D. Admixture shall be proportioned and mixed in accordance with manufacturer's recommendations.
- 2.6 An air-entraining admixture is not required but is acceptable if it conforms to ASTM C260 and is compatible with the required water reducing admixture. Submit such admixtures for approval by the Architect prior to use.
- 2.7 E5 INTERNAL CURE ADMIXTURE SHALL be used at a rate not to exceed manufacturers recommended 4.0 fluid ounces per 100 pounds of cementitious materials.
- 2.8 If admixtures contain chloride ions, the percent by weight of cement shall be furnished in writing to the Architect.

2. 9 In no case shall the sum of chloride ions from all sources exceed 0.15 percent by weight of cement in conventionally reinforced concrete and 0.06 percent in pre-stressed concrete.
2. 10 All admixtures shall be used in accordance with the manufacturer's instructions.

### PART 3 - EXECUTION

#### 3. 1 QUALITY OF CONCRETE

- A. Ready-mix concrete shall be obtained from a ready-mix supplier approved by the Owner. If required by the Owner, the Contractor shall hire an approved testing laboratory to certify that the proposed Ready-mix Supplier conforms to ASTM C-94.
- B. Ready-mixed concrete shall be proportioned mixed and transported in accordance with ASTM C94 "Specifications for Ready-Mix Concrete".
- C. Pumped concrete shall be placed in accordance with "Placing Concrete by Pumping Methods" by ACI Committee 304.
- D. All concrete mixes shall be designed (or verified) by an independent testing laboratory, hired by the Contractor, as specified elsewhere in these Specifications.
- E. Concrete mixes shall conform to the following table:

Slumps <sup>2</sup> Construction	Type of Concrete	28 Day Compressive	Min. Sacks <sup>1</sup> of Cement	Slump	
		Strength	Per Cu. Yd.	Max.	Min.
All Structural Concrete	Normal	3500 psi Weight	5-1/4	5	3

- <sup>1</sup> In no case shall the cement content be less than the above minimum. If a higher cement content is required to meet the specified strength it shall be supplied at no extra cost to the Owner.
- <sup>2</sup> Slumps of pumped concrete placed without a pump aid admixture shall not exceed 6 inches at the pump hopper and shall not exceed the specified values at the discharge nozzle. In no case shall the concrete water-cement ratio be increased. A mid-range water reducing agent is required on all structural flat concrete work.

- F. If the Ready Mix Supplier cannot provide data to the testing lab to establish standard deviation and/or trial batch mix design, then concrete mixes shall conform to the following table:

**MAXIMUM PERMISSIBLE WATER-CEMENT RATIOS AND  
MINIMUM CEMENT CONTENTS FOR CONCRETE  
(WHEN STRENGTH DATA FROM TRIAL BATCHES OR  
FIELD EXPERIENCE IS NOT AVAILABLE)**

Specified compressive strength psi	Minimum sks. cement per cu. yd. concrete	Maximum permissible water-cement ratio			
		Non-air-entrained concrete		Air-entrained concrete	
		Absolute ratio by weight	U.S. gal. per 94-lb. bag of cement	Absolute ratio by weight	U.S. gal. per 94-lb. bag of cement
3500	6	0.51	5.8	0.40	4.5

- G. The strength of concrete and its slump shall be verified by tests performed by an independent testing laboratory as specified under CONCRETE TESTING AND QUALITY CONTROL.
- H. Each truck sent from the Ready-mix Plant to the Job site shall have a delivery ticket containing at least the following information:
  - 1. Name of Ready-mix Plant and serial number of ticket.
  - 2. Date and truck number.
  - 3. Name of Job and Contractor.
  - 4. Number of sacks of cement per cubic yard.
  - 5. Amount of concrete.
  - 6. Amount of water withheld for later addition on site.
  - 7. Time of day truck was loaded.
- I. Any truck without a proper ticket shall be rejected.

### 3.2 PLACING CONCRETE

- A. Concrete shall be placed according to the recommendations of ACI Committee 304. Consolidation of concrete shall conform to recommendations of ACI Committee 309.
- B. If concrete arrives at the Project with its slump below that suitable for placing, water may be added only if neither the maximum permissible water-cement ratio nor the maximum slump is exceeded. Use additional mixing as required to fully incorporate the added water.
- C. No concrete shall be placed until all of the following are accomplished:
  - 1. All reinforcement and other embedded items are securely fastened in proper position and all formwork for the placement is completed.
  - 2. The Architect or his representative has observed the assembled reinforcing steel and has indicated to the Job Superintendent that the sizes and positions of the reinforcing are in compliance with the Drawings and Specifications. The Architect shall inspect steel placement within 24 hours of notification by the Job Superintendent.
  - 3. All debris is removed from the places to be occupied by the concrete.
  - 4. All water (in amounts large enough to appreciably alter the water-cement ratio) has been removed from the places to be occupied by the concrete.
  - 5. All reinforcement is thoroughly cleaned of detrimental coating or debris.
  - 6. All forms are thoroughly wetted (except in freezing weather) or oiled.
- D. Equipment and procedures for chuting, pumping and pneumatically conveying concrete from mixer to forms shall insure a continuous flow of concrete at the delivery end without segregation of the concrete materials.
- E. Deposit concrete as nearly as practical to its final position to avoid segregation due to re-handling or flowing.
- F. Concrete in masonry pilasters shall be poured in vertical lifts of four feet or less. Masonry shall not extend above the top of each lift until the lift below has been poured.
- G. Place concrete in a continuous operation until placement of the panel or section is completed. When construction joints are necessary, make them in accordance with JOINTS AND EMBEDDED ITEMS.
- H. Consolidate all concrete during placement and work concrete thoroughly around reinforcement and embedded fixtures and into the corners of the forms.
- I. If placing concrete in atmospheric temperatures below 40 degrees F., provide adequate equipment to maintain concrete temperatures at 50 degrees F. or higher during placing. (See CURING AND PROTECTION for cold weather methods).
- J. Pump hoses used for placing concrete shall not be in contact with the reinforcing steel. All such hoses shall be supported on special brackets, troughs or such devices to prevent contact between hoses and reinforcing steel throughout the concrete work.



- K. Finished concrete surfaces shall not exceed the tolerances specified in the CONCRETE FORMWORK specification section.

### 3.3 SLAB ON GRADE VAPOR BARRIER

- A. All building slabs on earth fill shall be poured on a vapor retarder conforming to ASTM 1745, Class A.

### 3.4 JOINTS AND EMBEDDED ITEMS

- A. Joint fillers shall extend full depth of joint and shall be of the thickness shown on the Drawings.
- B. Use asphalt impregnated fiberboard conforming to ASTM D-1751 for expansion joint fillers.
- C. Construction joints not shown on the Drawings shall be properly keyed and shall be located at sections of minimum shear. Prior approval of the Architect is required for such joints.
- D. Joints shall not extend under columns. Joints on column lines shall be routed around column base or pedestal.
- E. Edges of concrete at joints shall be straight and sound. Remove unsound or unbonded material and repair all chips, spalls, cracks or other damaged edges.
- F. Concrete surfaces at all construction joints shall be thoroughly cleaned and all laitance removed. Hardened concrete surfaces shall be wetted and slushed with a coat of cement grout immediately before placing fresh concrete.
- G. All sleeves, inserts, anchors and other embedded items required for other work shall be placed prior to concreting.
- H. For slabs on grade, all conduit greater than 1 inch in diameter shall be placed in the earth fill below the slab. Conduits smaller than 1 inch may be placed on top of the waterproof membrane and below the slab reinforcing. Conduits shall be routed to avoid unnecessary crossings and to avoid accumulation of conduit runs at critical areas such as directly above piling, footings, column bases and construction joints. If any such accumulation of conduits is anticipated, the Contractor shall notify the Architect for inspection and approval prior to scheduling concrete pours.
- I. Position all embedded items accurately and support them against displacement during concrete operations.
- J. Exposed control joints shall be sealed with a gray colored paving sealant which has been approved by the Architect.

### 3.5 CURING AND PROTECTION

- A. E5 Curing Compound Admixture eliminates the use of standard curing processes. Follow manufacturer's instructions/directions for post placement.

### 3.6 FINISHING OF CONCRETE SURFACES

- A. Slab Surfaces:
  - 1. Contractor shall provide construction joints and divide slab into pour sizes which will assure proper finishing consistent with weather conditions, available labor and resources, and will minimize shrinkage cracking and early thermal cracking of slabs.
  - 2. No finishing operation shall be performed while there is excess moisture or bleeding water on the slab surface. Do not use finishing tools on slab surface until bleeding has stopped and water sheen has disappeared.
  - 3. Do not begin power floating if footprints in the slab surface are deeper than 1/8 inch and/or if the float blades throw mortar.

4. Force the coarse aggregate below the surface (if necessary), then consecutively screed, float and power trowel according to the following schedule:

LOCATION	FINAL SURFACE FINISH
Depressed slabs to receive setting beds for tile or special surfaces	Screed to a true plane.
Slabs to receive resilient flooring or carpet	Power trowel to a smooth, dense surface free of burnishes.
Exterior walks and drives	Screed off, then brush with a stiff broom to a uniform non-slip surface.
Exposed floor slabs	Power trowel to a smooth, dense surface free of burnishes.

B. Formed Surfaces:

1. Exposed sides of grade beams shall have a smooth and blemish free appearance.

### 3.7 REPAIR OF DEFECTIVE SURFACES

A. Defective formed surfaces shall be repaired in conformance with ACI 301.

B. All slab surfaces which have been improperly finished or damaged and exhibit blisters, excessive shrinkage cracks and/or early temperature cracks, flaking, spalling, and delaminations shall be repaired according to the following outline:

1. Fill all cracks wider than one thirty second ( $1/32$ ) of an inch and coat all crazed surfaces with a commercially proven crack healer/ penetrating sealer. Apply in strict conformance to recommendations of the manufacturer.
2. Remove spalls and popouts and grind and/or shot blast all unbonded, unsound and loose surface material to expose a sound, roughened concrete surface approximately  $1/8$ " deep. Remove all debris and blow clean with compressed air. Delaminations below the surface shall be identified by dragging a steel chain over the surface and detecting the hollow sounds which occur over delaminated areas. All prepared surfaces shall be rectangular in plan with sharp vertical edges at least  $1/8$ " deep. Feathered edges are not acceptable.
3. Verify with the manufacturer's technical representatives that all bonding agents and repair materials which are proposed for use are designed for the specific repair applications and are compatible with the planned use of the building by the Owner.
4. Fill and uniformly finish all prepared areas with a commercially proven screed mortar or repair mortar, depending on depth of repair. Apply these products in strict conformity to recommendations of the manufacturer.
5. If cracks wider than one sixteenth ( $1/16$ ) of an inch occur in unreinforced, jointed slabs (such as exterior paving), the cracked slabs shall be removed and replaced in sections no smaller than one half ( $1/2$ ) of the original panel size.
6. If slab edges at joints are offset vertically by more than one quarter ( $1/4$ ) of an inch, grind down the high edges so that the slab is flush across the joint to within one sixteenth ( $1/16$ ) of an inch.

### 3.8 CONCRETE TESTING AND QUALITY CONTROL

- A. The Contractor shall pay a testing laboratory approved by the Owner to perform the following services:
1. Each person inspecting the Work shall be certified by the American Concrete Institute as a Concrete Field Testing Technician - Grade I.
  2. If required by the Owner, provide written certification that the ready-mix plant (plants) supplying concrete for the Project is in compliance with ASTM C94.
  3. If the supplier proposes a mix, provide written certification that each concrete mix proposed by the supplier complies with the field experience method of mix design as specified in ACI 318. This certification shall contain copies of the consecutive strength tests used to determine standard deviation and average strength of the proposed mix.
  4. If the field experience method cannot be used, then design each concrete mix in accordance with ACI 318 by the trial batch method. Submit the design mix curves for each concrete strength to the Architect at least seven (7) days before concrete is poured.
  5. Prepare and test cylinders four (4) per one hundred (100) cubic yards if required by the Contractor to determine when forms may be removed. These cylinders shall be stored near the structure and shall receive the same cure and protection as the cast concrete from which they were obtained. Test shall be performed immediately upon removal from the job site.
- B. The Owner shall pay the testing laboratory to perform the following services:
1. Each person inspecting the Work shall be certified by the American Concrete Institute as a Concrete Field Testing Technician - Grade I.
  2. Secure production samples of materials at plant stockpiles during the course of the Work and test for compliance with the Specifications.
  3. Before each concrete pour, verify that the batch plant operation conforms to the mix design and adjust the mix as required.
  4. Inspect the loading ticket for each concrete truck at the job site. Each ticket shall include all of the information required by these Specifications. Reject any truck which is not properly ticketed.
  5. For each different mix placed, cast compression test cylinders according to the following schedule. Cast cylinders in groups of four (4). Cast each group from a different truck load (or batch) and use concrete from middle portion of the truck load. Field mark each cylinder for identification.

<u>REQUIRED</u>	<u>LOCATION OF CONCRETE</u>	<u># OF FOUR CYLINDER GROUPS</u>
	Footings	One per fifty cubic yards placed
	Slabs, beams, walls	One per fifty cubic yards placed
	Columns	One for every two truck loads or batches
	6. If the total placement in one (1) day is less than the amounts listed above, one group of four (4) cylinders shall be taken from the day's placement.	
	7. For each group of cylinders, test one (1) at seven (7) days and two (2) at twenty-eight (28) days. Hold one cylinder for additional testing if necessary. Submit prompt written reports of these tests to the Architect, Structural Engineer, Contractor, Ready-mix Supplier and to other parties designated by the Architect.	
	8. Cast and cure all cylinders in accordance with ASTM Specification C31. Test cylinders in accordance with ASTM Specification C39. All slump tests shall conform to ASTM Specification C143.	

9. Reports on test cylinders shall contain the standard data plus the following specific information on each cylinder:
    - a. The identifying mark placed on the cylinder in the field.
    - b. The actual measured slump of each specimen.
    - c. Amount of concrete in truck.
    - d. Amount of water withheld from truck for later addition on site.
    - e. Amount of water added on site.
    - f. The date and time of day the cylinder was molded.
    - g. The date on which the cylinder was received by the Laboratory and placed in the required controlled environment.
    - h. The date the cylinder was tested.
    - i. The total cubic yards of the pour from which the cylinders were taken.
  10. All cylinders shall be stored at the site and shipped to the Laboratory in rigid containers. Straw or similar shock absorbing material shall be stuffed between and around each cylinder during shipment.
- C. If the Contractor fails to notify the Testing Laboratory of a scheduled pour and as a result no cylinders are taken, the Contractor shall bear the cost of verifying that the in place concrete meets the strength requirements of the specifications. Cores shall be extracted and tested from the cast-in-place concrete in accordance with ASTM C42. Location of cores shall be determined by the Architect.
- D. If any material is found not to comply with these specifications, the testing laboratory shall immediately notify the Contractor that the material is rejected. If the Contractor persists in placing the rejected material into the work, the testing laboratory shall immediately notify the Architect. If a rejected batch of concrete is poured by the Contractor, the testing laboratory shall obtain a set of cylinders from the rejected batch. If the Contractor fails to cooperate with the testing laboratory, circumvents or ignores the specified testing program, the testing laboratory shall immediately notify the Architect.

### 3.9 DEFECTIVE WORK AND RETESTING

- A. When quality control tests performed by the testing laboratory show that materials fail to meet the specified requirements, the Contractor shall correct and/or remove and replace all defective work and shall coordinate retesting with the testing laboratory. All costs associated with reinspection and retesting of defective work shall be the sole responsibility of the.

END OF SECTION 03 30 00

## SECTION 04 01 30

### MAINTENANCE OF MASONRY AND STONE

#### 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. Cleaning of exterior masonry including brick and stone masonry.
  - 2. Cleaning of new interior and exterior masonry.
- B. Contractor is responsible for providing means and methods to recover job waste which includes but is not limited to dust control and runoff recovery. Plastic sheeting, special coated drop cloths, shop vacs, and vacuum apparatus adapters to grinders and equipment may have to be employed.
- C. Related Sections:
  - 1. Division 04 Section "Unit Masonry" for new masonry construction.

##### 1.3 DEFINITIONS

- A. Very Low-Pressure Spray: Under 100 psi.
- B. Low-Pressure Spray: 100 to 400 psi.
- C. Medium-Pressure Spray: 400 psi to 1000psi.
- D. High-Pressure Spray: Not permitted.
- E. Saturation Coefficient: Ratio of the weight of water absorbed during immersion in cold water to weight absorbed during immersion in boiling water; used as an indication of resistance of masonry units to freezing and thawing.

##### 1.4 SUBMITTALS

- A. Product Data: For each type of product required for type of masonry being cleaned. Include recommendations for application and use. Include test data substantiating that products comply with environmental requirements.
- B. Qualification Data: For masonry cleaning specialists.
- C. Cleaning Program. Include containment of water during interior masonry cleaning operations.

## 1.5 QUALITY ASSURANCE

- A. Qualifications: Engage an experienced masonry cleaning firm to perform work of this Section. Firm shall have completed work similar in extent to that indicated for this Project with a record of successful in-service performance. Experience installing masonry is not sufficient experience for masonry cleaning work.
  - 1. Field Supervision: Cleaning firm shall maintain experienced full-time supervisor on Project site during times masonry cleaning work is in progress. Supervisor shall not be changed during Project except for causes beyond the control of cleaning firm.
    - a. Worker Qualifications: Persons who are experienced in masonry cleaning work of types they will be performing.
- B. Cleaning Program: Prepare a written cleaning program that describes cleaning process in detail, including materials, methods, and equipment to be used, protection of surrounding materials, and control of runoff during operations.
  - 1. If materials and methods other than those indicated are proposed for any phase of cleaning work, add to the Quality-Control Program a written description of such materials and methods, including evidence of successful use on comparable projects, and demonstrations to show their effectiveness for this Project and worker's ability to use such materials and methods properly.
- C. Cleaning Appearance Standard: Cleaned surfaces are to have a uniform appearance as viewed from 20 feet away by the Architect. Perform additional cleaning of small areas that are noticeably different, so that surface blends smoothly into surrounding areas.
- D. Mockups: Prepare mockups of cleaning to demonstrate aesthetic effects and set quality standards for materials and execution and for fabrication and installation.
  - 1. Cleaning: Clean an area approximately 25 sq. ft. for brick, 25 sq. ft. for stone panels, and 5 lin. ft. for stone trim elements (belt course, coping, sills, etc.).
    - a. Test cleaners and methods on samples of adjacent materials for possible adverse reactions. Do not use cleaners and methods known to have deleterious effect.
    - b. Allow a waiting period of not less than seven days after completion of sample cleaning to permit a study of sample panels for negative reactions.
  - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless the Architect specifically approves such deviations in writing.
  - 3. Approved mockups may become part of the completed Work.
- E. Pre-Cleaning Conference: Conduct conference at Project site.
  - 1. Review methods and procedures related to masonry cleaning including, but not limited to, the following:
    - a. Construction schedule. Verify availability of materials, personnel, equipment, and facilities needed to make progress and avoid delays.
    - b. Materials, material application, and sequencing.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage, mixing with other components, and application.
- B. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or other detrimental effects.

## 1.7 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with work only when existing and forecasted weather conditions permit masonry cleaning work to be performed according to manufacturers' written instructions and specified requirements.
- B. Clean masonry surfaces only when air temperature is 40 deg F and above and is predicted to remain so for at least 7 days after completion of cleaning.

## 1.8 SEQUENCING AND SCHEDULING

- A. Order replacement materials at earliest possible date to avoid delaying completion of the Work.
- B. Perform masonry cleaning work in the following sequence:
  - 1. Remove plant growth, if any.
  - 2. Remove paint, if any.
  - 3. Clean masonry surfaces. Ensure that windows are not damaged by cleaning process.

## 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. PROSOCO, standard of quality.
  - 2. Diedrich Technologies Inc.
  - 3. Dominion Restoration Products, Inc.
  - 4. Price Research, Ltd.
  - 5. Dumond Chemicals, Inc.

### 2.2 CLEANING MATERIALS

- A. Water: Potable.
- B. Hot Water: Water heated to a temperature of 140 to 160 deg F.
- C. Nonacidic Liquid Cleaner for Existing Masonry Surfaces: Manufacturer's standard mildly alkaline liquid cleaner formulated for removing mold, mildew, and other organic soiling from ordinary building materials, including polished stone and brick.
- D. Nonacidic Liquid Cleaner for New Masonry Surfaces: Non-acidic compound for cleaning brick, tile and concrete surfaces of excess mortar, dirt and other common job-site soiling. Non-fuming compound shall contain no hydrochloric or other traditional inorganic acids and shall be safe for use on and around most metal surfaces. 70 percent more effective than citric and glycolic acids, and 50 percent more effective than phosphoric acid.

### 2.3 ACCESSORY MATERIALS

- A. Masking Tape: Nonstaining, nonabsorbent material, compatible with pointing mortar, joint primers, sealants, and surfaces adjacent to joints; that will easily come off entirely, including adhesive.

## 2.4 CHEMICAL CLEANING SOLUTIONS

- A. Dilute chemical cleaners with water to produce solutions not exceeding concentration recommended by chemical-cleaner manufacturer.

## PART 3 - EXECUTION

### 3.1 PROTECTION

- A. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm resulting from masonry restoration work.
  - 1. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during course of cleaning work.
- B. Comply with cleaner manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent cleaning solutions from coming into contact with people, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
  - 1. Cover adjacent surfaces with materials unless cleaners being used will not damage adjacent surfaces. When no longer needed, promptly remove masking to prevent staining.
  - 2. Keep wall wet below area being cleaned to prevent streaking from runoff.
  - 3. Do not clean masonry during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
  - 4. Neutralize and collect alkaline and acid wastes for disposal off Owner's property.
  - 5. Dispose of runoff from cleaning operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

### 3.2 PRELIMINARY CLEANING

- A. Removing Plant Growth: Completely remove visible plant, moss, and shrub growth from masonry surfaces. Carefully remove plants, creepers, and vegetation by cutting at roots and allowing to dry as long as possible before removal. Remove loose soil and debris from open masonry joints to whatever depth they occur.
- B. Preliminary Cleaning: Before beginning general cleaning, remove extraneous substances that are resistant to cleaning methods being used. Extraneous substances include paint, calking, asphalt, and tar.
  - 1. Carefully remove heavy accumulations of material from surface of masonry with a sharp chisel. Do not scratch or chip masonry surface.

### 3.3 CLEANING EXISTING MASONRY

- A. Proceed with cleaning in an orderly manner; work from bottom to top of each scaffold width and from one end of each elevation to the other. Ensure that dirty residues and rinse water will not wash over cleaned, dry surfaces.
- B. Use only those cleaning methods indicated for each masonry material and location.
  - 1. Use spray equipment that provides controlled application at volume and pressure indicated, measured at spray tip. Adjust pressure and volume to ensure that cleaning methods do not damage masonry.
    - a. Equip units with pressure gauges.



- C. Non-acidic Liquid Chemical Cleaning:
  - 1. Wet masonry with hot water applied by low-pressure spray.
  - 2. Apply cleaner to masonry in two applications by brush or low-pressure spray with cone-shaped spray tip. Let cleaner remain on surface for period of 1 to 10 minutes or as recommended by cleaner manufacturer. Gently scrub heavy soiled areas:
  - 3. Do not allow cleaner to dry on masonry.
  - 4. Rinse with cold water applied by medium pressure spray to remove chemicals and soil.
  - 5. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.
- D. Perform each cleaning method indicated in a manner that results in uniform coverage of all surfaces, including corners, moldings, and interstices, and that produces an even effect without streaking or damaging masonry surfaces.

### 3.4 CLEANING NEW MASONRY

- A. Verify mortar is fully set and cured.
- B. Non-acidic Cleaning Agent:
  - 1. Working from bottom to top, use clean water to thoroughly prewet surface to be cleaned applied by low-pressure spray.
  - 2. Apply Safety Klean liberally using low-pressure spray (50 psi max), roller or densely filled masonry washing brush. Do not apply with high-pressure spray. Do not atomize.
  - 3. Let the cleaning solution dwell 3-5 minutes. Reapply. Light scrubbing of the surface improves cleaning results especially where high pressure rinsing equipment is not available. Do not let cleaning solution "dry into" to the masonry. If solution starts to dry, reapply.
  - 4. Rinse with clean water from the bottom to the top, covering each section of the surface with a concentrated stream of water. To avoid streaking on vertical walls, take care to keep the wall below wet and rinsed free of cleaner and residues. The best combination of rinsing pressure and water volume is provided by masonry washing equipment generating 400-1000 psi with a water flow rate of 6-8 gallons per minute delivered through a 15-45 degree fan spray tip. Equipment should be adjustable to reduce water flow rate and rinsing pressure as required for controlled cleaning of more sensitive surfaces.

END OF SECTION 04 01 30

## SECTION 05 50 00

### METAL FABRICATIONS

#### 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. This Section includes the following metal fabrications:
  - 1. Loose bearing and leveling plates.
  - 2. Shelf and relieving angles.
  - 3. Miscellaneous framing and supports for the following:
    - a. Countertops
    - b. Mechanical and electrical equipment.
    - c. Applications where framing and supports are not specified in other sections.
  - 4. Miscellaneous steel trim including steel angle corner guards, and steel edgings.
  - 5. Steel pipe bollards.
  - 6. Metal columns concealed with partition half walls.
- B. Products furnished, but not installed, under this Section:
  - 1. Loose steel lintels.
    - a. All exterior lintels to be galvanized and shop primed for field painting.
  - 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 Sections: The following Sections contain requirements that relate to this Section:
  - 1. Division 05 Section "Structural Steel" for structural steel framing system components.
  - 2. Division 05 Section "Pipe and Tube Railings" for metal pipe and tube handrails and railing systems.

##### 1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design and detail miscellaneous metal fabrications specified under this section, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

##### 1.4 SUBMITTALS

- A. Product data for paint products, and grout.
- B. Shop drawings detailing fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other Sections.

- C. Samples representative of materials and finished products as may be requested by Architect.
- D. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer registered in the State of Louisiana responsible for their preparation.
- E. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.
- F. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include a list of completed projects with project name, addresses, names of architects and owners, and other information specified.

## 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."
  - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
  - 3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

## 1.6 COORDINATION

- A. Coordinate installation of anchorages and steel weld plates and angles for casting into concrete. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts and items with integral anchors that are to be embedded into concrete. Deliver such items to Project site in time for installation.

## 1.7 PROJECT CONDITIONS

- A. Field Measurements: Check actual locations of walls and other construction to which metal fabrications must fit by accurate field measurements before fabrication. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  - 1. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabricating products without field measurements. Coordinate construction to ensure that actual dimensions correspond to guaranteed dimensions. Allow for trimming and fitting.
- B. Provide inserts and anchors to be imbedded in work of other trades in sufficient time to not delay progress of work.

## PART 2 - PRODUCTS

### 2.1 FERROUS METALS

- A. Metal Surfaces: For metal fabrications exposed to view in the completed Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

- B. Steel Plates, Shapes, and Bars: ASTM A 36.
- C. Steel Tubing: Product type (manufacturing method) and as follows:
  - 1. Cold-Formed Steel Tubing: ASTM A 500.
  - 2. Hot-Formed Steel Tubing: ASTM A 501.
  - 3. For exterior installations and where indicated, provide tubing with hot-dip galvanized coating per ASTM A 53.
- D. Steel Pipe: ASTM A 53, standard weight (schedule 40), unless otherwise indicated, or another weight required by structural loads.
  - 1. Galvanized finish, unless otherwise indicated.
- E. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240/A 240M or ASTM A 666, Type 304.
- F. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
- G. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
  - 1. Size of Channels: 1-5/8 by 1-5/8 inches.
  - 2. Material: Galvanized steel, ASTM A 653/A 653M, structural steel, Grade 33, with G90 coating; 0.064-inch nominal thickness.
- H. Gray-Iron Castings: ASTM A 48, Class 35.
- I. Malleable-Iron Castings: ASTM A 47, Grade 32510.
- J. Cast-in-Place Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials capable of sustaining, without failure, the load imposed within a safety factor of 4, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
  - 1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 malleable iron or ASTM A 27 cast steel. Provide bolts, washers, and shims as required, hot-dip galvanized per ASTM A 153.
- K. Welding Rods and Bare Electrodes: Select according to AWS specifications for the metal alloy to be welded.

## 2.2 NONFERROUS METALS

- A. Aluminum Plate and Sheet: ASTM B 209, Alloy 6061-T6.
- B. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.

## 2.3 FASTENERS

- A. Select fasteners for the type, grade, and class required.
- B. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
  - 1. Provide stainless-steel fasteners for fastening aluminum.
  - 2. Provide stainless-steel fasteners for fastening stainless steel.
- C. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

- D. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593; with hex nuts, ASTM F 594; and, where indicated, flat washers; Alloy Group 1.
- E. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
  - 1. Material: Carbon steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn5.

## 2.4 GROUT

- A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
  - 1. Subject to compliance with requirements, provide one of the following:
    - a. Euco N-S Grout; Euclid Chemical Co.
    - b. Masterflow 928 and 713; Master Builders Technologies, Inc.
    - c. Sealtight 588 Grout; W. R. Meadows, Inc.

## 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. Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.
- 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 exposed work true to line and level with accurate angles and surfaces and straight sharp edges.
- E. Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss.
  - 1. Temperature Change (Range): 100 deg F.
- F. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- G. Remove sharp or rough areas on exposed traffic surfaces.

- H. 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 that no roughness shows after finishing, and contour of welded surface matches those adjacent.
- I. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.
- J. Provide for anchorage of type indicated, coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
- K. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. 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.
- L. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- M. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

## 2.6 METAL BOLLARDS

- A. Fabricate metal bollards from Schedule 40 steel pipe.
  - 1. Cap bollards with 1/4-inch- thick steel plate or recess plate to allow for concrete dome.
- B. Prime bollards with zinc-rich primer and finish as specified in Division 09 Section "Painting".

## 2.7 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction, made flat, free from warps or twists, and of the required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required. Galvanize after fabrication.

## 2.8 LOOSE STEEL LINTELS

- A. Fabricate loose structural steel lintels from steel angles and shapes of size noted on lintel schedule for openings and recesses in masonry walls and partitions at locations required.
- B. Weld adjoining members together to form a single unit.
- C. Size loose lintels for equal bearing of 1 inch per foot of clear span but not less than 6 inches bearing at each side of openings, unless otherwise indicated.
- D. Galvanize and shop-prime loose steel lintels located in exterior walls.

## 2.9 SHELF AND RELIEVING ANGLES

- A. Fabricate shelf and relieving angles from steel angles of sizes indicated and for attachment to concrete framing. Provide slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and not more than 24 inches o.c., unless otherwise indicated.
- B. Galvanize shelf angles to be installed on exterior concrete or masonry framing.
- C. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete or masonry.

## 2.10 MISCELLANEOUS FRAMING AND SUPPORTS

- A. Provide steel framing and supports for applications indicated that are not a part of structural steel framework as required to complete the Work.
- B. Fabricate units to sizes, shapes, and profiles indicated and required to receive other adjacent construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.
  - 1. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.
- C. Galvanize miscellaneous framing and supports in exterior locations, in mechanical room; elevator pits and elevator equipment rooms; loading dock; and food service areas.

## 2.11 FINISHES, GENERAL

- A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applying and designing finishes.
- B. Finish metal fabrications after assembly.

## 2.12 STEEL AND IRON FINISHES

- A. Galvanizing: For those items indicated for galvanizing, apply zinc coating by the hot-dip process complying with the following requirements:
  - 1. ASTM A 153 for galvanizing iron and steel hardware.
  - 2. ASTM A 123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 inch thick or thicker.
- B. Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:
  - 1. Exteriors (SSPC Zone 1B): SSPC-SP 6 "Commercial Blast Cleaning."
  - 2. Interiors (SSPC Zone 1A): SSPC-SP 3 "Power Tool Cleaning."
- C. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes or to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA 1 "Paint Application Specification No. 1" for shop painting.
  - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

## 2.13 PAINT

- A. Shop Primer for Steel: 100% acrylic primer.
  - 1. Sherwin Williams Pro-Cryl Universal Metal Primer, B66-310 series.
  - 2. Or approved equal.
- B. Shop Primer for Steel: Alkyd primer.
  - 1. Sherwin Williams Kem Kromik Universal Metal Primer, B50Z series.
  - 2. Or approved equal.
- C. Shop Primer for Galvanized Steel: 100% acrylic primer.
  - 1. Sherwin Williams Pro-Cryl Universal Metal Primer, B66-310 series.
  - 2. Or approved equal.
- D. Shop Primer for Galvanized Steel: Zinc primer.
  - 1. Sherwin Williams Zinc Clad II, B69D11, B69V3
  - 2. Or approved equal.
- E. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight and complying with DOD-P-21035 or SSPC-Paint 20.
  - 1. Provide ZRC Cold Galvanizing Compound, or approved equivalent.
- F. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installing anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.
- B. Set sleeves in concrete with tops flush with finish surface elevations. Protect sleeves from water and concrete entry.

### 3.2 INSTALLATION, GENERAL

- A. Install metal fabrications according to Delegated Design Shop Drawings and to manufacturer's written instructions unless more stringent requirements are indicated.
- B. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.
- C. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.



- D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.
- E. 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 the surfaces of exterior units that have been hot-dip galvanized after fabrication and are intended for bolted or screwed field connections.
- F. 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 that no roughness shows after finishing, and contour of welded surface matches those adjacent.
- G. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.
- H. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
  - 1. Extruded Aluminum: Two coats of clear lacquer.

### 3.3 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor supports for point supported glass systems securely to and rigidly brace from building structure.
- C. Support steel members on solid grouted masonry or concrete. Secure steel members with anchor bolts embedded in grouted masonry or concrete.
  - 1. Where grout space under bearing plates is indicated for steel members supported on concrete or masonry, install as specified in "Setting Loose Plates" Article.

### 3.4 SETTING LOOSE PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of bearing plates.
- B. Set loose leveling and bearing plates on wedges or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the bearing plate before packing with grout.
  - 1. Use nonshrink, metallic grout in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations, unless otherwise indicated.
  - 2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

### 3.5 INSTALLING METAL BOLLARDS

- A. Set bollards in concrete footing as indicated on Drawings. Provide threaded rod through base of bollard to prevent twisting of round bollards once set in concrete. Fill bollards solidly with concrete, mounding top surface.

### 3.6 ADJUSTING AND CLEANING

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

END OF SECTION 05 50 00

SECTION 06 11 00  
ROUGH CARPENTRY

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. This Section includes the following:
  - 1. Wood blocking and nailers.
  - 2. Wood cants at roof areas.
  - 3. Miscellaneous wood framing for millwork and partitions
  - 4. Plywood backing panels.
- B. Related Sections include the following:
  - 1. Division 06 Section "Interior Architectural Woodwork" for nonstructural carpentry items exposed to view and not specified in another Section.
  - 2. Division 06 Section "Sheathing" for exterior sheathing materials.

1.3 DEFINITIONS

- A. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.
- B. Lumber grading agencies, and the abbreviations used to reference them, include the following:
  - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
  - 2. NHLA: National Hardwood Lumber Association.
  - 3. NLGA: National Lumber Grades Authority.
  - 4. SPIB: The Southern Pine Inspection Bureau.
  - 5. WCLIB: West Coast Lumber Inspection Bureau.
  - 6. WWSA: Western Wood Products Association.

1.4 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. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
  3. For fire-retardant treatments specified to be High-Temperature (HT) type include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
  4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
  5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
- B. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
1. Preservative-treated wood.
  2. Fire-retardant-treated wood.

## 1.5 DELIVERY, STORAGE, AND HANDLING

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

## PART 2 - PRODUCTS

### 2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
1. Factory mark each piece of lumber with grade stamp of grading agency.
  2. 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.
  3. Provide dressed lumber, S4S.
  4. Maximum Moisture Content: 19% for blocking and 15% when used for miscellaneous framing components

### 2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPAC U1, Use Category UC2, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPAC C31 with inorganic boron (SBX).
1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
  - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
  - 2. Wood sills, sleepers, blocking, and similar concealed members in contact with masonry or concrete.

## 2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. Comply with performance requirements in AWPAC20 (lumber) and AWPAC27 (plywood).
  - 1. Use treatment that does not promote corrosion of metal fasteners.
  - 2. Use Interior Type A.
- B. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
- C. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.
  - 1. Use treatment that does not promote corrosion of metal fasteners.
- D. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.
- E. Application: Treat items indicated on Drawings, and the following:
  - 1. Concealed blocking.
  - 2. Plywood backing panels.

## 2.4 MISCELLANEOUS LUMBER

- A. Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
  - 1. Blocking.
  - 2. Nailers.
  - 3. Rooftop equipment bases and support curbs.
  - 4. Cants.
  - 5. Grounds.
  - 6. Utility shelving.
- B. For items of dimension lumber size, provide Construction or No. 2 grade lumber with 15 percent maximum moisture content of any species.
- C. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:
  - 1. Eastern softwoods, No. 2 Common grade; NELMA.
  - 2. Mixed Southern Pine No. 2 SPIB

- D. For blocking not used for attachment of other construction Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select, and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

## 2.5 PLYWOOD BACKING PANELS AND PROTECTION WAINSCOT

- A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

## 2.6 FASTENERS

- A. Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
  - 1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Lag Bolts: ASME B18.2.1.
- E. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.
- F. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies and equal to four times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
  - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Do not splice structural members between supports, unless otherwise indicated.
- D. 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 o.c.

- E. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- F. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
  - 1. Use inorganic boron for items that are continuously protected from liquid water.
- G. Securely attach 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.

### 3.2 WOOD BLOCKING AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

### 3.3 PROTECTION

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

END OF SECTION 06 11 00

## SECTION 06 20 00

### FINISH 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. Interior trim (baseboard).
- B. Related Requirements:
  - 1. Section 061000 "Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view.

##### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.
- B. Samples for Verification:
  - 1. For each species and cut of lumber and panel products, with 1/2 of exposed surface finished; 8 by 10 inches for panels.
- C. Shop Drawings: Show baseboard profile.

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

- A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation. Protect materials from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.
- B. Deliver interior finish carpentry materials only when environmental conditions meet requirements specified for installation areas. If interior finish carpentry materials must be stored in other than installation areas, store only where environmental conditions meet requirements specified for installation areas.

##### 1.5 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install trim until building is enclosed, wet work is completed, and HVAC system is operational and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.



- B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
  - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

## PART 2 - PRODUCTS

### 2.1 MATERIALS, GENERAL

- A. Lumber: DOC PS 20 and the following grading rules:
  - 1. NHLA: National Hardwood Lumber Association, "Rules for the Measurement and Inspection of Hardwood and Cypress."
  - 2. NeLMA: Northeastern Lumber Manufacturer's Association, "Standard Grading Rules for Northeastern Lumber."
  - 3. NHGA: "National Lumber Grades Authority, "Standard Grading Rules for Canadian Lumber."
  - 4. SPIB: The Southern Pine Inspection Bureau," Standard Grading Rules for Southern Pine Lumber."

### 2.2 INTERIOR TRIM

- A. Lumber Trim for Opaque Finish at Interior Doors, Door Casings, Conference Room Millwork and Reception Desk (Painted Finish):
  - 1. Species and Grade: Eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine (Finish or No. 1 Common); NeLMA, NLGA, or WWPA.
  - 2. Maximum Moisture Content: 15 percent with at least 85 percent of shipment at 12 percent or less.
  - 3. Finger Jointing: Not allowed.
  - 4. Face Surface: Surfaced (smooth).

### 2.3 MISCELLANEOUS MATERIALS

- A. Fasteners for Finish Carpentry: Provide nails or screws, in sufficient length to penetrate not less than 1-1/2 inches (38 mm) into wood substrate.
  - 1. For face-fastening siding, provide ringed-shank siding nails or hot-dip galvanized-steel siding nails.
  - 2. For interior fasteners conceal attachments where possible.
- B. Flashing: Comply with requirements in Section 076200 "Sheet Metal Flashing and Trim" for flashing materials installed in exterior finish carpentry.
- C. Sealants: Latex, complying with ASTM C 834 Type OP, Grade NF and with applicable requirements in Section 079200 "Joint Sealants," recommended by sealant manufacturer and manufacturer of substrates for intended application.

### 2.4 FABRICATION

- A. Back out or kerf backs of standing and running trim wider than 5 inches, except members with ends exposed in finished work.
- B. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.
- B. Prime lumber and moldings to be painted, including both faces and edges, unless factory primed. Cut to required lengths and prime ends. Comply with requirements in Section 099113 "Exterior Painting."
- C. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours, unless longer conditioning is recommended by manufacturer.

### 3.3 INSTALLATION, GENERAL

- A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.
  - 1. Do not use manufactured units with defective surfaces, sizes, or patterns.
- B. Install finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
  - 1. Scribe and cut finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
  - 2. For interior components, where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
  - 3. Install to tolerance of 1/8 inch in 96 inches (or level and plumb. Install adjoining finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
  - 4. Coordinate finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate finish carpentry.

### 3.4 STANDING AND RUNNING TRIM INSTALLATION

- A. Install flat-grain lumber with "bark side" exposed.
- B. Install trim with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long except where necessary.
  - 1. Use scarf joints for end-to-end joints.
  - 2. Cope/miter at returns, miter at corners and cope at inside corners to produce tight fitting joints with full-surface contact throughout length of joint.
  - 3. Stagger end joints in adjacent and related members.
  - 4. Install trim after gypsum board joint finishing operations are completed.

- 5. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting. Fasten to prevent movement or warping. Countersink fastener heads on exposed carpentry work and fill holes.
- C. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Plane backs of casings to provide uniform thickness across joints, where necessary for alignment.
- D. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.

### 3.5 ADJUSTING

- A. Replace finish carpentry that is damaged or does not comply with requirements. Finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

### 3.6 CLEANING

- A. Clean finish carpentry on exposed and semi-exposed surfaces. Touch up finishes to restore damaged or soiled areas.

### 3.7 PROTECTION

- A. Protect installed products from damage from causes during construction.
- B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.
  - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 06 20 00

## SECTION 06 40 23

### INTERIOR ARCHITECTURAL WOODWORK

#### 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. This Section includes the following:
  - 1. Solid surfacing countertops.
- B. The following Sections contain requirements that relate to this Section:
  - 1. Division 05 Section "Metal Fabrications" for miscellaneous metal supports.
  - 2. Division 06 Section "Rough Carpentry" for blocking, and other carpentry work concealed in the wall.
  - 3. Division 08 Section "Glazing" for components installed as part of counters and countertops.
  - 4. Division 09 Section "Painting" for field finishing of wood trim.
  - 5. Division 12 Section "Quartz Agglomerate Countertops and Facings" for quartz countertops installed as part of counters and countertops.

##### 1.3 DEFINITIONS

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

##### 1.4 REFERENCES

- A. AWI: Architectural Woodwork Institute.

##### 1.5 SUBMITTALS

- A. Product data for each type of product and process specified and incorporated into items of architectural woodwork during fabrication, finishing, and installation.
  - 1. For installation adhesives, including printed statement of VOC content.
  - 2. For each adhesive used, documentation indicating that the adhesive contains no urea formaldehyde.
  - 3. For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
- B. Shop drawings showing location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Provide AWI shop drawing certification for all casework.
  2. Apply AWI-certified compliance label to first page of Shop Drawings.
  3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcing specified in other Sections.
  4. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, and other items installed in architectural woodwork. Plumbing contractor to supply templates for sink and faucet cutouts.
  5. Show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.
- C. Samples for verification of the following:
1. Laminate-clad panel products, 8 by 10 inches, for each type, color, pattern, and surface finish, with separate samples of unfaced panel product used for core.
  2. Veneer-faced panel products with or for transparent finish, 8 by 10 inches, for species and cut. Include at least one face-veneer seam and finish as specified.
  3. Exposed cabinet hardware, one unit for each type and finish.
- D. Product Certificates: For each type of product, signed by product manufacturer.
- E. Woodwork Quality Standard Compliance Certificates: AWI-certified compliance certificates.
- F. Qualification Data: For Fabricator.
- G. Maintenance Data: For cleaning and maintaining fabric for seating.

## 1.6 QUALITY ASSURANCE

- A. Single-Source Responsibility for Fabrication and Installation: Engage a qualified woodworking firm to assume undivided responsibility for fabricating, finishing, and installing woodwork specified in this Section.
- B. Coordination: Fabricator shall coordinate and receive from plumbing contractor template layouts for lavatory and faucet holes. Assure compliance for proper fit and clearances with architectural design intent as indicated on drawings.
- C. Quality Standard: Unless otherwise indicated, comply with AWI's "Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
1. Provide AWI-certified compliance labels and/or certificates indicating that woodwork, including installation, complies with requirements of grades specified.
  2. Plastic laminate-clad casework shall be AWI custom grade or better.
- D. Fire test response characteristics of High Pressure Laminates:
1. Provide with the following Class A (Class I) surface burning characteristics as determined by testing identical products per UL 723 (ASTM E84) or another testing and inspecting agency acceptable to authorities having jurisdiction:
    - a. Flame Spread Index: 25 or less.
    - b. Smoke Developed Index: 450 or less.

- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating compliance with performance requirements.

- 1. The manufacturer shall submit certified test reports made by an independent organization for each type and class of panel system. Reports shall verify that the material will meet all performance requirements of this specification. Previously completed test reports will be acceptable if they are indicative of products used on this project. Test reports required are:

- a. Self-Ignition Temperature per (ASTM 1929-3).
- b. Smoke Density per (ASTM D-2843).
- c. Burning Extent per (ASTM D-635).
- d. Interior Flame Spread per (ASTM E-84).
- e. Color Difference per (ASTM D-2244-85).

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect woodwork during transit, delivery, storage, and handling to prevent damage, soilage, and deterioration.
- B. Do not deliver woodwork until painting and similar operations that could damage, soil, or deteriorate woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas whose environmental conditions meet requirements specified in "Project Conditions."

#### 1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 43 and 70 percent during the remainder of the construction period.
- B. Field Measurements: Where woodwork is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before fabrication, and show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  - 1. Verify locations of concealed framing, blocking, reinforcements, and furring that support woodwork by accurate field measurements before being enclosed. Record measurements on final shop drawings.
  - 2. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site and coordinate construction to ensure that actual dimensions correspond to guaranteed dimensions.

#### 1.9 COORDINATION

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

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Provide materials that comply with requirements of AWI's Quality Standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Wood Species and Cut for Opaque Finish: Refer to Division 06 Section "Finish Carpentry".
- C. Wood Products: Comply with the following:
  - 1. Medium-Density Fiberboard: ANSI A208.2, Grade MD-Exterior Glue.
  - 2. Particleboard: ANSI A208.1, Grade M-2.
  - 3. Plywood At Counters Within The ASC Areas: Marine Grade Plywood, face Grades AB, complying with BS 1088.
  - 4. Made with adhesive containing no urea formaldehyde.
- D. High-Pressure Decorative Laminate:
  - 1. As indicated on Finish Plans.
  - 2. NEMA LD 3, grades as indicated, or if not indicated, as required by woodwork quality standard.
  - 3. Basis of Design Manufacturers: As indicated within schedules on Drawings. Products listed are indicated as a Basis of Design Product and products of comparable manufactures that can achieve the indicated color and finish selections, as approved by the Owner's Design Consultant, will also be considered acceptable for use on the Project.
- E. Adhesives, General: Do not use adhesives that contain urea formaldehyde.
- F. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
  - 1. Wood Glues: 30 g/L.
  - 2. Contact Adhesive: 250 g/L.
- G. Adhesive for Bonding Plastic Laminate: Contact cement.

### 2.2 CABINET HARDWARE AND ACCESSORY MATERIALS

- A. Provide cabinet hardware and accessory materials associated with architectural cabinets.
- B. Cabinet Hardware Schedule: Refer to schedule at end of this Section for cabinet hardware required for architectural cabinets.
- C. Hardware Standard: Comply with BHMA A156.9 for items indicated by reference to BHMA numbers or referenced to this standard.
- D. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA code number indicated.
  - 1. Satin Stainless Steel: BHMA 630.
- E. For concealed hardware provide manufacturer's standard finish that complies with product class requirements of BHMA A156.9.

### 2.3 INSTALLATION MATERIALS

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

- B. Screws: Select material, type, size, and finish required for each use. Comply with ASME B18.6.1 for applicable requirements.
  - 1. For metal framing supports, provide screws as recommended by metal-framing manufacturer.
- C. Nails: Select material, type, size, and finish required for each use. Comply with FS FF-N-105 for applicable requirements.
- D. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed steel or lead expansion bolt devices for drilled-in-place anchors.

## 2.4 FABRICATION, GENERAL

- A. Interior Woodwork Grade: Provide interior woodwork complying with the referenced quality standard and of the following grade:
  - 1. Grade: AWI Custom Grade "A" face.
- B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to relative humidity conditions existing during time of fabrication and in installation areas.
- C. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
  - 1. Corners of cabinets and edges of solid-wood (lumber) members 3/4 inch thick or less: 1/16 inch.
  - 2. Edges of rails and similar members more than 3/4 inch thick: 1/8 inch.
- D. Complete fabrication, including assembly, finishing, and hardware application, before shipment to Project site to maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- E. Shop-cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Smooth edges of cutouts and, where located in countertops and similar exposures, seal edges with a water-resistant coating.

## 2.5 LAMINATE-CLAD CABINETS (PLASTIC-COVERED CASEWORK) - FABRICATION

- A. Quality Standard: Comply with AWI Section 400 requirements for laminate-clad cabinets.
  - 1. Grade: Custom.
- B. AWI Type of Cabinet Construction: Flush overlay; frameless construction.
  - 1. Marine grade plywood shall be used at all countertops where sinks are installed within the "Procedure" portion of the building (Pre-Op, Nurse 209, Med Storage, Post Op, Contamination, Sterile, Pro Work Rooms, Pro Baths, Procedure Rooms, Procedure Suites, Men's and Woman's Lockers) . Where countertops are more than a single section, marine grade plywood shall be required for only that section were the sink resides. Extra MDF may be substituted for Marine grade plywood if the Contractor prefers.



- C. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
  - 1. Horizontal Surfaces Other than Tops: HGS, 0.048-inch nominal thickness.
  - 2. Vertical Surfaces: HGS, 0.048-inch nominal thickness.
  - 3. Edges: HGS, 0.048-inch nominal thickness.
- D. Materials for Semiexposed Surfaces: Provide surface materials indicated below:
  - 1. Surfaces Other than Drawer Bodies: High-pressure decorative laminate, Grade VGS, 0.028-inch nominal thickness.
  - 2. Drawer Sides and Backs: Solid hardwood lumber, shop finished.
  - 3. Drawer Bottoms: Hardwood plywood, shop finished.
- E. Provide dust panels of 1/4-inch plywood or tempered hardboard above compartments and drawers except where located directly under tops.
- F. Color/Finish: As indicated on Drawings and Finish Schedule.

## 2.6 LAMINATE-CLAD COUNTERTOPS - FABRICATON

- A. Quality Standard: Comply with AWI Section 400 requirements for countertops.
- B. Type of Top: High-pressure decorative laminate complying with the following:
  - 1. Grade: HGS, 0.048-inch nominal thickness.
  - 2. Edge Treatment: Solid White Maple as shown on drawings.
  - 3. Core Material: Phenolic resin, medium-density particleboard.
  - 4. Color/ Finish: As indicated on Drawings and Finish Schedule

## 2.7 SOLID SURFACING MATERIAL COUNTERTOPS

- A. Specified in Division 12 Section.

## 2.8 MISCELLANEOUS MATERIALS

- A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.
- B. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.
  - 1. Use wood glue that has a VOC content of 30 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Multipurpose Construction Adhesive: Formulation complying with ASTM D 3498 that is recommended for indicated use by adhesive manufacturer.
  - 1. Use adhesive that has a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.
  - 1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

## PART 3 - EXECUTION

### 3.1 PREPARATION

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

### 3.2 INSTALLATION

- A. Quality Standard: Install woodwork to comply with AWI Section 1700 for the same grade specified in Part 2 of this Section for type of woodwork involved.
- B. Install woodwork plumb, level, true, and straight with no distortions. Shim as required with concealed shims. Install to a tolerance of 1/8 inch in 96 inches for plumb and level (including tops).
- C. Scribe and cut woodwork to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.
- D. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork and matching final finish where transparent finish is indicated.
- E. Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 96 inches long, except where shorter single-length pieces are necessary. Scarf running joints and stagger in adjacent and related members.
  - 1. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base if finished.
  - 2. Install running trim with no more variation from a straight line than 1/8 inch in 96 inches.
- F. Cabinets: Install without distortion so that doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete the installation of hardware and accessory items as indicated.
  - 1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
  - 2. Provide continuous blocking or metal strapping at areas indicated to receive wall cabinetry.
- G. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
  - 1. Align adjacent surfaces of countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
  - 2. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
  - 3. Calk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants."

- H. Complete the finishing work specified in this Section to the extent not completed at shop or before installation of woodwork. Fill nail holes with matching filler where exposed. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats were applied in the shop.

### 3.3 ADJUSTING AND CLEANING

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

### 3.4 PROTECTION

- A. Provide final protection and maintain conditions in a manner acceptable to fabricator and Installer that ensures that woodwork is without damage or deterioration at the time of Substantial Completion.

### 3.5 CABINET HARDWARE AND ACCESSORY SCHEDULE

- A. BHMA numbers are used below to designate hardware requirements, except as otherwise indicated.
- B. Drill-In Concealed Hinges: Soss Invisible Hinge; Hafele.
  - 1. Opening angle 180°.
  - 2. Case is die-cast zinc; linkage is steel.
  - 3. Finish: Satin chrome.
  - 4. Operation: Self closing.
- C. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 170 degrees of opening, self closing.
- D. Pulls (General Casework): Hickory Hardware, Greenwich Cabinet Pull P3371-SS
  - 1. Stainless Steel finish.
  - 2. Length: 128 mm (nominal 5-inches hole spacing).
- E. Catches: As follows:
  - 1. Magnetic Catches: B03141.
- F. Recessed Adjustable Metal Shelf Standards: B04071.
  - 1. Shelf Rests for Standards: B04081.
- G. Drawer Slides: Side-mounted, full-extension, zinc-plated steel drawer slides with steel ball bearings, complying with BHMA A156.9, Grade 1 and rated for the following loads:
  - 1. Box Drawer Slides: 100 lbf at full extension.
  - 2. File Drawer Slides: 200 lbf at full extension.
  - 3. Pencil Drawer Slides: 45 lbf at full extension.

- H. Door Locks: E07121.
  - 1. Provide for all base- and wall-cabinets as indicated on drawings.
- I. Drawer Locks: E07041.
  - 1. Provide for all drawers as indicated on drawings.
- J. Grommets for Cable Passage Through Countertops: 3inch OD, stainless steel grommets with 3/4-inch hole and cap with slot for wire passage through countertops.
- K. Retractable Keyboard Tray:
  - 1. Doug Mockett KP7/M2-90 "Adjustable Keyboard Platform"
  - 2. Locations as indicated on drawings
- L. Wire Manager:
  - 1. Doug Mockett WM2 One-Piece J-Shape Wire Manager
  - 2. Locations as indicated on drawings.

END OF SECTION 06 40 23

SECTION 07 19 00  
WATER REPELLENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes clear water-repellent coatings for the following vertical surfaces:
  - 1. Brick masonry.
  - 2. Cast stone.
- B. Related Sections include the following:
  - 1. Division 7 Section "Joint Sealants" for joint sealants.

1.3 SUBMITTALS

- A. Product Data: Include manufacturer's specifications, surface preparation and application instructions, recommendations for water repellents for each surface to be treated, and protection and cleaning instructions. Include data substantiating that materials are recommended by manufacturer for applications indicated and comply with requirements.
- B. Samples: Of each substrate indicated to receive water repellent, 12 inches (300 mm) square, with specified repellent treatment applied to half of each sample.
- C. Manufacturer Certificates: Signed by manufacturer certifying that water repellents comply with requirements.
- D. Applicator Certificates: Signed by manufacturer certifying that the applicator is acceptable to manufacturer for application of products provided by manufacturer.

1.4 QUALITY ASSURANCE

- A. Applicator Qualifications: Engage an experienced applicator who employs only persons trained and approved by water repellent manufacturer for application of manufacturer's products.
- B. Field Samples: Architect will select one representative surface for each substrate to receive water repellents. Apply water repellent to each substrate, with either partial or full coverage as directed. Comply with application requirements of this Section.
  - 1. Obtain Architect's approval of field samples before applying water repellents.
  - 2. Maintain field samples during construction in an undisturbed condition as a standard for judging the completed Work.

## 1.5 PROJECT CONDITIONS

- A. Weather and Substrate Conditions: Do not proceed with application of water repellent under any of the following conditions, except with written instruction of manufacturer:
1. Ambient temperature is less than 40 deg F (4.4 deg C).
  2. Concrete surfaces and mortar have cured for less than 28 days.
  3. Concrete or brick masonry walls are not treated prior to 30 days after building close-in.
  4. Rain or temperatures below 40 deg F (4.4 deg C) are predicted within 24 hours.
  5. Application is earlier than 24 hours after surfaces have been wet.
  6. Substrate is frozen or surface temperature is less than 40 deg F (4.4 deg C).
  7. Windy condition exists that may cause water repellent to be blown onto vegetation or surfaces not intended to be coated.

## 1.6 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Special Warranty: Submit a written warranty, executed by the applicator and water repellent manufacturer, covering materials and labor, agreeing to repair or replace materials that fail to provide water repellency within the specified warranty period. Warranty does not include deterioration or failure of coating due to unusual weather phenomena, failure of prepared and treated substrate, formation of new joints and cracks in excess of 1/16 inch (1.5 mm) wide, fire, vandalism, or abuse by maintenance equipment.
1. Warranty Period: 5 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 WATER REPELLENTS

- A. Silane/Siloxane-Blend, Penetrating Water Repellent: Clear, silane and siloxane blend with 400 g/L or less of VOCs.
1. Products: Subject to compliance with requirements, provide the following:
    - a. PROSOCO, Inc; Siloxane PD (no substitute).

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements and conditions affecting performance of the Work.
1. Verify that surfaces are clean and dry according to water-repellent manufacturer's requirements. Check moisture content in ten representative locations by method recommended by manufacturer.
  2. Verify that there is no efflorescence or other removable residues that would be trapped beneath the application of water repellent.
  3. Verify that required repairs are complete, cured, and dry before applying water repellent.

- B. Test pH level according to water-repellent manufacturer's written instructions to ensure chemical bond to silica-containing or siliceous minerals.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. New Construction: Allow concrete and other cementitious materials to age before application of water repellent, according to repellent manufacturer's written instructions.
- B. Clean substrate of substances that might interfere with penetration or performance of water repellents. Test for moisture content, according to repellent manufacturer's written instructions, to ensure surface is sufficiently dry.
  - 1. Cast Stone: Remove oil, curing compounds, laitance, and other substances that inhibit penetration or performance of water repellents according to ASTM E 1857.
  - 2. Clay Brick Masonry: Clean clay brick masonry per ASTM D 5703.
- C. Test for pH level, according to water repellent manufacturer's written instructions, to ensure chemical bond to silicate minerals.
- D. Protect adjoining work, including sealant bond surfaces, from spillage or blow-over of water repellent. Cover adjoining and nearby surfaces of aluminum and glass if there is the possibility of water repellent being deposited on surfaces. Cover live plants and grass.
  - 1. Immediately clean water repellent from adjoining surfaces, complying with manufacturer's cleaning recommendations.
- E. Coordination with Mortar Joints: Do not apply water repellent until pointing mortar for joints adjacent to surfaces receiving water-repellent treatment has been installed and cured.
- F. Coordination with Sealants: Do not apply water repellent until sealants for joints adjacent to surfaces receiving water-repellent treatment have been installed and cured.
  - 1. Water-repellent work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent, and sealant materials identical to those used in the work.
- G. Test Application: Before performing water-repellent work, including bulk purchase and delivery of products, prepare a small application in an unobtrusive location and in a manner approved by Architect to demonstrate the final effect (visual, physical, and chemical) of planned application. Proceed with work only after Architect approves test application or as otherwise directed.
- H. Revisions of planned application, if any, as requested by Architect, will be by Change Order if they constitute a departure from requirements of Contract Documents at the time of contracting.

### 3.3 APPLICATION

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect the substrate before application of water repellent and to instruct Applicator on the product and application method to be used.

- B. Apply coating of water repellent on surfaces to be treated using 15 psi-pressure spray with a fan-type spray nozzle, roller, or brush to the point of saturation. Apply coating in dual passes of uniform, overlapping strokes. Remove excess material; do not allow material to puddle beyond saturation. Comply with manufacturer's written instructions for application procedure unless otherwise indicated.
  - 1. Cast Stone: At Contractor's option, first application of water repellent may be completed before installing units. Mask mortar and sealant bond surfaces to prevent water repellent from migrating onto joint surfaces. Remove masking after repellent has cured.
- C. Apply a second saturation coating, repeating first application. Comply with manufacturer's written instructions for limitations on drying time between coats and after rainstorm wetting of surfaces between coats. Consult manufacturer's technical representative if written instructions are not applicable to Project conditions.

#### 3.4 FIELD QUALITY CONTROL

- A. Coverage Test: In the presence of Architect, hose down a dry, repellent-treated surface to verify complete and uniform product application. A change in surface color will indicate incomplete application.
  - 1. Notify Architect even days in advance of the dates and times when surfaces will be tested.
  - 2. Reapply water repellent until coverage test indicates complete coverage.

#### 3.5 CLEANING

- A. Protective Coverings: Remove protective coverings from adjacent surfaces and other protected areas.
- B. Immediately clean water repellent from adjoining surfaces and surfaces soiled or damaged by water-repellent application as work progresses. Repair damage caused by water-repellent application.
- C. Comply with manufacturer's written cleaning instructions.

END OF SECTION 07 19 00



## SECTION 07 22 00

### ROOF INSULATION

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. Work shall include, but is not limited to, the following:
  - 1. Preparation of new and existing Lightweight Insulating Concrete over Steel roof deck, Sloped Steel Deck and Structural Concrete Decks and all flashing substrates.
  - 2. Insulation (meet minimum R of 20.)
  - 3. Cover-board (Adhered)
  - 4. All related materials and labor required to complete specified roofing necessary to receive specified manufacturer's warranty.
  - 5. Cellular Lightweight Insulating Concrete New and Existing = Base Sheet / Coverboard / 2 ply (no insulation added)
  - 6. Sloped Steel = ISO / Cover board / 2 ply
  - 7. Structural Concrete = 1/4" Tapered / Coverboard / 2 ply

##### 1.02 RELATED SECTIONS

- A. Division 010000 – General Requirements
- B. Division 011000 – Summary of Work
- C. Division 071416 – Cold Fluid-Applied Waterproofing
- D. Division 072713 – Modified Bituminous Sheet Vapor Retarders
- E. Division 075216 – Styrene-Butadiene-Styrene (SBS) Modified Bitumen Membrane Roofing
- F. Division 076200 – Sheet Metal Flashing and Trim

##### 1.03 DEFINITIONS

- A. ASTM D 1079-Definitions of Term Relating to Roofing and Waterproofing.
- B. The National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual, Fifth Edition Glossary.

##### 1.04 REFERENCES

- A. AMERICAN SOCIETY OF CIVIL ENGINEERS - Reference Document ASCE 7, Minimum Design Loads for Buildings and Other Structures.

- B. AMERICAN STANDARD OF TESTING METHODS (ASTM):
  - 1. ASTM C 1177/C 1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
  - 2. ASTM C 1278 - Standard Specification for Fiber-Reinforced Gypsum Panel.
  - 3. ASTM C 1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Insulation Board.
  - 4. ASTM C 1325 – Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units.
  - 5. ASTM D 41 - Standard Specification for Asphalt Primer Used in Roofing, Damp proofing, and Waterproofing.
- C. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)::
  - 1. ANSI/SPRI FX-1, Standard Field Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners.
  - 2. ANSI/SPRI IA-1, Standard Field Test Procedure for Determining the Mechanical Uplift Resistance of Insulation Adhesives over Various Substrates.
  - 3. ANSI/FM 4474- American National Standard for Evaluating the Simulated Wind Resistance of Roof Assemblies Using Static Positive and/or Negative Differential Pressures.
- D. FACTORY MUTUAL (FM):
  - 1. FM 4450 - Approval Standard - Class I Insulated Steel Roof Decks.
  - 2. FM 4470 - Approval Standard - Class I Roof Covers.
- E. FLORIDA BUILDING CODE (FBC):
  - 1. 20XX Florida Building Code (FBC).
- F. INTERNATIONAL CODES COUNCIL (ICC):
  - 1. 20XX International Building Code (IBC).
- G. NATIONAL ROOFING CONTRACTORS' ASSOCIATION (NRCA).
- H. UNDERWRITERS LABORATORY (UL):
  - 1. UL 790 Standard Test Methods for Fire Tests of Roof Coverings.
  - 2. UL 1256 – Fire Test of Roof Deck Constructions.

#### 1.05 ACTION SUBMITTALS

- A. Product Data Sheets: Submit manufacturer's product data sheets, installation instructions and/or general requirements for each component.
- B. Safety Data Sheets: Submit manufacturer's Safety Data Sheets (SDS) for each component.
- C. Sample/Specimen Warranty from the manufacturer and contractor.
- D. Shop Drawings: Provide roof plan and applicable roof system detail drawings.

#### 1.06 INFORMATIONAL SUBMITTALS

- A. Contractor Certification: Submit written certification from roofing system manufacturer certifying that the applicator is authorized by the manufacturer to install the specified materials and system.

## 1.07 CLOSEOUT SUBMITTALS

- A. Warranty: Provide manufacturer's and contractor's warranties upon substantial completion of the roofing system.

## 1.08 QUALITY ASSURANCE

- A. MANUFACTURER QUALIFICATIONS:
  - 1. Manufacture shall have 20 years of experience manufacturing roofing materials.
  - 2. Trained Technical Field Representatives, employed by the manufacturer, independent of sales.
  - 3. Provide reports in a timely manner of all site visit reports.
  - 4. Provide specified warranty upon satisfactory project completion.
- B. CONTRACTOR QUALIFICATIONS:
  - 1. Contractor shall be authorized by the manufacturer to install specified materials prior to the bidding period through satisfactory project completion.
  - 2. Applicators shall have completed projects of similar scope using same materials as specified herein.
  - 3. Contractor shall provide full time, on-site superintendent or foreman experienced with the specified roof system through satisfactory project completion.
  - 4. Applicators shall be skilled in the application methods for all materials.
  - 5. Contractor shall maintain a daily record, on-site, documenting material installation and related project conditions.
  - 6. Contractor shall maintain a copy of all submittal documents, on-site, available at all times for reference.

## 1.09 DELIVERY, STORAGE AND HANDLING

- A. Refer to each product data sheet or other published literature for specific requirements.
- B. Deliver materials and store them in their unopened, original packaging, bearing the manufacturer's name, related standards, and any other specification or reference accepted as standard.
- C. Protect and store materials in a dry, well-vented, and weatherproof location. Only materials to be used the same day shall be removed from this location.
- D. When materials are to be stored outdoors, store away from standing water, stacked on raised pallets or dunnage, at least 4 in or more above ground level. Carefully cover storage with "breathable" tarpaulins to protect materials from precipitation and to prevent exposure to condensation.
- E. Properly dispose of all product wrappers, pallets, cardboard tubes, scrap, waste, and debris. All damaged materials shall be removed from job site and replaced with new, suitable materials.

## 1.10 SITE CONDITIONS

- A. SAFETY:
  - 1. The contractor shall be responsible for complying with all project-related safety and environmental requirements.
  - 2. Refer to NRCA CERTA recommendations, local codes and building owner's requirements for hot work operations.

3. The contractor shall review project conditions and determine when and where conditions are appropriate to utilize the specified liquid-applied, or semi-solid roofing materials. When conditions are determined by the contractor to be unsafe or undesirable to proceed, measures shall be taken to prevent or eliminate the unsafe or undesirable exposures and conditions, or equivalent approved materials and methods shall be utilized to accommodate requirements and conditions.
4. The contractor shall review project conditions and determine when and where conditions are appropriate to utilize the specified hot asphalt-applied materials. When conditions are determined by the contractor to be unsafe or undesirable to proceed, measures shall be taken to prevent or eliminate the unsafe or undesirable exposures and conditions, or equivalent approved materials and methods shall be utilized to accommodate requirements and conditions. .
5. The contractor shall refer to product Safety Data Sheets (SDS) for health, safety, and environment related hazards, and take all necessary measures and precautions to comply with exposure requirements.

B. ENVIRONMENTAL CONDITIONS:

1. Monitor substrate temperature and material temperature, as well as all environmental conditions such as ambient temperature, moisture, sun, cloud cover, wind, humidity, and shade. Ensure conditions are satisfactory to begin work and ensure conditions remain satisfactory during the installation of specified materials. Materials and methods shall be adjusted as necessary to accommodate varying project conditions. Materials shall not be installed when conditions are unacceptable to achieve the specified results.
2. Precipitation and dew point: Monitor weather to ensure the project environment is dry before, and will remain dry, during the application of roofing materials. Ensure all roofing materials and substrates remain above the dew point temperature as required to prevent condensation and maintain dry conditions.
3. Mopping asphalt application: Primer, where used, shall be fully dry before applying hot asphalt. Take all necessary measures and monitor all conditions, to ensure the specified asphalt temperature is no less than 400°F (204°C) at the point of contact with the specified membrane as it is rolled into the hot asphalt.

## 1.11 PERFORMANCE REQUIREMENTS

A. FIRE CLASSIFICATION:

1. Roof construction performance testing shall be in accordance with UL 1256, FM 4450 or FM 4470 to meet the specified requirements for interior flame spread and fuel contribution.
  - a. Roof construction meets requirements of UL 1256, or FM Class 1.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURER

- A. SINGLE SOURCE MANUFACTURER: All roofing materials shall be provided by a single supplier with 20 years or more manufacturing history in the US.
1. Comply with the Manufacturer's requirements as necessary to provide the specified warranty.

- B. PRODUCT QUALITY ASSURANCE PROGRAM: Manufacturer shall be an ISO 9001 registered company.
- C. ACCEPTABLE MANUFACTURER:
  - 1. Soprema
  - 2. Garland
  - 3. Tremco
  - 4. Prior Approved Equal

## 2.02 THERMAL INSULATION SYSTEM

- A. RIGID INSULATION
  - 1. POLYISOCYANURATE INSULATION:
    - a. SOPRA-ISO: Closed cell polyisocyanurate foam core bonded on each side to a glass fiber-reinforced felt facer.
      - i. Thickness: Two-inch (2") board thickness. Total thickness to meet specified insulation system thermal resistance 'R' value of 20
      - ii. Dimensions: 4 x 4 ft or 4 x 8 ft boards
      - iii. Meets or exceeds ASTM C1289, Type II, Class 1, Grade 2 (20 psi).
    - b. SOPRA-ISO Tapered: Closed cell polyisocyanurate foam core bonded on each side to a glass fiber-reinforced felt facer, tapered to provide slope.
      - i. Taper: 1/4, 1/2 Crickets in per foot. Insulation, crickets and saddles provided with taper as required for positive roof slope. Tapered to meet an Average R of 20.
      - ii. Dimensions: 4 x 4 ft boards
      - iii. Meets or exceeds ASTM C1289, Type II, Class 1, Grade 2 (20 psi).
- B. COVER-BOARD (ADHERED)
  - 1. ASPHALTIC ROOF BOARD
    - a. SOPREMA SOPRABOARD (Resisto Board, Ecology Roof System Corp. ERS Ecology Roof Board, Viridian Systems, LLC., Pika Ply Recovery Board, IKO Industries, Ltd., ProtectoBoard, Henry Company Recover Board): Mineral fortified, asphaltic roof substrate board with glass fiber facers. For use as roof cover-board and for vertical flashing substrate. ASPHALTIC ROOF BOARD shall be manufactured by the membrane supplier.
      - i. Thickness: 1/4 in
      - ii. Dimensions: 4 x 8 ft acceptable for mechanical attachment, insulation adhesive or asphalt application.
      - iii. Water absorption: Less than 1 percent per ASTM D994.
      - iv. Impact resistance: Included in FM Approvals per 4450/4470 for FM Severe Hail (SH) rating.
      - v. Compressive strength, psi (kPa) measured at 50 percent compression, per ASTM C472:
        - a) 1/4 in board: 1,320 (9,100)

- vi. Puncture resistance, lbf (N) per ASTM E154:
  - a) ¼ in board: 100 (445)

C. INSULATION CANT AND TAPERED STRIP

1. CANT STRIP, MODIFIED BITUMEN

- a. SOPREMA SOPRACANT MB: Modified bitumen cant strips
  - i. Length: 39.4 in sections.
  - ii. Cross-section dimensions: Size as required for flashing conditions.

2. TAPERED EDGE STRIP AND BOARDS:

- a. Expanded perlite, blended with binders and fibers.
  - i. Dimensions: Size as required.
  - ii. Meets or exceeds ASTM C728.

D. INSULATION ADHESIVE

1. POLYURETHANE FOAM INSULATION ADHESIVE

- a. SOPREMA DUOTACK 365: Two-component, polyurethane foam insulation adhesive, applied in ribbons from cartridges or two-component bulk packaging with pump-driven delivery system.
  - i. Ribbon size: 1/2 in to 3/4 in wide.
  - ii. Ribbon spacing: As required to meet specified wind uplift resistance performance.
    - a) Field of Roof (Zone 1): 12 in on-centers
    - b) Perimeter of Roof (Zone 2): 6 in on-centers
    - c) Corners of Roof (Zone 3): 4 in on-centers
- b. SOPREMA DUOTACK SPF HFO: Two-component, polyurethane foam insulation adhesive, applied in ribbons from two-component compressed cylinders.
  - i. Ribbon size: 2-1/2 to 3-1/2 in wide.
  - ii. Ribbon spacing: As required to meet specified wind uplift resistance performance.
    - a) Field of Roof (Zone 1): 12 in on-centers
    - b) Perimeter of Roof (Zone 2): 6 in on-centers
    - c) Corners of Roof (Zone 3): 4 in on-centers

2.03 ACCESSORIES

A. PRIMERS:

- 1. ELASTOCOL 500 PRIMER: Asphalt cut-back primer. Primer for the preparation of substrates for asphalt applications.
  - a. Meets or exceeds ASTM D41
  - b. VOC content: 350 g/L or less.

B. INSULATION FASTENERS AND PLATES

- 1. SOPREMA #14 MP FASTENER and SOPREMA 3 IN INSULATION PLATE: Insulation system fasteners and metal stress plates.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Examination includes visual observations, qualitative analysis, and quantitative testing measures as necessary to ensure conditions remain satisfactory throughout the project.
- B. Conduct qualitative insulation adhesive adhesion tests, or quantitative bonded pull tests as necessary to ensure satisfactory adhesion is achieved.
- C. The contractor shall examine all roofing substrates including, but not limited to insulation materials, roof decks, walls, curbs, rooftop equipment, fixtures, and wood blocking.
- D. The applicator shall not begin installation until conditions have been properly examined and determined to be clean, dry and, otherwise satisfactory to receive specified roofing materials.
- E. During the application of specified materials, the applicator shall continue to examine all project conditions to ensure conditions remain satisfactory to complete the specified roofing system.

### 3.02 PREPARATION

- A. Before commencing work each day, the contractor shall prepare all roofing substrates to ensure conditions are satisfactory to proceed with the installation of specified roofing materials. Preparation of substrates includes, but is not limited to, substrate repairs, securement of substrates, eliminating all incompatible materials, and cleaning.
- B. Where conditions are found to be unsatisfactory, work shall not begin until conditions are made satisfactory to begin work. Commencing of work shall indicate contractor's acceptance of conditions.

### 3.03 PRIMER APPLICATION

- A. Apply the appropriate specified primer to dry, compatible substrates as required to enhance adhesion of new specified roofing materials.
- B. Apply primer using brush, roller, or sprayer at the rate published on the product data sheet.
- C. Asphalt Primer: Apply primer to dry compatible masonry, metal, wood and other required substrates before applying asphalt.
- D. Project conditions vary throughout the day. Monitor changing conditions, monitor the drying time of primers, and monitor the adhesion of the membrane plies. Adjust primer and membrane application methods as necessary to achieve the desired results.

### 3.04 INSULATION FASTENER APPLICATION

- A. Fasten (Insulation Base Layer and Insulation top layer) to the deck using specified insulation fasteners and plates.
- B. Evenly distribute fasteners as required by the board manufacturer's published requirements.
- C. Fasten the insulation to meet the specified wind uplift resistance performance requirements and warranty requirements.

- D. Minimum insulation fastening requirement:
1. Field of Roof (Zone 1): 12 fasteners per 4x8 ft board.
  2. Perimeter of Roof (Zone 2): 24 fasteners per 4x8 ft board.
  3. Corners of Roof (Zone 3): 32 fasteners per 4x8 ft board.
- E. For insulation and Cover-boards located partially within the defined perimeter and/or corners, install fastening for the entire board as specified herein.

### 3.05 INSULATION ADHESIVE APPLICATION

A. DUOTACK 365

1. Apply the specified two-component insulation adhesive to adhere (Insulation Layers, Cover-board) to the deck and insulation substrate(s).
2. Follow insulation adhesive product data sheets and published general requirements for installation requirements.
3. Apply insulation adhesive in uniform ribbons, 1/2 in to 3/4 in wide.
4. Immediately install insulation components into insulation adhesive and apply weight to ensure the materials maintain full contact with all ribbons for complete adhesion. Do not allow insulation adhesive to skin-over before placing the insulation materials into the adhesive.
5. Adhere the insulation system to meet the specified wind uplift resistance performance and specified warranty requirements.
6. Minimum insulation adhesive ribbon spacing:
  - a. Field of Roof (Zone 1): 12 in on-centers.
  - b. Perimeter of Roof (Zone 2): 6 in on-centers.
  - c. Corners of Roof (Zone 3): 4 in on-centers.

B. DUOTACK SPF HFO

1. Apply the specified two-component insulation adhesive to adhere (Insulation Layers, Cover-board) to the deck and insulation substrate(s).
2. Follow insulation adhesive product data sheets and published general requirements for installation requirements.
3. Apply insulation adhesive in uniform ribbons, 2-1/2 to 3-1/2 in wide.
4. Install insulation components into insulation adhesive and apply weight to ensure the materials maintain full contact with all ribbons for complete adhesion. Do not allow insulation adhesive to skin-over before placing the insulation materials into the adhesive.
5. Adhere the insulation system to meet the specified wind uplift resistance performance and specified warranty requirements.
6. Minimum insulation adhesive ribbon spacing:
  - a. Field of Roof (Zone 1): 12 in on-centers.
  - b. Perimeter of Roof (Zone 2): 6 in on-centers.
  - c. Corners of Roof (Zone 3): 4 in on-centers.



### 3.06 INSULATION SYSTEM APPLICATION

- A. Follow insulation system component product data sheets, published general requirements and, approvals.
- B. Install all insulation system components on clean, dry, uniform and, properly prepared substrates.
- C. All insulation system boards shall be carefully installed and fitted against adjoining sheets to form tight joints.
- D. Insulation system boards that must be cut to fit shall be saw-cut or knife-cut in a straight line, not broken. Chalk lines shall be used to cut insulation components. Uneven or broken edges shall not be accepted. Remove dust and debris that develops during cutting operations.
- E. Stagger successive layers of insulation 12 in vertically and laterally to ensure board joints do not coincide with joints from the layers above and below.
- F. Crickets, saddles, and tapered edge strips shall be installed before installing Cover-boards.
- G. Install tapered insulation, saddles and crickets as required to ensure positive slope for complete roof drainage.
- H. Cover-boards shall be installed to fit tight against adjacent boards. When required by the Cover-board manufacturer, a uniform gap shall be provided between Cover-boards using a uniform guide placed between board joints to form a gap between all boards during installation.
- I. The finished insulation system surface shall be tight to, and flush with, adjacent substrates to form a satisfactory substrate to install specified roof membrane and flashings.
- J. Install specified cants where required for membrane flashing transitions.

### 3.07 CLEAN-UP

- A. Clean-up and properly dispose of waste and debris resulting from these operations each day as required to prevent damages and disruptions to operations.

END OF SECTION

## SECTION 07 52 16

### 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. Work shall include, but is not limited to, the following:
  - 1. Preparation of new and existing Lightweight Insulating Concrete over Steel roof deck, Sloped Steel Deck and Structural Concrete Decks and all flashing substrates.
  - 2. Base Sheet mechanically fastened at new and existing LWIC.
  - 3. SBS-modified bitumen base ply (heat-welded).
  - 4. SBS-modified bitumen cap sheet (heat-welded).
  - 5. SBS-modified bitumen membrane flashings.
  - 6. Liquid-applied, reinforced flashings.
  - 7. Refer to related Sections for Insulation, Coverboard and Roof Edge Systems.
  - 8. All related materials and labor required to complete specified roofing necessary to receive specified manufacturer's warranty.
  - 9. Cellular Lightweight Insulating Concrete New and Existing = Base Sheet / Coverboard / 2 ply (no insulation added).
  - 10. Sloped Steel = ISO / Cover board / 2 ply.
  - 11. Structural Concrete = 1/4" Tapered / Coverboard / 2 ply.
- B. Related Sections: The following sections contain requirements that relate to this Section:
  - 1. Division 01 Section "Project Meetings".
  - 2. Division 06 Section "Rough Carpentry".
  - 3. Division 07 Section "Roof Insulation".
  - 4. Division 07 Section "Sheet Metal Flashing and Trim".
  - 5. Divisions 22 and 23 Sections for roof drains and mechanical equipment curbs and penetrations to be installed on and in conjunction with membrane roofing system.
  - 6. Division 26 sections for electrical components and equipment to be installed on and in conjunction with membrane roofing system.

##### 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. The National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual, Fifth Edition Glossary.

##### 1.4 REFERENCES

- A. AMERICAN SOCIETY OF CIVIL ENGINEERS - Reference Document ASCE 7, Minimum Design Loads for Buildings and Other Structures.
- B. AMERICAN STANDARD OF TESTING METHODS (ASTM):
  - 1. ASTM C 836 - Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course.
  - 2. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants.

3. ASTM D 41 - Standard Specification for Asphalt Primer Used in Roofing, Damp proofing, and Waterproofing.
4. ASTM D 1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
5. ASTM D 3019 - Standard Specification for Lap Cement Used with Asphalt Roll Roofing, Non-Fibred, Asbestos-Fibred, and Non-Asbestos-Fibred.
6. ASTM D 3746 - Standard Test Method for Impact Resistance of Bituminous Roofing System.
7. ASTM D 4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free.
8. ASTM D 4601 - Standard Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing.
9. ASTM D 5147 - Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material.
10. ASTM D 5849 - Standard Test Method for Evaluating Resistance of Modified Bituminous Roofing Membrane to Cyclic Fatigue (Joint Displacement).
11. ASTM D 6164 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.
12. ASTM D 7379 - Standard Test Methods for Strength of Modified Bitumen Sheet Material Laps Using Cold Process Adhesive.
13. ASTM E 108 - Standard Test Methods for Fire Tests of Roof Coverings.
14. ASTM E 1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.

C. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI):

1. ANSI/SPRI/FM 4435/ES-1 Wind Design Standard for Edge System Used with Low Slope Roofing System.
2. ANSI/SPRI FX-1, Standard Field Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners.
3. ANSI/SPRI IA-1, Standard Field Test Procedure for Determining the Mechanical Uplift Resistance of Insulation Adhesives over Various Substrates.
4. ANSI/FM 4474- American National Standard for Evaluating the Simulated Wind Resistance of Roof Assemblies Using Static Positive and/or Negative Differential Pressures.

D. FACTORY MUTUAL (FM):

1. FM 4450 - Approval Standard - Class I Insulated Steel Roof Decks.
2. FM 4470 - Approval Standard - Class I Roof Covers.

E. FLORIDA BUILDING CODE (FBC):

1. 20XX Florida Building Code (FBC).

F. INTERNATIONAL CODES COUNCIL (ICC):

1. 20XX International Building Code (IBC).

G. NATIONAL ROOFING CONTRACTORS' ASSOCIATION (NRCA):

1. UL 790 Standard Test Methods for Fire Tests of Roof Coverings.
2. UL 1256 – Fire Test of Roof Deck Constructions.

## 1.5 ACTION SUBMITTALS

- A. Product Data Sheets: Submit manufacturer's product data sheets, installation instructions and/or general requirements for each component.
- B. Safety Data Sheets: Submit manufacturer's Safety Data Sheets (SDS) for each component.
- C. Sample warranty from the manufacturer and contractor.
- D. Provide roof plan and representative detail drawings.

## 1.6 INFORMATIONAL SUBMITTALS

- A. Submit a letter from the roofing manufacturer indicating the contractor is an authorized applicator.

## 1.7 CLOSEOUT SUBMITTALS

- A. Warranty: Provide manufacturer's and contractor's warranties upon project completion.

## 1.8 QUALITY ASSURANCE

### A. Manufacturer Qualifications:

- 1. Manufacturer shall have 20 years of manufacturing experience.
- 2. Manufacturer shall have trained technical service representatives employed by the manufacturer, independent of sales.
- 3. Manufacturer shall provide site visit reports in a timely manner.

### B. Contractor Qualifications:

- 1. Contractor shall be authorized by the manufacturer to install specified materials prior to the bidding period through satisfactory project completion.
- 2. Applicators shall have completed projects of similar scope using same or similar materials specified.
- 3. Contractor shall provide full time, on-site superintendent or foreman experienced with the specified roofing from beginning through satisfactory project completion.
- 4. Applicators shall be skilled in the application methods for all materials.
- 5. Contractor shall maintain a daily record, on-site, documenting material installation and related project conditions.
- 6. Contractor shall maintain a copy of all submittal documents, on-site, available at all times for reference.

## 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Refer to each product data sheet or other published literature for specific requirements.
- B. Deliver materials and store them in their unopened, original packaging, bearing the manufacturer's name, related standards, and any other specification or reference accepted as standard.
- C. Protect and store materials in a dry, well-vented, and weatherproof location. Only materials to be used the same day shall be removed from this location. During cold weather, store materials in a heated location, removed only as needed for immediate use.
- D. When materials are to be stored outdoors, store away from standing water, stacked on raised pallets or dunnage, at least 4 in or more above ground level. Carefully cover storage with "breathable" tarpaulins to protect materials from precipitation and to prevent exposure to condensation.
- E. Carefully store roof membrane materials delivered in rolls on-end with selvage edges up. Store and protect roll storage to prevent damage.
- F. Properly dispose of all product wrappers, pallets, cardboard tubes, scrap, waste, and debris. All damaged materials shall be removed from job site and replaced with new, suitable materials.

## 1.10 SITE CONDITIONS

### A. Safety:

1. The contractor shall be responsible for complying with all project-related safety and environmental requirements.
2. Heat-welding shall include heating the specified membrane ply using propane roof torches or electric hot-air welding equipment. The contractor shall determine when and where conditions are appropriate to utilize heat-welding equipment. When conditions are determined by the contractor to be unsafe to proceed, equivalent SBS-modified bitumen materials and methods shall be utilized to accommodate requirements and conditions.
3. Refer to NRCA CERTA recommendations, local codes and building owner's requirements for hot work operations.
4. The contractor shall review project conditions and determine when and where conditions are appropriate to utilize the specified liquid-applied, or semi-solid roofing materials. When conditions are determined by the contractor to be unsafe or undesirable to proceed, measures shall be taken to prevent or eliminate the unsafe or undesirable exposures and conditions, or equivalent approved materials and methods shall be utilized to accommodate requirements and conditions.
5. The contractor shall review project conditions and determine when and where conditions are appropriate to utilize the specified hot asphalt-applied materials. When conditions are determined by the contractor to be unsafe or undesirable to proceed, measures shall be taken to prevent or eliminate the unsafe or undesirable exposures and conditions, or equivalent approved materials and methods shall be utilized to accommodate requirements and conditions.
6. The contractor shall refer to product Safety Data Sheets (SDS) for health, safety, and environment related hazards, and take all necessary measures and precautions to comply with exposure requirements.

### B. Environmental Conditions:

1. Monitor substrate temperature and material temperature, as well as all environmental conditions such as ambient temperature, moisture, sun, cloud cover, wind, humidity, and shade. Ensure conditions are satisfactory to begin work and ensure conditions remain satisfactory during the installation of specified materials. Materials and methods shall be adjusted as necessary to accommodate varying project conditions. Materials shall not be installed when conditions are unacceptable to achieve the specified results.
2. Precipitation and dew point: Monitor weather to ensure the project environment is dry before, and will remain dry, during the application of roofing materials. Ensure all roofing materials and substrates remain above the dew point temperature as required to prevent condensation and maintain dry conditions.
3. Heat-Welding Application: Take all necessary precautions and measures to monitor conditions to ensure all environmental conditions are safe to use roof torches and hot-air welding equipment. Combustibles, flammable liquids and solvent vapors that represent a hazard shall be eliminated. Flammable primers and cleaners shall be fully dry before proceeding with heat-welding operations. Prevent or protect wood, paper, plastics and other such combustible materials from direct exposure to open flames from roof torches. Refer to NRCA CERTA recommendations.

## 1.11 PERFORMANCE REQUIREMENTS

### A. Wind Uplift Resistance:

7. Performance testing shall be in accordance with ANSI/FM 4474, FM 4450, FM 4470, UL 580 or UL 1897
  - a. Roof System Design Pressures: Calculated in accordance with ASCE 7, or applicable standard, for the specified roof system attachment requirements.
  - b. Design Pressures:
    - 1) Field of Roof (Zone 1): -24.2 psf.
    - 2) Perimeter of Roof (Zone 2): 40.6 psf.
    - 3) Corners of Roof (Zone 3): 40.6 psf.

### B. Fire Classification:

1. Performance testing shall be in accordance with UL 790, ASTM E108, FM 4450 or FM 4470 to meet the 1/4:12 roof slope requirement.
  - a. Meets requirements of UL Class A or FM Class A.
2. Performance testing shall be in accordance with UL 1256, FM 4450 or FM 4470 to meet the specified requirements for interior flame spread and fuel contribution.
  - a. Meets requirements of UL 1256, or FM Class 1.

### C. Impact Resistance:

1. Performance testing for impact resistance shall be in accordance with FM 4450, FM 4470, ASTM D3746 or CGSB 37-GP 56M to meet the specified impact resistance requirements.
  - a. Meets requirements for FM-SH (Severe Hail), ASTM D3746, or CGSB 37-GP 56M.

## 1.12 WARRANTY

- A. Manufacturer's 20 Year Total System No Dollar Limit (NDL) Warranty. The manufacturer shall provide the owner with the manufacturer's warranty providing labor and materials for 20 years from the date the warranty is issued.
- B. The contractor shall guarantee the workmanship and shall provide the owner with the contractor's warranty covering workmanship for a period of 2 years from completion date.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURER

- A. Single Source Manufacturer: All SBS modified bitumen membrane and flashing sheets shall be manufactured by a single supplier with 20 years or more manufacturing history in the US.
  1. Comply with the Manufacturer's requirements as necessary to provide the specified warranty.
- B. Product Quality Assurance Program: Manufacturer shall be an ISO 9001 registered company. A 'Quality Compliance Certificate (QCC) for reporting/confirming the tested values of the SBS-Modified Bitumen Membrane Materials will be supplied upon request.

C. Acceptable Manufacturer:

1. Soprema
2. Garland
3. Tremco

2.2 ROOFING SYSTEM

- A. The roof membrane assembly shall consist of a multi-ply, prefabricated, reinforced, homogeneous Styrene-Butadiene-Styrene (SBS) block copolymer modified asphalt membrane, secured to a prepared substrate. Reinforcement mats shall be impregnated (saturated) and coated with a high quality SBS modified bitumen blend. The cross section of the sheet material shall contain no oxidized or non-SBS modified bitumen.

2.3 SBS-MODIFIED BITUMEN MEMBRANES

A. Base Sheet/Anchor Sheet:

1. Base Sheet/Anchor Sheet, Mechanically Fastened:

- a. MODIFIED SOPRA-G: SBS-modified bitumen coated and impregnated glass fiber base sheet, mechanically fastened, approved for use with torch, asphalt or cold adhesive membrane applications.

- 1) Width: 36 in (0.914 m)
- 2) Meets or exceeds ASTM D4601, Type II, UL Type G2.

B. Base Ply:

1. Base Ply, Heat-Welded:

- a. SOPREMA SOPRALENE FLAM 180: SBS-modified bitumen membrane with plastic burn-off film on top and bottom surfaces. Non-woven polyester reinforcement. Meets or exceeds ASTM D6164, Type I, Grade S, per ASTM D5147 test methods:

- 1) Thickness: 118 mils (3.0 mm)
- 2) Width: 39.4 in (1 m)
- 3) Length: 32.8 ft (10 m)
- 4) Roll weight: 81 lb (36.7 kg)
- 5) Net mass per unit area, lb/100 sq ft (g/sq m):
  - a. 75 lb (3662 g)
- 6) Peak load @ 0°F (-18°C), lbf/in (kN/m):
  - a. MD 115 lbf/in (20.1 kN/m), XMD 90 lbf/in (15.8 kN/m)
- 7) Elongation at peak load @ 0°F (-18°C), lbf/in (kN/m):
  - a. MD 35%, XMD 40%
- 8) Peak load @ 73.4°F (23°C), lbf/in (kN/m):
  - a. MD 85 lbf/in (14.9 kN/m), XMD 65 lbf/in (11.4 kN/m)
- 9) Elongation at peak load @ 73.4°F (23°C), lbf/in (kN/m):
  - a. MD 55%, XMD 60%
- 10) Ultimate Elongation @ 73.4°F (23°C), lbf/in (kN/m):
  - a. MD 65%, XMD 80%
- 11) Tear Strength @ 73.4°F (23°C), lbf (N):
  - a. MD 125 lbf (556 N), XMD 85 lbf (378 N)
- 12) Low temperature flexibility, °F (°C):
  - a. MD/XMD: -15°F (-26°C)
- 13) Dimensional stability, %:
  - a. MD/XMD: Less than 0.5%
- 14) Compound stability, °F (°C):
  - a. MD/XMD: 240°F (116°C)

C. Flashing Base Ply:

1. Flashing Base Ply, Heat-Welded:

- a. SOPREMA SOPRALENE FLAM 180: SBS-modified bitumen membrane with plastic burn-off film on top and bottom surfaces. Non-woven polyester reinforcement. Meets or exceeds ASTM D6164, Type I, Grade S, per ASTM D5147 test methods:

- 1) Thickness: 118 mils (3.0 mm)
- 2) Width: 39.4 in (1 m)
- 3) Length: 32.8 ft (10 m)
- 4) Roll weight: 81 lb (36.7 kg)
- 5) Net mass per unit area, lb/100 sq ft (g/sq m):
  - a. 75 lb (3662 g)
- 6) Peak load @ 0°F (-18°C), lbf/in (kN/m):
  - a. MD 115 lbf/in (20.1 kN/m), XMD 90 lbf/in (15.8 kN/m)
- 7) Elongation at peak load @ 0°F (-18°C), lbf/in (kN/m):
  - a. MD 35%, XMD 40%
- 8) Peak load @ 73.4°F (23°C), lbf/in (kN/m):
  - a. MD 85 lbf/in (14.9 kN/m), XMD 65 lbf/in (11.4 kN/m)
- 9) Elongation at peak load @ 73.4°F (23°C), lbf/in (kN/m):
  - a. MD 55%, XMD 60%
- 10) Ultimate Elongation @ 73.4°F (23°C), lbf/in (kN/m):
  - a. MD 65%, XMD 80%
- 11) Tear Strength @ 73.4°F (23°C), lbf (N):
  - a. MD 125 lbf (556 N), XMD 85 lbf (378 N)
- 12) Low temperature flexibility, °F (°C):
  - a. MD/XMD: -15°F (-26°C)
- 13) Dimensional stability, %:
  - a. MD/XMD: Less than 0.5%
- 14) Compound stability, °F (°C):
  - a. MD/XMD: 240°F (116°C)

D. Cap Sheet:

1. Cap Sheet, Heat-Welded:

- a. SOPREMA SOPRALENE FLAM 180 FR GR: SBS-modified bitumen membrane Cap Sheet with a burn-off film bottom surface and mineral granule top surface. Non-woven polyester reinforced. UL Class A for specified roof slope requirements. Meets or exceeds ASTM D6164, Type I, Grade G, per ASTM D5147 test methods:

- 1) Thickness: 157 mils (4.0 mm)
- 2) Width: 39.4 in (1 m)
- 3) Length: 32.8 ft (10 m)
- 4) Roll weight: 118 lb (53.5 kg)
- 5) Net mass per unit area, lb/100 sq ft (g/sq m):
  - a. 110 lb (5371 g)
- 6) Peak load @ 0°F (-18°C), lbf/in (kN/m):
  - a. MD 115 lbf/in (20.1 kN/m), XMD 90 lbf/in (15.8 kN/m)
- 7) Elongation at peak load @ 0°F (-18°C), lbf/in (kN/m):
  - a. MD 35%, XMD 40%
- 8) Peak load @ 73.4°F (23°C), lbf/in (kN/m):
  - a. MD 85 lbf/in (14.9 kN/m), XMD 65 lbf/in (11.4 kN/m)
- 9) Elongation at peak load @ 73.4°F (23°C), lbf/in (kN/m):
  - a. MD 55%, XMD 60%
- 10) Ultimate Elongation @ 73.4°F (23°C), lbf/in (kN/m):
  - a. MD 65%, XMD 80%



- 11) Tear Strength @ 73.4°F (23°C), lbf (N):
  - a. MD 125 lbf (556 N), XMD 85 lbf (378 N)
- 12) Low temperature flexibility, °F (°C):
  - a. MD/XMD: -15°F (-26°C)
- 13) Dimensional stability, %:
  - a. MD/XMD: Less than 0.5%
- 14) Compound stability, °F (°C):
  - a. MD/XMD: Less than 0.5%
- 15) Granule Surfacing:
  - a. White mineral granules.

#### E. Flashing Cap Sheet

##### 1. Flashing Cap Sheet, Heat-Welded:

- a. SOPREMA SOPRALENE FLAM 180 FR GR: SBS-modified bitumen membrane Cap Sheet with a burn-off film bottom surface and mineral granule top surface. Non-woven polyester reinforced. UL Class A for specified roof slope requirements. Meets or exceeds ASTM D6164, Type I, Grade G:

- 1) Thickness: 157 mils (4.0 mm)
- 2) Width: 39.4 in (1 m)
- 3) Length: 32.8 ft (10 m)
- 4) Roll weight: 118 lb (53.5 kg)
- 5) Net mass per unit area, lb/100 sq ft (g/sq m):
  - a. 110 lb (5371 g)
- 6) Peak load @ 0°F (-18°C), lbf/in (kN/m):
  - a. MD 115 lbf/in (20.1 kN/m), XMD 90 lbf/in (15.8 kN/m)
- 7) Elongation at peak load @ 0°F (-18°C), lbf/in (kN/m):
  - a. MD 35%, XMD 40%
- 8) Peak load @ 73.4°F (23°C), lbf/in (kN/m):
  - a. MD 85 lbf/in (14.9 kN/m), XMD 65 lbf/in (11.4 kN/m)
- 9) Elongation at peak load @ 73.4°F (23°C), lbf/in (kN/m):
  - a. MD 55%, XMD 60%
- 10) Ultimate Elongation @ 73.4°F (23°C), lbf/in (kN/m):
  - a. MD 65%, XMD 80%
- 11) Tear Strength @ 73.4°F (23°C), lbf (N):
  - a. MD 125 lbf (556 N), XMD 85 lbf (378 N)
- 12) Low temperature flexibility, °F (°C):
  - a. MD/XMD: -15°F (-26°C)
- 13) Dimensional stability, %:
  - a. MD/XMD: Less than 0.5%
- 14) Compound stability, °F (°C):
  - a. MD/XMD: 240°F (116°C)
- 15) Granule Surfacing:
  - a. White mineral granules.

#### 2.4 ACCESSORIES

##### A. Primers:

1. ELASTOCOL 500 Primer: Asphalt cut-back primer. Primer for the preparation of membrane substrates for asphalt, heat-welded, hot asphalt and COLPLY ADHESIVE, solvent-based, cold adhesive-applied and cement applications.

B. General Purpose Roofing Cement and Mastic

1. SOPREMA SOPRAMASTIC: SBS Mastic. Fiber-reinforced, roofing cement, packaged in 5 gallon pails. General purpose roofing cement for low-slope roofing used for sealing membrane T-joints and membrane edges along terminations, transitions and at roof penetrations.
  - a. VOC Content: 190 g/L or less.
  - b. Meets or exceeds ASTM D4586, Type I, Class II.
2. SOPREMA SOPRAMASTIC: SBS Mastic. Fiber-reinforced, roofing cement, packaged in 10.4 oz caulk tubes. General purpose roofing cement for low-slope roofing used for sealing membrane T-joints and membrane edges along terminations, transitions and at roof penetrations.
  - a. VOC Content: 190 g/L or less.
  - b. Meets or exceeds ASTM D4586, Type I, Class II.
3. SOPREMA SBL ROOF CEMENT: Asbestos-free, trowel grade elastomeric utility cement.
  - a. VOC Content: 226 g/L or less.
  - b. Meets or exceeds ASTM D4586, Type I, Class II.
4. SOPREMA SBL HP FLASHING CEMENT: Asbestos-free, trowel grade roof flashing cement.
  - a. VOC Content: 223g/L or less.
  - b. Meets or exceeds ASTM D4586, Type I, Class II.

C. General Purpose Sealant

1. SOPREMA SOPRAMASTIC SP1: General purpose, paintable, gun-grade, elastomeric, polyether moisture curing sealant for sealing SBS membrane terminations, Kynar 500 PVDF, horizontal and vertical construction joints.
  - a. VOC Content: 20 g/L or less.
  - b. Meets or exceeds ASTM C920, Type S, Grade NS, Class 50.
  - c. Standard color
2. SOPREMA SOPRAMASTIC ALU: Modified bitumen mastic, aluminum hued for application to membrane edge and perimeter metal.
  - a. VOC Content: 270 g/L or less.
  - b. Standard color

D. Base Sheet/Anchor Sheet Fasteners

1. SOPREMA BASE SHEET FASTENER BSF 1.7 in: Anchor/Base sheet fastener and metal stress plate.

E. Membrane Fasteners and Plates

1. SOPREMA #14 MP Fastener: Membrane base ply fastener.

F. Liquid-Applied Reinforced Flashing System:

1. SOPREMA ALSAN FLASHING: Single-component, polyurethane-bitumen resin with polyester reinforcing fleece fabric fully embedded into the resin to form roof system flashings.
  - a. VOC Content: 250 g/L.
  - b. SOPREMA ALSAN FLASHING: Liquid resin, Meets or exceeds ASTM C836.
  - c. SOPREMA ALSAN POLYFLEECE: Non-woven polyester reinforcement.
  - d. Surfacing: SOPREMA ALSAN FLASHING with mineral granules broadcast into wet SOPREMA ALSAN FLASHING to match adjacent SBS-modified bitumen cap sheet.
2. SOPREMA ALSAN RS 230 FLASH: Rapid curing, polymethyl methacrylate (PMMA) liquid resin with an embedded polyester reinforcement fabric used for monolithic waterproofing flashing membranes.
  - a. VOC content: 4.2 g/L.
  - b. SOPREMA ALSAN RS CATALYST POWDER: Reactive agent added to the PMMA liquid resin to induce curing.
  - c. SOPREMA ALSAN RS FLEECE: Polyester reinforcement fabric.
  - d. Color: White, Grey

G. Mineral Granules:

1. SOPREMA Granules: No. 11, mineral coated colored granules, color to match cap sheet, supplied by membrane cap sheet manufacturer.
  - a. SOPREMA GRANULES.

H. Expansion Joint:

1. SOPREMA SOPRAJOINT: Low-profile, polyester knit-reinforced, SBS-modified bitumen expansion joint membrane. Top surface consists of an aluminum-clad bond-breaker, with plastic burn-off film on the bottom surface for torch or hot air welding.
  - a. Thickness: 160 mils (4.0 mm)
  - b. Width: 18 in (457 mm)
  - c. Roll Length: 32.8 ft (10 m)
  - d. Expansion joint, maximum unsupported span: 2 in (51 mm)
  - e. Expansion joint, maximum displacement: 5/8 in (16 mm)

I. Walkway Protection:

1. SOPREMA SOPRAWALK: Polyester reinforced SBS modified bitumen walkway protection with a granule surface and sanded underside.
  - a. Thickness: 200 mils (5.0 mm)
  - b. Width: 39.4 in (1 m)
  - c. Roll Length: 26 ft (7.9 m)
  - d. Granule Surfacing: Color = Grey

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examination includes visual observations, qualitative analysis, and quantitative testing measures as necessary to ensure conditions remain satisfactory throughout the project.

- B. The contractor shall examine all roofing substrates including, but not limited to: insulation materials, roof decks, walls, curbs, rooftop equipment, fixtures, and wood blocking.
- C. The applicator shall not begin installation until conditions have been properly examined and determined to be clean, dry and, otherwise satisfactory to receive specified roofing materials.
- D. During the application of specified materials, the applicator shall continue to examine all project conditions to ensure conditions remain satisfactory to complete the specified roofing system.

### 3.2 PREPARATION

- A. Before commencing work each day, the contractor shall prepare all roofing substrates to ensure conditions are satisfactory to proceed with the installation of specified roofing materials. Preparation of substrates includes, but is not limited to, substrate repairs, securement of substrates, eliminating all incompatible materials, and cleaning.
- B. Where conditions are found to be unsatisfactory, work shall not begin until conditions are made satisfactory to begin work. Commencing of work shall indicate contractor's acceptance of conditions.

### 3.3 PRIMER APPLICATION

- A. Examine all substrates, and conduct adhesion peel tests as necessary, to ensure satisfactory adhesion is achieved.
- B. Apply the appropriate specified primer to dry, compatible substrates as required to enhance adhesion of new specified roofing materials.
- C. Apply primer using brush, roller, or sprayer at the rate published on the product data sheet. Lightly prime for uniform coverage, do not apply heavy or thick coats of primer.
- D. Asphalt Primer: Apply primer to dry compatible masonry, metal, wood and other required substrates before applying asphalt and heat-welded membrane plies. Primer is optional for solvent based solvent-based SBS adhesives and cements. Refer to product data sheets.

### 3.4 HEAT WELDING

- A. The Contractor is responsible for project safety. Where conditions are deemed unsafe to use open flames, manufacturer's alternate membrane application methods shall be used to install SBS modified bitumen membrane and flashings. Acceptable alternate installation methods include hot asphalt, cold adhesive-applied, self-adhered membranes and mechanically fastened plies. Hot-air welding equipment may be used in lieu of roof torches to seal membrane side and end laps where heat welding the laps is necessary. Refer to NRCA CERTA, local codes and building owner's requirements for hot work operations.
- B. Single or multi-nozzle, hand-held propane roof torches shall be used to install heat-welded membrane and flashing plies. Multi-nozzle carts (dragon wagons) may also be utilized to install membrane plies. Seven (7) nozzle carts are recommended for more uniform heat application in lieu of five (5) nozzle carts

### 3.5 SBS MASTIC AND GENERAL-PURPOSE ROOFING CEMENT APPLICATION

- A. Apply SOPREMA SOPRAMASTIC general purpose SBS mastic and roofing cement to seal drain leads, metal flanges, seal along membrane edge at terminations, and where specified and required in detail drawings.
- B. Do not use general purpose SBS mastics and roofing cement where flashing cement applications are required. Do not use SBS mastics and roofing cement beneath SBS-modified bitumen membrane and flashing plies.
- C. Apply general purpose SBS mastic and elastic roofing cement using caulk gun, or notched trowel at 2.0 – 2.5 gallons per square on each surface. Application rates vary based on substrate porosity and roughness. Tool-in as necessary to seal laps.
- D. Embed matching granules into wet cement where exposed.

### 3.6 MECHANICALLY FASTENED ANCHOR SHEET/BASE SHEET APPLICATION

- A. Follow material product data sheets and published general requirements for installation instructions.
- B. Ensure environmental conditions are satisfactory, and will remain satisfactory, during the application.
- C. Unroll the sheet onto the roof surface and allow time to relax prior to installing the fasteners.
- D. Starting at the low point of the roof, lay out the membrane to ensure the plies are installed perpendicular to the roof slope, shingled to prevent back-water laps.
- E. Cut sheet to working lengths and widths as required, conforming to rooftop conditions.
- F. Align sheet at side-laps to produce a consistent overlap required for wind uplift resistance approvals.
- G. As uniform tension is being applied, fasten the sheet beginning at the center of the sheet and work towards the end-laps, removing all wrinkles and buckles as fastening progresses.
- H. Install specified fasteners along the center line of side-laps, and intermediate rows staggered between side-laps, and fasten all end-laps.
- I. Fasten sheet as required for specified wind uplift resistance. Install additional fasteners in roof perimeter and corners as specified.

### 3.7 HEAT-WELDED, FULLY ADHERED MEMBRANE APPLICATION

- A. Follow material product data sheets and published general requirements for installation instructions.
- B. Ensure environmental conditions are safe and satisfactory, and will remain safe and satisfactory, during the application of the heat-welded membrane and flashings.
- C. Ensure all primers are fully dry before beginning heat-welding operations.
- D. Unroll membrane onto the roof surface and allow time to relax prior to heat welding.
- E. Starting at the low point of the roof, lay out the membrane to ensure the plies are installed perpendicular to the roof slope, shingled to prevent back-water laps.
- F. Ensure all roofing and flashing substrates are prepared and acceptable to receive the heat-welded membrane.
- G. Cut membrane to working lengths and widths to conform to rooftop conditions and lay out to always work to a selvage edge.
- H. Ensure specified side-laps and end-laps are maintained. End-laps should be staggered 3 ft apart.
- I. Direct roof torch on the roll as necessary to prevent overheating and damaging the membrane and substrates.
- J. As the membrane is unrolled, apply heat to the underside of the membrane until the plastic burn-off film melts away. Continuously move the torch side-to-side across the underside of the roll to melt the bitumen on the underside of the sheet, while continuously unrolling membrane.
- K. While unrolling and heating the sheet, ensure approximately ¼ to 1/2 in of hot bitumen flows ahead of the roll as it is unrolled, and there is 1/8 to 1/4 in bleed out at all laps.
- L. Adjust the application of heat to the underside of the membrane and to substrate as required for varying substrates and environmental conditions.
- M. At the 6 in end-laps, melt the plastic burn-off film from the top surface or embed granules and remove surfacing, where present, using a torch or hot-air welder.
- N. At end-laps where T-Joints exist, cut a 45 degree dog-ear away from the selvage edge, or otherwise ensure the membrane is fully heat-welded watertight at all T-joints.
- O. Each day, physically inspect all side and end-laps, and ensure the membrane is sealed watertight. Where necessary, use a torch or hot-air welder and a clean trowel to ensure all laps are fully sealed.
- P. Inspect the installation each day to ensure the plies are fully adhered. Repair all voids, wrinkles, open laps and all other deficiencies.
- Q. Offset cap sheet side and end-laps away from the base ply laps so that cap sheet laps are not located within 18 in of base ply laps.

### 3.8 FLASHING APPLICATION, HEAT WELDED

- A. Refer to SBS manufacturer's membrane application instructions, flashing detail drawings, and follow product data sheets and other published requirements for installation instructions. Refer to manufacturer's membrane flashing detail drawings.
- B. The contractor is responsible for project safety. Refer to NRCA CERTA recommendations and building owner requirements for hot work operations.
- C. Where required to seal substrates for fire safety, install specified adhered, self-adhered or fastened backer ply to the substrate. Ensure backer-ply covers and seals all substrates requiring protection from exposure to torch operations.
- D. Ensure all flashing substrates that require primer are primed, and the primer is fully dry.
- E. Unroll the flashing base ply and flashing cap sheet onto the roof surface to their complete length. Once relaxed, cut the membrane to the required working lengths to accommodate the flashing height, cants and the required over-lap onto the horizontal roof surface.
- F. Cut the flashing membrane from the end of the roll in order to always install flashings to the side-lap line or selvage edge line.
- G. Lay out the flashing base ply and flashing Cap Sheet to offset all side-laps a minimum of 12 inches so that side-laps are never aligned on top of the ply beneath. Shingle the flashing ply laps to prevent back-water laps.
- H. Install non-combustible cant strips at transitions where required.
- I. Ensure correct membrane and flashing sequencing to achieve redundant, multi-ply, watertight flashings.
- J. Roof Membrane Base Ply:
  - 1. Before installing flashings, install the roof membrane base ply in the horizontal field of the roof, and extend the base ply up to the top of the cant, where present, at roof terminations, transitions and penetrations.
- K. Flashing Base Ply:
  - 1. Install the flashing base ply starting at the top leading edge of the vertical flashing substrate, down over the cant and onto the horizontal surface of the roof a minimum of 3 inches beyond the of base of the cant onto the roof. Cut the base ply at corners to form 3-inch side-laps. Install gussets to seal corner transitions.
  - 2. Install one or more flashing base ply(s) at all roof terminations, transitions and penetrations.
- L. Flashing Base Ply:
  - 1. Install the roof membrane Cap Sheet in the horizontal field of the roof over the flashing base ply up to the roof termination, transition or penetration, and up to the top of cants where present.
  - 2. Using a chalk line, mark a line on the membrane cap sheet a minimum of 4 inches from the base of the cant onto the roof. Where granules are present, embed the cap sheet granules using a torch and trowel or granule embedder to prepare the surface to receive the flashing cap sheet.
- M. Flashing Base Ply:
  - 1. Install the roof membrane Cap Sheet in the horizontal field of the roof over the flashing base ply up to the roof termination, transition or penetration, and up to the top of cants where present.
  - 2. Using a chalk line, mark a line on the membrane cap sheet a minimum of 4 inches from the base of the cant onto the roof. Where granules are present, embed the cap sheet granules using a torch and trowel or granule embedder to prepare the surface to receive the flashing cap sheet.
- N. During the membrane and flashing installation, ensure all plies are completely adhered into place, with no bridging, voids or openings. Ensure bitumen or flashing cement bleed-out is present at all flashing side and end-laps.

- O. Use a damp sponge float or damp rag to press-in the heat-welded flashing plies during installation.
- P. Where sufficient bitumen bleed-out is not present, and for all self-adhered plies, apply specified gun-grade sealant or mastic to seal the membrane termination along all roof terminations, transitions and penetrations. These include gravel stop edge metal, pipe penetrations, along the top edge of curb and wall flashing, and all other flashing terminations where necessary to seal flashings watertight.
- Q. Fasten the top leading edge of the flashing 8 in on-centers with appropriate 1 in metal cap nails or other specified fasteners and plates. Seal fastener penetrations watertight using specified sealant or mastic.
- R. Manufacturer's liquid-applied, reinforced flashing systems shall be installed where conditions are not favorable to install SBS modified bitumen flashings. Such conditions include irregular shapes penetrating roof surfaces (I-beams), confined areas and low flashing heights. Manufacturer's liquid-applied, reinforced flashing systems are recommended in lieu of pitch pans and lead pipe flashings.

### 3.9 LIQUID-APPLIED, SINGLE-COMPONENT, BITUMEN-URETHANE FLASHING SYSTEM APPLICATION:

- A. Refer to manufacturer's details drawings, product data sheets and published general requirements for application rates and specific installation instructions.
- B. Pre-cut SOPREMA ALSAN POLYFLEECE polyester reinforcing fleece to conform to roof terminations, transitions and penetrations being flashed. Ensure a minimum 2 in overlap of fleece at side and end-laps. Ensure the completed liquid-applied flashing membrane is fully reinforced.
- C. Apply the base coat of SOPREMA ALSAN FLASHING liquid-applied flashing resin onto the substrate using a brush or roller, working the material into the surface for complete coverage and full adhesion at 2.0 gallons per square.
- D. Immediately apply the SOPREMA ALSAN POLYFLEECE reinforcing into the wet base coat of resin. Using a brush or roller, work the SOPREMA ALSAN POLYFLEECE into the wet resin while applying the second coat of SOPREMA ALSAN FLASHING resin to completely encapsulate the fleece at 2.0 gallons per square, and extend the liquid resin 1 inch beyond the fleece.
- E. Apply a finish coat of SOPREMA ALSAN FLASHING resin at 2.0 gallons per square within 2-3 hours. When applying the finish coat more than 24 hours, the surface may need to be cleaned using acetone or MEK to ensure satisfactory adhesion.
- F. Broadcast mineral granules into the wet finish coat as required to match the adjacent cap sheet.

### 3.10 LIQUID-APPLIED, PMMA MEMBRANE AND FLASHING SYSTEM APPLICATION ALSAN RS:

- A. Refer to manufacturer's details drawings, product data sheets and published general requirements for application rates and specific installation instructions.
- B. Pre-cut SOPREMA ALSAN RS FLEECE polyester reinforcing fleece to conform to roof terminations, transitions and penetrations being flashed. Ensure a minimum 2 in overlap of fleece at side and end-laps. Ensure the completed liquid-applied flashing membrane is fully reinforced.
- C. Apply the base coat of catalyzed SOPREMA ALSAN RS resin onto the substrate using a brush or roller, working the material into the surface for complete coverage and full adhesion.
- D. Immediately apply the SOPREMA ALSAN RS FLEECE reinforcing into the wet base coat of resin. Using a brush or roller, work the (SOPREMA ALSAN FLEECE reinforcing fabric into the wet resin while applying the second coat of catalyzed SOPREMA ALSAN RS resin to completely encapsulate the fleece.
- E. Refer to reinforced, polymethyl-methacrylate (PMMA) polymethacrylate (PMA) specification section and application instructions, details drawings, product data sheets and published general requirements for installation instructions.

3.11 WALKWAYS:

- A. At areas outlined on the drawings, and around the perimeter of all rooftop equipment and at all door and stair landings, install walkway protection.
- B. Cut walkway from end of rolls. No piece shall be less than 24 in and no more than 60 in.
- C. Remove foil/film or embed granules where present on cap sheet.
- D. Provide a 4 in space between sheets for drainage.
- E. Locate walkway membranes a minimum of 2 in from side-laps, end-laps and flashing membranes.
- F. Fully adhere walkway protection by heat welding or adhering the field with cold adhesive and heat welding a 3 in perimeter.

3.12 CLEAN-UP:

- A. Clean-up and properly dispose of waste and debris resulting from these operations each day as required to prevent damages and disruptions to operations.

END OF SECTION 07 52 16



## SECTION 07 62 00

### 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 other Division 01 Specification Sections, apply to this Section.

##### 1.2 SUMMARY

- A. Section Includes:

- 1. Roof drainage sheet metal fabrications.

- a. Downspouts
    - b. Conductor Heads
    - c. Splash pans

- 2. Low-slope roof sheet metal fabrications.

- a. Flashing
    - b. Counterflashing.

- B. Related Sections:

- 1. Division 06 Section "Rough Carpentry" for wood nailers, curbs, and blocking.
  - 2. Division 07 Section "Metal Composite Material Panels" for sheet metal flashing and trim integral with metal composite material panels.

##### 1.3 COORDINATION

- A. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide a leakproof, secure, and non-corrosive installation.

##### 1.4 PERFORMANCE REQUIREMENTS

- A. Securement of all metal edge components, excepting gutters, shall be installed as tested in accordance with the most current version of the ANSI\SPRI ES-1, American National Standard for Edge Systems Used with Low-Slope Roofing Systems."
- B. Sheet metal flashing and trim assemblies as indicated 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.
- C. SPRI Wind Design Standard: Manufacture and install copings and roof edge flashings tested according to SPRI ES-1 and capable of resisting the design pressures indicated on the Drawings.

- D. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

## 1.5 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
- B. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:
1. Identification of material, thickness, weight, and finish for each item and location in Project.
  2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
  3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
  4. Details of termination points and assemblies, including fixed points.
  5. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
  6. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
  7. Details of special conditions.
  8. Details of connections to adjoining work.
- C. Samples for Initial Selection: For each type of sheet metal flashing, trim, and accessory indicated with factory-applied color finishes involving color selection.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
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. Accessories and Miscellaneous Materials: Full-size Sample.
- E. Qualification Data: For qualified fabricator.
- F. Maintenance Data: For sheet metal flashing, trim, and accessories to include in maintenance manuals.
- G. Warranty: Sample of special warranty.

## 1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
- B. Sheet Metal Flashing and Trim Standard: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

- C. Preinstallation Conference: Conduct conference at Project site.
1. Meet with Owner, Architect, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials.
  2. Review methods and procedures related to sheet metal flashing and trim.
  3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
  4. Review special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect sheet metal flashing.
  5. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

## 1.7 DELIVERY, STORAGE, AND HANDLING

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

## 1.8 WARRANTIES

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

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

3. Exposed Coil-Coated Finishes:

- a. Three-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  - 1) Color: As selected by Architect from manufacturer's full color line, including metallics.
  - 2) Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

2.2 UNDERLAYMENT MATERIALS

- A. Synthetic Underlayment: UV-resistant polypropylene, polyolefin, or polyethylene polymer fabric with surface coatings or treatments to improve traction underfoot and abrasion resistance; evaluated and documented to be suitable for use as a roof underlayment under applicable codes by a testing and inspecting agency acceptable to authorities having jurisdiction.
  - 1. Products: Subject to compliance with requirements, provide the following:
    - a) GCP Applied Technologies Inc. (formerly Grace Construction Products); Ice and Water Shield.
- B. Slip Sheet: Building paper, 3-lb/100 sq. ft. minimum, rosin sized.

2.3 MISCELLANEOUS MATERIALS

- A. Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal unless otherwise indicated.
- B. Fasteners: Suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.
  - 1. Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
    - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
    - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
  - 2. Fasteners for Aluminum-Zinc Alloy-Coated Steel Sheet: Series 300 stainless steel.
- C. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- D. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

- F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- G. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

## 2.4 FABRICATION, GENERAL

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

## 2.5 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof-Edge Flashing: Fabricate in minimum 96-inch- long, but not exceeding 10-foot-long, sections. Furnish with 6-inch- wide, joint cover plates.
  - 1. Joint Style: Butt, with 12-inch- wide, concealed backup plate.
  - 2. Fabricate from the following materials:
    - a. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.
- B. Flashing: Fabricate from the following materials:
  - 1. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.

C. Counterflashing: Fabricate from the following materials:

1. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch thick.

## 2.6 ROOF DRAINAGE SHEET METAL FABRICATIONS

A. Downspouts: Fabricate 4" x 5" rectangular downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.

1. Manufactured Hanger Style: As selected by Architect.
2. Fabricate from the following materials:

- a. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch thick.

B. Conductor Heads: Fabricate conductor to Width = 15" (at least 2" wider than edge scupper), Depth = 7" and Height = 12.5", with transition to specified downspout dimensions. Fabricate from the following materials:

- a. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.

C. Splash Pans: Concrete.

## 2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Roof-Edge Flashing: Fabricate in minimum 96-inch- long, but not exceeding 10-foot-long, sections. Furnish with 6-inch- wide, joint cover plates.

1. Joint Style: Butt, with 6-inch- wide, concealed backup plate.
2. Fabricate from the following materials:

- a. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.

B. Copings: Fabricate in minimum 96-inch- long, but not exceeding 10-foot- long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and interior leg. Miter corners, seal, and solder or weld watertight.

1. Coping Profile: As indicated on drawings.
2. Joint Style: Butt, with 6-inch- wide, concealed backup plate.
3. Fabricate from the following materials:

- a. Aluminum-Zinc Alloy-Coated Steel: 0.040 inch thick.

C. Roof and Roof to Wall Transition Flashing: Fabricate from the following materials:

1. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.

D. Counterflashing: Fabricate from the following materials:

1. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch thick.

## 2.8 MISCELLANEOUS SHEET METAL FABRICATIONS

### A. Equipment Support Flashing: Fabricate from the following materials:

1. Stainless Steel: 0.025 inch thick.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.
  1. Verify compliance with requirements for installation tolerances of substrates.
  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. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 UNDERLAYMENT INSTALLATION

- A. Install underlayment as indicated on Drawings.
- B. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller. Cover underlayment within 14 days.
- C. Slip Sheet: Apply slip sheet, wrinkle free, over underlayment or directly on substrate, in accordance with manufacturer's recommendations before installing sheet metal flashing and trim.

### 3.3 INSTALLATION, GENERAL

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



- F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches, except reduce pre-tinning where pre-tinned surface would show in completed Work.
1. Do not solder aluminum sheet.
  2. Pre-tinning is not required for zinc-tin alloy-coated stainless steel.
  3. Do not use torches for soldering.
  4. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
  5. Stainless-Steel Soldering: Tin edges of uncoated sheets using solder recommended for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
- G. Rivets: Rivet joints where indicated and where necessary for strength.

### 3.4 ROOF FLASHING INSTALLATION

- A. Install sheet metal flashing and trim to comply with performance requirements and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at 16-inch centers.
- C. 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 16-inch centers.
  2. Anchor interior leg of coping with washers and screw fasteners through slotted holes at 24-inch centers.
- D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.
- E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with sealant. Secure in a waterproof manner by means of anchor and washer at 36-inch centers.

### 3.5 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, and other penetrating items.

### 3.6 ROOF DRAINAGE SYSTEM INSTALLATION

- A. Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.

- B. Downspouts: Join sections with 1-1/2-inch telescoping joints.
  - 1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches o.c. in between.
  - 2. Provide elbows at base of downspout to direct water away from building.
- C. Conductor Heads: Install conductors where indicated at roof edge. Continuously support conductor with hemmed joint/connection, set to correct elevation, over cants or tapered edge strips, and under roofing membrane. Conductor shall be 2" wider than roof edge scupper.
  - 1. Anchor conductor head to exterior wall and seal with elastomeric sealant to downspout.
- D. Splash Pans: Install where downspouts discharge on low-slope roofs. Set in Roofing cement or elastomeric sealant compatible with roofing membrane.

### 3.7 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.

### 3.8 ERECTION TOLERANCES

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

### 3.9 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean off excess sealants.
- C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.
- D. 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 07 62 00

## SECTION 07 84 00

### PENETRATION FIRESTOPPING

#### 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. Penetrations in fire-resistance-rated walls.
  - 2. Penetrations in horizontal assemblies.
- B. Each trade on this Project is responsible for properly firestopping its work under the provisions of this Section and Division 07 Section Fire-resistive Joint Systems. In the event that a single firm is not utilized in the application of penetration fireproofing, then each trade on this Project is responsible for properly firestopping its work under the provisions of this Section and Division 07 Section "Fire-resistive Joint Systems."

##### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.
  - 1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.
- C. Qualification Data: For qualified Installer.
- D. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for penetration firestopping.

##### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications:
  - 1. A firm experienced in installing penetration firestopping similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance.

2. Qualifications include

- a. Having the necessary experience, staff, and training to install manufacturer's products per specified requirements.
- b. Trained by the firestop material manufacturer in all systems.
- c. Manufacturer's willingness to sell its penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

B. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:

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

- 1) UL in its "Fire Resistance Directory."

C. Preinstallation Conference: Conduct conference at Project site.

1.5 PROJECT CONDITIONS

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

1.6 COORDINATION

- A. One installer entity shall perform all firestop and fire-resistive joint system installation required for the project.
- B. General Contractor shall coordinate work of the various trades with the firestop and fire-resistive joint system installation to ensure proper sequencing.
- C. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.
- D. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Hilti, Inc.
  - 2. 3M Fire Protection Products.

### 2.2 PENETRATION FIRESTOPPING

- A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
- B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
  - 1. Fire-resistance-rated walls include fire walls, fire-barrier walls, smoke-barrier walls, and fire partitions.
  - 2. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
  - 1. Horizontal assemblies include floors, floor/ceiling assemblies, and ceiling membranes of roof/ceiling assemblies.
  - 2. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
  - 3. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
- D. Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.
  - 1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at 0.30-inch wg at both ambient and elevated temperatures.
- E. W-Rating: Where indicated to be water-leak-resistant, provide penetration firestopping showing no evidence of water leakage when tested according to UL 1479.
- F. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- G. VOC Content: Provide penetration firestopping that complies with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
  - 1. Architectural Sealants: 250 g/L.
  - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
  - 3. Sealant Primers for Porous Substrates: 775 g/L.

- H. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.
1. Permanent forming/damming/backing materials, including the following:
    - a. Slag-wool-fiber or rock-wool-fiber insulation.
    - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
    - c. Fire-rated form board.
    - d. Fillers for sealants.
  2. Temporary forming materials.
  3. Substrate primers.
  4. Collars.
  5. Steel sleeves.

## 2.3 FILL MATERIALS

- A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.
- E. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
- I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
  1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of nonsag grade for both opening conditions.

## 2.4 MIXING

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

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 PREPARATION

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

### 3.3 INSTALLATION

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

- C. Install fill materials for firestopping by proven techniques to produce the following results:
  - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required, including flutes and voids at wall heads and metal decking, to achieve fire-resistance ratings indicated.
  - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
  - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.
- D. Fill voids at flutes of metal decking at wall heads and other areas with semi-refractory mineral fiber insulation prior to installation of fire-resistant sealants."
- E. Provide intumescent putty pads at all penetrations of fire-rated wall with electrical boxes, junction boxes, and similar devices to provide fully sealed conditions behind substrate of wall surface materials

### 3.4 IDENTIFICATION

- A. Identify penetration firestopping with painted designations or preprinted metal or plastic labels. Install or attach labels permanently to surfaces adjacent to and within 6 inches of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
  - 1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."

### 3.5 FIELD QUALITY CONTROL

- A. Owner will engage a qualified agency to perform inspections in accordance with E 2174, "On-Site Inspection of Installed Fire Stops."
- B. Where deficiencies are found or penetration firestopping is damaged or removed because of testing, repair or replace penetration firestopping to comply with requirements.
- C. Proceed with enclosing penetration firestopping with other construction only after inspection reports are issued and installations comply with requirements.

### 3.6 CLEANING AND PROTECTION

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



### 3.7 PENETRATION FIRESTOPPING SCHEDULE

- A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.
- B. Provide the following as indicated and required:
  - 1. Firestopping with No Penetrating Items
  - 2. Firestopping for Metallic Pipes, Conduit, or Tubing
  - 3. Firestopping for Nonmetallic Pipe, Conduit, or Tubing
  - 4. Firestopping for Electrical Cables
  - 5. Firestopping for Cable Trays with Electric Cables
  - 6. Firestopping for Insulated Pipes
  - 7. Firestopping for Miscellaneous Electrical Penetrants
  - 8. Firestopping for Miscellaneous Mechanical Penetrants
  - 9. Firestopping for Groupings of Penetrants

END OF SECTION 07 84 00

## SECTION 07 92 00

### JOINT SEALANTS

#### 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. Silicone joint sealants.
2. Latex joint sealants.
3. Preformed joint sealants.
4. Acoustical joint sealants.

###### B. Related Sections:

1. Division 04 Section "Unit Masonry" for masonry control and expansion joint fillers and gaskets.
2. Division 07 Section "Penetration Firestopping" for sealing joints in fire-resistance-rated construction.
3. Division 08 Section "Glazing" for glazing sealants.
4. Division 09 Section "Gypsum Board" for sealing perimeter joints.
5. Division 09 Section "Tiling" for sealing tile joints.
6. Division 09 Section "Acoustical Panel Ceilings" for sealing edge moldings at perimeters with acoustical sealant.
7. Division 32 Section "Concrete Paving Joint Sealants" for concrete control and expansion joint fillers.

##### 1.3 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- 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.
- E. Qualification Data: For qualified Installer.
- F. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
- G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.
- H. Warranties: Sample of special warranties.

## 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.
- C. Preinstallation Conference: Conduct conference at Project site.

## 1.5 PROJECT 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.
  - 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.

## 1.6 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Five years.
- B. Warranty excludes deterioration or failure of joint sealants from the following:
  - 1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
  - 2. Disintegration of joint substrates from natural 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 MATERIALS, 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. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):
  - 1. Architectural Sealants: 250 g/L.
  - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
  - 3. Sealant Primers for Porous Substrates: 775 g/L.
- C. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- D. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- E. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

## 2.2 SILICONE JOINT SEALANTS

- A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.
  - 1. Application: Exterior non-traffic joints.
  - 2. Products: Subject to compliance with requirements, provide one of the following:
    - a. Dow Corning Corporation; 790.
    - b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
    - c. Pecora Corporation; 301 NS.
    - d. Tremco Incorporated; Spectrem 1.
- B. Single-Component, Nonsag, Traffic-Grade, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use T.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Dow Corning Corporation; 790.
    - b. Pecora Corporation; 301 NS.
    - c. Tremco Incorporated; Spectrem 800.
- C. Single-Component, Pourable, Traffic-Grade, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade P, Class 100/50, for Use T.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Dow Corning Corporation; 890-SL.
    - b. Pecora Corporation; 300 SL.
    - c. Tremco Incorporated; Spectrem 900 SL.

- D. Mildew-Resistant, Single-Component, Neutral-Curing or Acid-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.

1. Products: Subject to compliance with requirements, provide one of the following:
  - a. BASF Building Systems; Omniplus.
  - b. Dow Corning Corporation; 786 Mildew Resistant.
  - c. GE Advanced Materials - Silicones; Sanitary SCS1700.
  - d. Pecora Corporation; 898.
  - e. Tremco Incorporated; Tremsil 200 Sanitary.

### 2.3 LATEX JOINT SEALANTS

- A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
1. Application: Interior non-traffic joints unless sanitary or acoustical sealant indicated or required.
  2. Products: Subject to compliance with requirements, provide one of the following:
    - a. BASF Building Systems; Sonolac.
    - b. Bostik, Inc.; Chem-Calk 600.
    - c. Pecora Corporation; AC-20+.
    - d. Tremco Incorporated; Tremflex 834.

### 2.4 PREFORMED JOINT SEALANTS

- A. Preformed Foam Joint Sealant: Manufacturer's standard preformed, precompressed, open-cell foam sealant manufactured from urethane foam with minimum density of 10 lb/cu. ft. and impregnated with a nondrying, water-repellent agent. Factory produce in precompressed sizes in roll or stick form to fit joint widths indicated; coated on one side with a pressure-sensitive adhesive and covered with protective wrapping.
1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Dayton Superior Specialty Chemicals; Polytite Standard.
    - b. EMSEAL Joint Systems, Ltd.; Emseal 25V.
    - c. Willseal USA, LLC; Willseal 150.

### 2.5 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Pecora Corporation; AC-20 FTR.
    - b. USG Corporation; SHEETROCK Acoustical Sealant.

## 2.6 JOINT SEALANT BACKING

- A. Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

## 2.7 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 joint-sealant performance.
- 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.

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. 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. 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.
- G. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping. Do not pull or stretch material. Produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures, apply heat to sealant in compliance with sealant manufacturer's written instructions.

- H. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, 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.

### 3.4 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.

### 3.5 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 and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

### 3.6 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. Control and expansion joints in unit masonry.
- c. Joints between metal panels.
- d. Joints between different materials listed above.
- e. Perimeter joints between materials listed above and frames of doors, windows, and louvers.
- f. Control and expansion joints in ceilings and other overhead surfaces.
- g. Other joints as indicated.

2. Silicone Joint Sealant: Single component, nonsag, neutral curing, Class 100/50.

3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

- B. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.

1. Joint Locations:

- a. Control and expansion joints in brick pavers.
- b. Isolation and contraction joints in cast-in-place concrete slabs.
- c. Tile control and expansion joints.
- d. Joints between different materials listed above.
- e. Other joints as indicated.

2. Silicone Joint Sealant: Single component, nonsag, traffic grade, neutral curing or Single component, pourable, traffic grade, neutral curing.

3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.



- C. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
    - a. Control and expansion joints on exposed interior surfaces of exterior walls.
    - b. Perimeter joints of exterior openings where indicated.
    - c. Tile control and expansion joints.
    - d. Vertical joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
    - e. Perimeter joints between interior wall surfaces and frames of interior doors windows and elevator entrances.
    - f. Other joints as indicated.
  2. Joint Sealant: Latex or Acrylic based.
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
1. Joint Locations:
    - a. Isolation joints in cast-in-place concrete slabs.
    - b. Control and expansion joints in tile flooring.
    - c. Other joints as indicated.
  2. Silicone Joint Sealant: Single component, nonsag, traffic grade, neutral curing or Single component, pourable, traffic grade, neutral curing.
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- E. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Sealant Location:
    - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
    - b. Tile control and expansion joints where indicated.
    - c. Other joints as indicated.
  2. Joint Sealant: Mildew resistant, single component, nonsag, neutral curing, Silicone or Single component, nonsag, mildew resistant, acid curing.
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

- F. Joint-Sealant Application: Interior acoustical joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Location:
    - a. Acoustical joints where indicated.
    - b. Other joints as indicated.
  2. Joint Sealant: Acoustical.
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

END OF SECTION 07 92 00

## SECTION 08 11 13

### 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:

- 1. Standard hollow metal doors and frames.

- B. Related Sections:

- 1. Division 08 Section "Door Hardware" for door hardware for hollow metal doors and frames.
  - 2. Division 09 Section "Painting" for field painting hollow metal doors and frames.
  - 3. Division 13 Section "Radiation Protection" for lead lined hollow metal doors and frames.
  - 4. Division 26 Sections for electrical connections including conduit and wiring for door controls and operators with factory installed electrical knockout boxes.

##### 1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings.
- B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

##### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, temperature-rise ratings, and finishes.
- B. Shop Drawings: Include the following:
  - 1. Elevations of each door design.
  - 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 preparation for power, signal, and control systems.

C. Samples for Verification:

1. Samples are only required by request of the architect and for manufactures that are not current members of Steel Door Institute.
2. For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches.
3. For the following items, prepared on Samples about 12 by 12 inches to demonstrate compliance with requirements for quality of materials and construction:
  - a. Doors: Show vertical-edge, top, and bottom construction; core construction; and hinge and other applied hardware reinforcement. Include separate section showing glazing if applicable.
  - b. Frames: Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow metal panels and glazing if applicable.

D. Door Schedule: Submit schedule of doors and frames using same reference numbers for details and openings as those on Contract Drawings. Coordinate with final Door hardware Schedule.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch-high wood blocking. Do not store in a manner that traps excess humidity.
  1. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.8 COORDINATION

- A. Coordinate installation of anchorages 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.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with this section requirements, provide products by one of the following:
  - 1. Amweld Building Products, LLC.
  - 2. Ceco Door Products; an Assa Abloy Group company.
  - 3. Curries Company; an Assa Abloy Group company.
  - 4. Republic Doors and Frames.
  - 5. Steelcraft; an Ingersoll-Rand company.

### 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.
  - 1. Smoke and Draft Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with MFPA 105.

### 2.3 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.
- 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. Glazing: Comply with requirements in Division 08 Section "Glazing."
- F. Grout: ASTM C 476, except with a maximum slump of 4 inches (102 mm), as measured according to ASTM C 143/C 143M.
- G. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

### 2.4 STANDARD HOLLOW METAL DOORS

- A. General: Provide 1 3/4" thick beveled and handed doors of design indicated, fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.
  - 1. Design: Flush panel

2. Core Construction: Manufacturer's standard polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.
    - a. Fire Door Cores: As required to provide fire-protection ratings indicated.
    - b. Thermal-Rated (Insulated) Doors: At all exterior doors provide doors fabricated with thermal-rated assemblies with R Factor 11 or better.
      - 1) Locations: Exterior doors, and elsewhere as noted in opening schedule and herein.
  3. Vertical Edges for Single-Acting Doors: Beveled edge
    - a. Beveled Edge: 1/8 inch in 2 inches.
  4. Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch radius.
  5. Top and Bottom Edges: Closed with flush or inverted 0.042-inch- thick, end closures or channels of same material as face sheets for flush closure.
    - a. Inverted channel closure is not acceptable.
  6. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.
  7. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- B. Interior Doors: Face sheets fabricated from cold-rolled steel sheets. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
1. Level 3 and Physical Performance Level A (Extra Heavy Duty), minimum 16 gauge (0.053-inch - thick steel, Model 2 (Seamless face and edges).
- C. Exterior Doors: Face sheets fabricated from metallic-coated steel sheets. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
1. Level 3 and Physical Performance Level A (Extra Heavy Duty), minimum 16 gauge (0.053-inch - thick steel, Model 2 (Seamless face and edges).
- D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- E. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

## 2.5 STANDARD HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Interior Frames: Fabricated from cold rolled steel sheets.
1. Fabricate frames with mitered or coped corners.
  2. Fabricate frames as face welded joints and back weld joints continuously, unless otherwise indicated.
  3. Frames for Level 3 Steel Doors: Minimum 14 gauge 0.067-inch- thick steel sheet.

4. Provide terminated stops 6 inches above finish floor with a 45 degree angle cut, close open ends of stop with steel sheet closure. Cover opening in extension of frame with welded-steel filler plate, with welds ground smooth and flush with frame.
    - a. Provide at all door frames within areas of the project with the exception of any fire- rated opening locations.
    - b. Fire-rated frames shall not have terminated stops.
- C. Exterior Frames: Fabricated from metallic-coated steel sheets.
1. Fabricate frames with mitered or coped corners.
  2. Fabricate frames as face welded joints and back weld joints continuously, unless otherwise indicated.
  3. Frames for Level 3 Steel Doors: Minimum 14 gauge 0.067-inch- thick steel sheet.
- D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.
- E. Electrical Knock Out Boxes: Factory weld electrical knock out boxes to frame for electrical hardware preps; included but not limited to electric thru wire hinges, electrical raceways, door position switches, electric strikes, jamb mount card readers, and magnetic locks as noted in door hardware sets in Division 8 Door Hardware.
1. Electrical knock out boxes are required at door position switches, electric strikes, card readers, and middle hinge locations for all locations regardless of electrical hardware specified in Division 8 Door Hardware.
  2. Provide electrical knock out boxes with 3/4-inch knockouts.
  3. Conduit to be coordinated and installed in field from middle hinge box and strike box to door position box.
  4. Electrical knock out boxes to comply with NFPA requirements and fit electrical door hardware as specified in hardware sets in Division 8 Door Hardware.
  5. Electrical knock out boxes for continuous hinges should be located in the center of the vertical dimension on the hinge jamb.
  6. Provide field installed conduit per Division 28 section for standardized plug connectors to accommodate up to twelve (12) wires as required for electrified door hardware specified in hardware sets in Division 8 Door Hardware. Provide sufficient number of concealed wires to accommodate electric function of specified hardware. Wire nut connections are not acceptable.

## 2.6 FRAME ANCHORS

- A. Jamb Anchors:
1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
- B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick, and as follows:
1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

## 2.7 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 thickness of metal. 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. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8
- C. Hollow Metal Doors:
  - 1. Exterior Doors:
    - a. Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Top of door to be flush and completely sealed joints in top edges of doors against water penetration.
  - 2. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge strap for continuous hinges specified in hardware sets in Division 8 Door Hardware.
  - 3. Seamless Edge: Provide seamless edge on hollow metal doors by intermittently tack welding seam, grinding smooth and finishing edge free from defects and blemishes.
  - 4. 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.
  - 5. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible. Continuously backweld joints at exterior frames.
  - 6. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge strap for continuous hinges specified in hardware sets in Division 8 Door Hardware.
  - 7. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops; provide security head screws at exterior locations.
  - 8. Grout Guards: Weld guard boxes to frame at back of mortise hardware prep in frames at all hinge, strike and other recessed hardware preps regardless of grouting requirements.
  - 9. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
  - 10. Jamb Anchors: Provide number and spacing of anchors as follows:
    - a. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. 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) Two anchors per head for frames above 42 inches wide and mounted in metal-stud partitions.
  - 11. Door Silencers: Except on weather-stripped or gasketed doors, drill stops to receive door silencers as follows. Keep holes clear during construction. Silencers to be supplied by frame manufacture regardless if specified in division 8 Door Hardware.
    - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
- D. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.



- E. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
  - 1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
  - 2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
  - 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
- F. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints at fabricators shop
  - 1. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
  - 2. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.
  - 3. Gap for butted or mitered joints in glass stop should not exceed .0625-inch.

## 2.8 STEEL FINISHES

- A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.
  - 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

## 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. For the record, 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. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:
  - 1. Squareness: Plus, or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
  - 2. Alignment: Plus, or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
  - 3. Twist: Plus, or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
  - 4. Plumbness: Plus, or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.
- C. 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 of size and profile indicated. Comply with ANSI/SDI A250.11.
  - 1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
    - a. At fire-protection-rated openings, install frames according to NFPA 80.
    - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    - c. Install door silencers in frames before grouting.
    - d. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    - e. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
  - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post installed expansion anchors.
    - a. Floor anchors may be set with powder-actuated fasteners instead of post installed expansion anchors if so indicated and approved on Shop Drawings.
  - 3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
  - 4. Field Supplied Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.

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.
  6. Lead-Lined Frames: Install in accordance with Division 13 Section, "Radiation Protection."
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Standard Steel Doors:
    - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
    - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
    - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
    - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
  2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
  3. Smoke-Control Doors: Install doors and gaskets according to NFPA 105.

### 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. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 08 11 13

## SECTION 08 14 16

### 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 wood-veneer faces.
  - 2. Factory fitting flush wood doors to frames and factory machining for hardware.
- B. Related Sections:
  - 1. Division 06 Section Interior Architectural Woodwork for requirements for veneers from the same flitches for both flush wood doors and wood paneling.
  - 2. Division 08 Section "Glazing" for glass view panels in flush wood doors.

##### 1.3 SUBMITTALS

- A. Product Data: For each type of door indicated. 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; location and extent of hardware blocking; and other pertinent data.
  - 1. Indicate dimensions and locations of mortises and holes for hardware.
  - 2. Indicate dimensions and locations of cutouts.
  - 3. Indicate requirements for veneer matching.
  - 4. Indicate doors to be factory finished and finish requirements.
  - 5. Indicate fire-protection ratings for fire-rated doors.
- C. Samples for 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 the finished work.
  - 2. Corner sections of doors, approximately 8 by 10 inches for wood veneer doors with door faces and edges representing actual materials to be used.
    - a. Provide samples for each species of veneer and solid lumber required.
    - b. Finish veneer-faced door samples with same materials proposed for factory-finished doors.
  - 3. Frames for light openings, 6 inches long, for each material, type, and finish required.
- E. Warranty: Sample special warranty.

#### 1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- B. Source Limitations: Obtain wood doors from single manufacturer wherever possible.
- C. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, latest edition, "Industry Standard for Architectural Wood Flush Doors."
- D. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
  - 1. Temperature-Rise Limit: Where indicated, provide doors that have a maximum transmitted temperature end point of not more than 250 deg F above ambient after 30 minutes of standard fire-test exposure.
- E. Preinstallation Conference: Conduct conference at Project site.

#### 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 and wrap bundles of doors in plastic sheeting.
- C. Mark each door on top rail with opening number used on Shop Drawings.

#### 1.6 PROJECT 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 the remainder of the construction period.

#### 1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which 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 wood face veneers exceeding 0.01 inch in a 3-inch span.
    - c. Telegraphing of core construction and delamination of face in decorative laminate-faced doors.
  - 2. Warranty Period for Solid-Core Interior Doors: Life of installation.

## PART 2 - PRODUCTS

### 2.1 DOOR CONSTRUCTION, GENERAL

- A. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.
- B. Structural-Composite-Lumber-Core Wood Veneer Doors:
  - 1. Structural Composite Lumber: WDMA I.S.10.
    - a. Screw Withdrawal, Face: 700 lbf.
    - b. Screw Withdrawal, Edge: 400 lbf.
- C. Fire-Protection-Rated Doors: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
  - 1. Edge Construction: Provide 45, 60 and 90 minute fire-rated doors edge construction with intumescent seals concealed by outer stile (Category A). Comply with specified requirements for exposed edges.
  - 2. Edge Construction: Provide 20-minute fire-rated doors as Category B, with smoke and fire seals (supplied by seal manufacturer) applied to frame for 20 minute openings.
  - 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.
  - 4. Pairs: Provide formed-steel edges and astragals with intumescent seals.
    - a. Finish steel edges and astragals with baked enamel.
- D. Mineral-Core Doors:
  - 1. Core: Non-combustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
  - 2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware.
  - 3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.
- E. Low emitting materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.

### 2.2 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Graham.
  - 2. Algoma Hardwoods.
  - 3. Eggers Industries.
  - 4. Marshfield Door Systems, Inc.
  - 5. V-T Industries Inc.

- B. Interior Solid-Core Doors:
  - 1. Grade: Premium, with Grade A faces.
  - 2. Match between Veneer Leaves: Book match.
  - 3. Assembly of Veneer Leaves on Door Faces: Balance match.
  - 4. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
  - 5. Room Match: Match door faces within each separate room or area of building. Corridor-door faces do not need to match where they are separated by 10 feet or more.
  - 6. Exposed Vertical Edges: Same species as faces.
  - 7. Core: Structural composite lumber, Mineral core.
  - 8. Construction: Five plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering.
  - 9. Species for Doors at Auditorium Portion of Project: Match existing species
    - a. Cut: Match existing cut.

## 2.3 LIGHT FRAMES

- A. Wood Beads for Light Openings in Wood Doors up to and including 20-minute rating:
  - 1. Wood Species:
    - a. Doors with Wood-Veneer faces: Same species as door faces.
  - 2. Profile:
    - a. Doors with Wood-Veneer faces: Flush tapered beads.

## 2.4 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
  - 1. Comply with requirements in NFPA 80 for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, 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.
- C. Openings: Cut and trim openings through doors in factory.
  - 1. Light Openings: Trim openings with moldings of material and profile indicated.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine doors and installed door frames before hanging doors.
  - 1. Verify that 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 Division 8 Section "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.
  - 1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

### 3.3 ADJUSTING

- A. Operation: Re-hang 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 08 14 16



## SECTION 08 14 33

### STILE AND RAIL WOOD DOORS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. This Section includes the:
  - 1. Interior paint-grade stile and rail wood doors.
  - 2. Fire-rated interior paint-grade stile and rail wood doors where indicated.
  - 3. Glazed, paneled, and louvered stile and rail doors.
- B. Related Sections:
  - 1. Division 8 – Door Hardware
  - 2. Division 8 – Glazing
  - 3. Division 9 - Painting

##### 1.2 REFERENCES

- A. ANSI/WDMA I.S. 6A – Interior Architectural Wood Stile and Rail Doors.
- B. NFPA 80 – Fire Doors and Other Opening Protectives.
- C. UL 10C / NFPA 252 – Positive Pressure Fire Tests.

##### 1.3 SUBMITTALS

- A. Product Data: Door construction, materials, fire ratings, finishes.
- B. Shop Drawings:
  - 1. Door elevations and panel layouts.
  - 2. Glazed openings and louvers.
  - 3. Fire-rated construction details.
  - 4. Factory primer and paint color options.
  - 5. Panel and glazing molding profiles.
  - 6. Warranty documentation.

##### 1.4 QUALITY ASSURANCE

- A. Manufacturers specializing in architectural stile and rail wood doors.
- B. Fabrication and installation in accordance with ANSI/WDMA I.S. 6A.

##### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors wrapped and protected.
- B. Store in clean, dry, enclosed spaces with adequate ventilation

##### 1.6 PROJECT CONDITIONS

- A. Do not install until building is enclosed, HVAC is operational, and temperature and humidity are at occupancy levels.

## 1.7 WARRANTY

- A. Interior Stile and Rail Doors: Lifetime warranty against defects in materials and workmanship.
- B. Fire-rated doors: Manufacturer's standard fire-door warranty.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURER

- A. Basis of Design: Aspiro™ Series | Marshfield-Algoma™ by Forte Opening Solutions.
- B. Substitutions: Subject to compliance and approval.

### 2.2 STANDARDS AND PERFORMANCE

- A. ANSI/WDMA I.S. 6A.
- B. WDMA Quality Grade: Custom or Premium.

### 2.3 PAINT-GRADE STILE AND RAIL DOORS

- A. Stiles and Rails:
  - 1. Structural composite lumber core.
  - 2. Faces: High Density Fiberboard (HDF) or paint grade hardwood veneer.
- B. Panel Types (as scheduled):
  - 1. Medium Density Fiberboard (MDF)
  - 2. Glazed panels.
  - 3. Combination MDF and glass panels.
  - 4. Wood louvers.
- C. Wood Panels:
  - 1. Raised or flat profile as indicated.
  - 2. Paint-grade hardwood panel moldings.
- D. Glazing:
  - 1. Fully tempered clear glass unless otherwise indicated.
  - 2. Paint-grade hardwood glazing beads and mullions.

### 2.4 FINISHES

- A. Factory Primer:
  - 1. Manufacturer's standard primer compatible with field-applied paint.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify frames are plumb, square, and properly prepared.
- B. Inspect doors for damage prior to installation.

### 3.2 INSTALLATION

- A. Install per ANSI/WDMA I.S. 6A.
- B. Coordinate with door hardware and glazing installation.

### 3.3 ADJUSTING AND REPAIRING

- A. Adjust doors for smooth operation.
- B. Repair minor defects per manufacturer's recommendations.
- C. Replace doors that cannot be satisfactorily repaired.

### 3.4 PROTECTION AND CLEANING

- A. Protect doors until Substantial Completion.
- B. Clean surfaces in accordance with manufacturer's instructions.

END OF SECTION 08 14 33

## SECTION 08 71 00

### DOOR HARDWARE

#### PART 1 - GENERAL

##### 1.01 SUMMARY

###### A. Section includes:

1. Mechanical and electrified door hardware
2. Electronic access control system components

###### B. Section excludes:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

###### C. Related Sections:

1. Division 01 Section "Alternates" for alternates affecting this section.
2. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
3. Division 08 Sections:
  - a. "Metal Doors and Frames"

##### 1.02 REFERENCES

###### A. UL LLC

1. UL 10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Test of Fire Door Assemblies
3. UL 1784 - Air Leakage Tests of Door Assemblies
4. UL 305 - Panic Hardware

###### B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule
2. Recommended Locations for Builders Hardware
3. Keying Systems and Nomenclature
4. Installation Guide for Doors and Hardware

###### C. NFPA – National Fire Protection Association

1. NFPA 70 – National Electric Code
2. NFPA 80 – 2016 Edition – Standard for Fire Doors and Other Opening Protectives
3. NFPA 101 – Life Safety Code
4. NFPA 105 – Smoke and Draft Control Door Assemblies
5. NFPA 252 – Fire Tests of Door Assemblies

D. ANSI - American National Standards Institute

1. ANSI A117.1 – 2017 Edition – Accessible and Usable Buildings and Facilities
2. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
3. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems
4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
5. ANSI/SDI A250.8 - Standard Steel Doors and Frames

1.03 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:
  - a. Review drawings and Sections from related trades to verify compatibility with specified hardware.
  - b. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

B. Action Submittals:

1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
  - a. Wiring Diagrams: For power, signal, and control wiring and including:
    - 1) Details of interface of electrified door hardware and building safety and security systems.
    - 2) Schematic diagram of systems that interface with electrified door hardware.
    - 3) Point-to-point wiring.
    - 4) Risers.
3. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.
  - a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.
4. Door Hardware Schedule:
  - a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
  - b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.

- c. Indicate complete designations of each item required for each opening, include:
      - 1) Door Index: door number, heading number, and Architect's hardware set number.
      - 2) Quantity, type, style, function, size, and finish of each hardware item.
      - 3) Name and manufacturer of each item.
      - 4) Fastenings and other pertinent information.
      - 5) Location of each hardware set cross-referenced to indications on Drawings.
      - 6) Explanation of all abbreviations, symbols, and codes contained in schedule.
      - 7) Mounting locations for hardware.
      - 8) Door and frame sizes and materials.
      - 9) Degree of door swing and handing.
      - 10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.
  - 5. Key Schedule:
    - a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
    - b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
    - c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
    - d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
    - e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
    - f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.
- C. Informational Submittals:
- 1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
  - 2. Provide Product Data:
    - a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
    - b. Include warranties for specified door hardware.
- D. Closeout Submittals:
- 1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
    - a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
    - b. Catalog pages for each product.
    - c. Final approved hardware schedule edited to reflect conditions as installed.
    - d. Final keying schedule
    - e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
    - f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

E. Inspection and Testing:

1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:
  - a. Fire door assemblies, in compliance with NFPA 80.
  - b. Required egress door assemblies, in compliance with NFPA 101.

1.04 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
3. Architectural Hardware Consultant: 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 meets these requirements:
  - a. For door hardware: DHI certified AHC or DHC.
  - b. Can provide installation and technical data to Architect and other related subcontractors.
  - c. Can inspect and verify components are in working order upon completion of installation.
  - d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.
4. Single Source Responsibility: Obtain each type of door hardware from a single manufacturer.

B. Certifications:

1. Fire-Rated Door Openings:
  - a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.
  - b. Provide only items of door hardware that are listed products tested by UL LLC, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.
2. Smoke and Draft Control Door Assemblies:
  - a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105
  - b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.

3. Electrified Door Hardware
    - a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.
  4. Accessibility Requirements:
    - a. Comply with governing accessibility regulations cited in "REFERENCES" article 087100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.
- C. Pre-Installation Meetings
1. Keying Conference
    - a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
      - 1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
      - 2) Preliminary key system schematic diagram.
      - 3) Requirements for key control system.
      - 4) Requirements for access control.
      - 5) Address for delivery of keys.
  2. Pre-installation Conference
    - a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
    - b. Inspect and discuss preparatory work performed by other trades.
    - c. Inspect and discuss electrical roughing-in for electrified door hardware.
    - d. Review sequence of operation for each type of electrified door hardware.
    - e. Review required testing, inspecting, and certifying procedures.
    - f. Review questions or concerns related to proper installation and adjustment of door hardware.
  3. Electrified Hardware Coordination Conference:
    - a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

#### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping.
- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.
- C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
- D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.



- E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.
- F. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

#### 1.06 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop 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.
- D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

#### 1.07 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.
  - 1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
  - 2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.

#### 1.08 MAINTENANCE

- A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.
- B. Turn over unused materials to Owner for maintenance purposes.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

- A. The Owner requires use of certain products for their unique characteristics and project suitability to ensure continuity of existing and future performance and maintenance standards. After investigating available product offerings, the Awarding Authority has elected to prepare proprietary specifications. These products are specified with the notation: "No Substitute."
  - 1. Where "No Substitute" is noted, submittals and substitution requests for other products will not be considered.

- B. Approval of alternate manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category are only to be considered by official substitution request in accordance with section 01 60 00.
- C. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.
- D. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

## 2.02 MATERIALS

### A. Fabrication

- 1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer's recognized installation standards for application intended.
- 2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
- 3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with "Metal Doors and Frames", "Flush Wood Doors", "Stile and Rail Wood Doors" to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.

### B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.

- 1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

### C. Cable and Connectors:

- 1. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with number and gage of wires enough to accommodate electric function of specified hardware.
- 2. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices.
- 3. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

## 2.03 HINGES

### A. Manufacturers and Products:

- 1. Scheduled Manufacturer and Product:
  - a. Ives 5BB1 series
- 2. Acceptable Manufacturers and Products:
  - a. Hager BB1191/1279 series
  - b. McKinneyTB

B. Requirements:

1. Provide hinges conforming to ANSI/BHMA A156.1.
2. Provide five knuckle, ball bearing hinges.
3. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
  - a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
  - b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
4. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
  - a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
  - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
5. 2 inches or thicker doors:
  - a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
  - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
7. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
8. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
  - a. Steel Hinges: Steel pins
  - b. Non-Ferrous Hinges: Stainless steel pins
  - c. Out-Swinging Exterior Doors: Non-removable pins
  - d. Out-Swinging Interior Lockable Doors: Non-removable pins
  - e. Interior Non-lockable Doors: Non-rising pins
9. Provide hinges with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component. Provide mortar guard for each electrified hinge specified.

## 2.04 FLUSH BOLTS

A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Ives
2. Acceptable Manufacturers:
  - a. Trimco
  - b. Rockwood

B. Requirements:

1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

## 2.05 LOCKSETS, LATCHSETS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
  - a. Schlage PC series
2. Acceptable Manufacturers and Products:
  - a. Sargent 10X
  - b. Best 9K series

B. Requirements:

1. Provide mortise locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3-hour fire doors.
2. Indicators: Where specified, provide indicator window
3. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
4. Provide locks with standard 2-3/4 inches backset with full 1/2 inch throw latchbolt.
5. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide switches and sensors integrated into the locks and latches.
6. Lever Trim: As specified. Coordinate with exit device trims and other hardware.

## 2.06 CYLINDERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
  - a. Schlage

B. Requirements:

1. Provide cylinders/cores compliant with ANSI/BHMA A156.5; latest revision; Section 12, Grade 1: permanent cylinders; cylinder face finished to match lockset; manufacturer's series as indicated. Refer to "KEYING" article, herein.
2. Provide cylinders in the below-listed configuration(s), distributed throughout the Project as indicated.
  - a. Security: dual-locking cylinder with interchangeable core requiring restricted, patented keyway.
3. Nickel silver bottom pins.
4. Mark permanent cylinders/cores and keys with applicable blind code per DHI publication "Keying Systems and Nomenclature" for identification. Blind code marks shall not include actual key cuts.
5. Identification stamping provisions must be approved by the Architect and Owner.
6. Failure to comply with stamping requirements shall be cause for replacement of cylinders/cores involved at no additional cost to Owner.
7. Replaceable Construction Cores.
  - a. Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
8. 12 construction change (day) keys.
  - a. Owner or Owner's Representative will replace temporary construction cores with permanent ones.

## 2.07 KEYING

### A. Scheduled System:

1. New factory registered system:
  - a. Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

### B. Requirements:

1. Construction Keying:
  - a. Replaceable Construction Cores.
    - 1) Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
      - a) 3 construction control keys
      - b) 12 construction change (day) keys.
    - 2) Owner or Owner's Representative will replace temporary construction cores with permanent cores.
2. Permanent Keying:
  - a. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
    - 1) Master Keying system as directed by the Owner.
  - b. Forward biting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
  - c. Provide keys with the following features:
    - 1) Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
    - 2) Patent Protection: Keys and blanks protected by one or more utility patent(s).
    - 3) Geographically Exclusive: Where High Security or Security cylinders/cores are indicated, provide nationwide, geographically exclusive key system complying with the following restrictions.
  - d. Identification:
    - 1) Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
    - 2) Identification stamping provisions must be approved by the Architect and Owner.
    - 3) Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
    - 4) Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
    - 5) Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
  - e. Quantity: Furnish in the following quantities.
    - 1) Change (Day) Keys: 3 per cylinder/core.
    - 2) Permanent Control Keys: 3.
    - 3) Master Keys: 6.

## 2.08 KEY CONTROL SYSTEM

### A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Telkee

2. Acceptable Manufacturers:
  - a. HPC
  - b. Lund

B. Requirements:

1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.
  - a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
  - b. Provide hinged-panel type cabinet for wall mounting.

## 2.09 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
  - a. LCN 4050 series
2. Acceptable Manufacturers:
  - a. Sargent 351
  - b. Norton 7500

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. Certify surface mounted mechanical closers to meet fifteen million (15,000,000) full load cycles. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2-inch (38 mm) diameter with 11/16-inch (17 mm) diameter double heat-treated pinion journal.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers. When closers are parallel arm mounted, provide closers which mount within 6-inch (152 mm) top rail without use of mounting plate so that closer is not visible through vision panel from pull side.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI/BHMA Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

## 2.10 DOOR TRIM

### A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Ives
2. Acceptable Manufacturers:
  - a. Trimco
  - b. Rockwood

### B. Requirements:

1. Provide push plates in sizes as specified in hardware sets by 0.050 inch (1 mm) thick and beveled 4 edges. Where width of door stile prevents use specified size adjust width to fit.
2. Provide push bars of solid bar stock, diameter and length as scheduled. Provide push bars of sufficient length to span from center to center of each stile. Where required, mount back-to-back with pull, where not back-to-back use 3/8" x 16 TPI Type O mounting.
3. Provide offset pulls of solid bar stock, diameter and length as scheduled. Where required, mount back-to-back with push bar, where not back-to-back use 3/8" x 16 TPI Type O mounting.
4. Provide pulls of solid bar stock, diameter and length as scheduled. Where required, mount back-to-back with push bar, where not back-to-back use 3/8" x 16 TPI Type O mounting.
5. Provide pull plates in sizes as specified in hardware sets by 0.050 inch (1 mm) thick, beveled 4 edges, and prepped for pull. Where width of door stile prevents use specified size adjust width to fit.

## 2.11 PROTECTION PLATES

### A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Ives
2. Acceptable Manufacturers:
  - a. Trimco
  - b. Rockwood

### B. Requirements:

1. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Sizes of plates:
  - a. Kick Plates: 10 inches (254 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs.
  - b. Mop Plates: 4 inches (102 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs.
  - c. Armor Plates: 36 inches (914 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs. Coordinate plate width on doors with edge guards accordingly.

- d. Door Edge Guards: Edge Guards to be minimum of 0.050 inch (1 mm) thick. Coordinate edge guard height with armor plates. Edge Guards to be beveled as required by door. Edge Guards to have cut-outs as required to accommodate all hardware.
- 3. At fire rated doors, provide protection plates over 16 inches high with UL label.

## 2.12 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

### A. Manufacturers:

- 1. Scheduled Manufacturers:
  - a. Glynn-Johnson
- 2. Acceptable Manufacturers:
  - a. Rixson
  - b. ABH

### B. Requirements:

- 1. Provide heavy duty concealed or surface mounted overhead stop or holder for interior doors as specified.

## 2.13 DOOR STOPS AND HOLDERS

### A. Manufacturers:

- 1. Scheduled Manufacturer:
  - a. Ives
- 2. Acceptable Manufacturers:
  - a. Trimco
  - b. Rockwood

### B. Provide door stops at each door leaf:

- 1. Provide convex type where mortise type locks are used and concave type where cylindrical type locks are used.
- 2. Where a wall stop cannot be used, provide universal floor stops for low or high rise options.
- 3. Where wall or floor stop cannot be used, provide medium duty surface overhead stop.
- 4. Provide roller bumpers where doors open into each other and overhead stop cannot be used.

## 2.14 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

### A. Manufacturers:

- 1. Scheduled Manufacturer:
  - a. Pemko
- 2. Acceptable Manufacturers:
  - a. Zero International



b. National Guard Products

B. Requirements:

1. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items.
2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
3. Size thresholds:
  - a. Saddle Thresholds: 1/2 inch (13 mm) high by jamb width by door width.
  - b. Bumper Seal Thresholds: 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width.
4. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.

2.15 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Ives
2. Acceptable Manufacturers:
  - a. Trimco
  - b. Rockwood

B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Prior to installation of hardware, 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. Verify doors, frames, and walls have been properly reinforced for hardware installation.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. 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. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
  - 4. Installation Guide for Doors and Hardware: DHI TDH-007-20
- B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.
- C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.
- I. Lock Cylinders:
  - 1. Install construction cores to secure building and areas during construction period.
  - 2. Replace construction cores with permanent cores as indicated in keying section.
  - 3. Furnish permanent cores to Owner for installation.
- J. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY sections for:
  - 1. Conduit, junction boxes and wire pulls.
  - 2. Connections to and from power supplies to electrified hardware.
  - 3. Connections to fire/smoke alarm system and smoke evacuation system.
  - 4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
  - 5. Connections to panel interface modules, controllers, and gateways.
  - 6. Testing and labeling wires with Architect's opening number.
- K. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- L. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.
- M. Closer/Holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.

- N. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.
- O. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- P. 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 may impede traffic or present tripping hazard.
- Q. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- R. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- S. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

### 3.03 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. Spring Hinges: Adjust to achieve positive latching when door can close freely from an open position of 30 degrees.
  - 2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
  - 3. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

### 3.04 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items per manufacturer's instructions to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

### 3.05 DOOR HARDWARE SCHEDULE

- A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.

- B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.
- C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.

D. Hardware Sets

HW SET: 01

DOOR NUMBER:

110.1

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5 NRP	630	IVE
1	EA	EXIT DEVICE	EXISTING TO BE REUSED		YAL
1	EA	KEYPAD EXIT TRIM	AU-NTT613	626	YAL
1	EA	DOOR CLOSER	EXISTING TO BE REUSED		YAL
1	SET	SEALS	316APK	AL	PEM
1	EA	DOOR SWEEP	307AV	AL	PEM
1	EA	THRESHOLD	2005AV	AL	PEM

EXISTING DOOR CLOSER AND EXIT DEVICE ARE TO BE RE-USED. REPLACE IF NECESSARY FOR OPENING TO FUNCTION CORRECTLY.

HW SET: 02

DOOR NUMBER:

100.1

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5 NRP	630	IVE
1	EA	EXIT DEVICE	EXISTING TO BE REUSED		YAL
1	EA	DOOR CLOSER	EXISTING TO BE REUSED		YAL
1	SET	SEALS	316APK	AL	PEM
1	EA	DOOR SWEEP	307AV	AL	PEM
1	EA	THRESHOLD	2005AV	AL	PEM

EXISTING DOOR CLOSER AND EXIT DEVICE ARE TO BE RE-USED. REPLACE IF NECESSARY FOR OPENING TO FUNCTION CORRECTLY.

SET: 03

DOOR NUMBER:

200.1

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	630	IVE
1	EA	LOCKSET	EXISTING TO BE REUSED		YAL
1	EA	DOOR CLOSER	EXISTING TO BE REUSED		YAL
1	SET	SEALS	316APK	AL	PEM
1	EA	DOOR SWEEP	3452AV	AL	PEM
1	EA	THRESHOLD	114A X 61	AL	PEM

EXISTING DOOR CLOSER AND LOCKSET ARE TO BE RE-USED. REPLACE IF NECESSARY FOR OPENING TO FUNCTION CORRECTLY.

HW SET: 04

DOOR NUMBER:

110.2          203.1

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	FIRE EXIT HARDWARE	98L-F 996L	626	VON
1		CYLINDER	CYLINDER AS REQUIRED	626	SCH
1	EA	SURFACE CLOSER	4050A.RWPA	689	LCN
1	EA	FLOOR STOP	FS439	630	IVE
1	EA	DOOR SWEEP	307AV	AL	PEM

HW SET: 05

DOOR NUMBER:

123.1

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	PC80PD RHO	626	SCH
1	EA	SURFACE CLOSER	4050A.CUSH	689	LCN
1	SET	SEALS	316APK	AL	PEM

HW SET: 06

DOOR NUMBER:

108.1          115.1

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	PC80PD RHO	626	SCH
1	EA	SURFACE CLOSER	4050A.RWPA	689	LCN
1	EA	FLOOR STOP	FS439	630	IVE
1	SET	SEALS	316APK	AL	PEM

HW SET: 07  
DOOR NUMBER:  
118.1

EACH TO HAVE:

6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
2	EA	PANIC HARDWARE	9827L 996L LBR	626	VON
2		CYLINDER	CYLINDER AS REQUIRED	626	SCH
2	EA	SURFACE CLOSER	4050A.CUSH	689	LCN
2	EA	SILENCER	SR65	GRY	IVE

HW SET: 08  
DOOR NUMBER:  
125.1

EACH TO HAVE:

6	EA	HINGE	5BB1 __X__	652	IVE
2	EA	MANUAL FLUSH BOLT	FB458	626	IVE
1	EA	ENTRANCE LOCK	PC53PD RHO	626	SCH
2	EA	FLOOR STOP	FS439	630	IVE
2	EA	SILENCER	SR65	GRY	IVE

PROVIDE HINGES WITH SUFFICIENT SIZE TO ALL 180 DEG. SWING.

HW SET: 09  
DOOR NUMBER:  
105.1          106.1          202.1

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	PC80PD RHO	626	SCH
1	EA	SURFACE CLOSER	4050A.RWPA	689	LCN
3	EA	SILENCER	SR65	GRY	IVE

HW SET: 10  
DOOR NUMBER:  
116.1          122.1

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	PC80PD RHO	626	SCH
1	EA	OVERHEAD STOP	450S	630	GLY
3	EA	SILENCER	SR65	GRY	IVE

HW SET: 11

DOOR NUMBER:

104.1            107.1

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	PC70PD RHO	626	SCH
1	EA	SURFACE CLOSER	4050A.HWPA	689	LCN
1	EA	FLOOR STOP	FS439	630	IVE
3	EA	SILENCER	SR65	GRY	IVE

HW SET: 12

DOOR NUMBER:

111.1            112.1            117.1            119.1            120.1            121.1  
124.1

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	ENTRANCE LOCK	PC53PD RHO	626	SCH
1	EA	FLOOR STOP	FS439	630	IVE
3	EA	SILENCER	SR65	GRY	IVE

HW SET: 13

DOOR NUMBER:

109.1

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	PC10S RHO	626	SCH
1	EA	SURFACE CLOSER	4050A.HWPA	689	LCN
1	EA	FLOOR STOP	FS439	630	IVE
3	EA	SILENCER	SR65	GRY	IVE

HW SET: 14

DOOR NUMBER:

102.1            103.1

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PUSH PLATE	8200 4" X 16"	630	IVE
1	EA	PULL PLATE	8303-8 4" X 16"	630	IVE
1	EA	SURFACE CLOSER	4050A.RWPA	689	LCN
1	EA	FLOOR STOP	FS439	630	IVE
3	EA	SILENCER	SR65	GRY	IVE

HW SET: 15  
DOOR NUMBER:  
101.1

EACH TO HAVE:

1	EA	SLIDING SET	280A-SWKIT/_-14__-2	AL	PEM
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SIZE AS REQUIRED BY DOOR PANELS. PROVIDE SOFT CLOSE FUNCTION.  
CONTRACTOR TO PROVIDE HARDWARE TO SECURE DOOR LEAFS TOGETHER.

END OF SECTION.



## SECTION 08 81 00

### GLAZING

#### 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. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
  - 1. Windows.
  - 2. Interior borrowed lites.
  - 3. Doors.
  - 4. Glazed entrances.
- B. All applications: Tempered lites where required by Code.
- C. Exterior Applications: Heat-strengthened lites where required by glass fabricator's thermal analysis and/or performance requirements.

##### 1.3 DEFINITIONS

- A. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations according to ASTM C 1036.
- C. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.
- D. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.
- E. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for 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.

##### 1.4 PERFORMANCE REQUIREMENTS

- A. Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
  - 1. Refer to requirements in related sections for specific applications.

- B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:
  - 1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
    - a. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade as indicated on Drawings.
- C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:
  - 1. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
  - 2. Center-of-Glass Values: Based on using LBL-44789 WINDOW 5.0 computer program for the following methodologies:
    - a. U-Factors: NFRC 100 expressed as Btu/ sq. ft. x h x deg F.
    - b. Solar Heat Gain Coefficient: NFRC 200.
    - c. Solar Optical Properties: NFRC 300.

## 1.5 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Samples: For the following products, in the form of 12-inch-square Samples for glass.
  - 1. Decorative Frit: Minimum size 6 inches square samples, representing actual product, color, and patterns.
  - 2. Insulating glass for each designation indicated. 12-inch square samples.
  - 3. For each color (except black) of exposed glazing sealant indicated. 12" lengths.
- C. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.
- D. Product Certificates: For those products not permanently labeled, provide product certificates signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.
- E. Qualification Data: For installer.
- F. Preconstruction Adhesion and Compatibility Test Report: From glazing sealant manufacturer indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.

## 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- B. Source Limitations for Glass: Obtain the following through one source from a single manufacturer for each glass type: Coated float glass and insulating glass.
- C. Source Limitations for Glass Sputter-Coated with Solar-Control Low-E Coatings: Where solar-control low-e coatings of a primary glass manufacturer that has established a certified fabricator program is specified, obtain sputter-coated solar-control low-e-coated glass in fabricated units from a manufacturer that is certified by coated-glass manufacturer.
- D. Source Limitations for Glazing Accessories: Obtain glazing accessories through one source from a single manufacturer for each product and installation method indicated.
- E. Elastomeric Glazing Sealant Product Testing: Obtain sealant test results for product test reports in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period.
  - 1. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
  - 2. Test elastomeric glazing sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.
- F. Preconstruction Adhesion and Compatibility Testing: Submit to elastomeric glazing sealant manufacturers, for testing indicated below, samples of each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member that will contact or affect elastomeric glazing sealants:
  - 1. 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.
  - 2. Submit not fewer than eight pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
  - 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
  - 4. For materials failing tests, obtain sealant manufacturer's written instructions for corrective measures, including the use of specially formulated primers.
  - 5. Testing will not be required if elastomeric glazing sealant manufacturers submit data based on previous testing of current sealant products for adhesion to, and compatibility with, glazing materials matching those submitted.
- G. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201.
  - 1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council or another certification agency.
  - 2. Where glazing units, including Kind FT glass and laminated glass, are specified in Part 2 articles for glazing lites more than 9 sq. ft. in exposed surface area of one side, provide glazing products that comply with Category II materials, for lites 9 sq. ft. or less in exposed surface area of one side, provide glazing products that comply with Category I or II materials, except for hazardous locations where Category II materials are required by 16 CFR 1201 and regulations of authorities having jurisdiction.

- H. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
  - 1. GANA Publications: GANA Laminated Division's "Laminated Glass Design Guide" and GANA's "Glazing Manual."
  - 2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units."
- I. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following testing and inspecting agency:
  - 1. Insulating Glass Certification Council.
- J. 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 in the location and of the size indicated or, if not indicated, as directed by Professional.
  - 2. Build glass mockups by installing the following kinds of glass in mockups specified in Division 08 Sections for aluminum storefronts, to match glazing systems required for Project, including glazing methods:
    - a. Insulated glass
    - b. Fritted insulating glass.
    - c. Spandrel glass installation.
    - d. Laminated glass skylight installation
  - 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- K. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Meetings."

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

#### 1.8 PROJECT 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 liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F.

## 1.9 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form, made out to Owner and signed by coated-glass manufacturer agreeing to replace coated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
  - 1. Warranty Period: 10 years.
- B. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form, made out to Owner and signed by insulating-glass manufacturer agreeing to replace insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
  - 1. Warranty Period: 10 years.

## PART 2 - PRODUCTS

### 2.1 GLASS PRODUCTS

- A. Annealed Float Glass: ASTM C 1036, Type I (transparent flat glass), Quality-Q3; of class indicated.
  - 1. Locations: Typical non-insulated interior glazing conditions, unless required to be safety glazing by Code.
- B. Fully Tempered Float Glass: ASTM C 1048; Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear), Quality-Q3.
  - 1. Locations: Typical non-insulated interior glazing locations required to be clear safety glazing as required by Code or specifically indicated to be safety glazing or tempered on the Drawings.
    - a. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
- C. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article and in Part 2 "Insulating-Glass Units" Article.
  - 1. Locations: Typical insulated exterior glazing locations as indicated on the Drawings and may or may not be required to be safety glazing as required by Code or specifically indicated to be safety glazing on the Drawings.
    - a. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
    - b. Provide Kind FT (fully tempered) glass lites where safety glass is indicated.
    - c. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulating-glass units are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.

- d. Sealing System: Dual seal, with primary and secondary sealants as follows:
  - 1) Manufacturer's standard sealants.
- e. Spacer Specifications: Manufacturer's standard spacer material and construction complying with the following requirements:
  - 1) Spacer Material: Aluminum with mill or clear anodic finish.
  - 2) Desiccant: Molecular sieve or silica gel, or blend of both.
  - 3) Corner Construction: Manufacturer's standard corner construction.

## 2.2 GLAZING GASKETS

- A. Gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:
  - 1. EPDM, ASTM C 864.
  - 2. Silicone, ASTM C 1115.
  - 3. Thermoplastic polyolefin rubber, ASTM C 1115.
  - 4. Any material indicated above.
- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:
  - 1. EPDM.
  - 2. Silicone.
  - 3. Thermoplastic polyolefin rubber.
  - 4. Any material indicated above.

## 2.3 GLAZING SEALANTS

- A. Provide products of type indicated, complying with the following requirements:
  - 1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
  - 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.
  - 4. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D.

- B. Elastomeric Glazing Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates. VOC content not to exceed 250 g/L.
  - 1. Single-Component Silicone Glazing Sealants:
    - a. Products:
      - 1) Dow Corning Corporation; 790.
      - 2) GE Silicones; SilPruf LM SCS2700.
      - 3) Tremco; Spectrem 1 (Basic).
    - b. Type and Grade: S (single component) and NS (nonsag).
    - c. Class: 50.
    - d. Use Related to Exposure: NT (nontraffic).
    - e. Uses Related to Glazing Substrates: M, G, A, and, as applicable to glazing substrates indicated, O.
      - 1) Use O Glazing Substrates: Coated glass, color anodic aluminum.
- C. Glazing Sealants for Fire-Resistive Glazing Products: Identical to products used in test assemblies to obtain fire-protection rating.

## 2.4 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; 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; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
  - 1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
  - 2. 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; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:
  - 1. Type 1, for glazing applications in which tape acts as the primary sealant.
  - 2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

## 2.5 MISCELLANEOUS GLAZING MATERIALS

- A. Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer 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.
- G. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistance rating.

## 2.6 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to glaze 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.

## 2.7 MONOLITHIC FLOAT-GLASS UNITS

- A. Uncoated Clear Float-Glass Units: Class 1 (clear) Kind FT (fully tempered) float glass.

- 1. Thickness: 6.0 mm.

## 2.8 LOW-E INSULATING-GLASS UNITS

- A. Clear Glass Units:

- 1. Basis-of-Design Product: Provide replacement glazing to match existing in thickness, tint and performance by one of the following:
  - a. AGC Flat Glass North America Inc.
  - b. Guardian Industries.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine framing glazing, 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 system.
  - 3. Minimum required face or edge clearances.
  - 4. Effective sealing between joints of glass-framing members.
- B. Examine substrates and conditions where installation of resin fabrications will occur with Installer present, for compliance with manufacturers' requirements.
- C. 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. Adjust glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches as follows:
  - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
  - 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

### 3.4 TAPE GLAZING

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

### 3.5 GASKET GLAZING (DRY)

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

END OF SECTION 08 81 00

## SECTION 09 29 00

### GYPSUM BOARD ASSEMBLIES

#### 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. This Section includes the following:
  - 1. Interior gypsum board.
  - 2. Cementitious tile backing panels.
  - 3. Nonload-bearing steel framing members for gypsum board assemblies.
  - 4. Gypsum board assemblies attached to steel framing.
  - 5. Suspension grid system for gypsum-board ceilings and bulkheads.
  - 6. Light-gauge metal blocking and reinforcing.
- B. Related Sections include the following:
  - 1. Division 06 Section "Sheathing" for gypsum sheathing.
  - 2. Division 09 Section "Painting" for primers applied to gypsum board surfaces.

##### 1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide lightgauge metal framing capable of withstanding loads within limits and under conditions indicated.
  - 1. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
    - a. Gypsum Board Finish: Horizontal deflection of 1/240 of the wall height.
    - b. Tile Backer Board Finish: Horizontal deflection of 1/360 of the wall height
  - 2. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
    - a. Upward and downward movement of 3/4 inch.

##### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show layout, spacings, sizes, thicknesses, and types of lightgauge metal framing including bracing where required. Show locations and details for metal blocking, reveals, reglets, control joints and other unique details affecting the performance or aesthetic appearance of the system.

## 1.5 QUALITY ASSURANCE

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- 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.

## 1.6 STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

## 1.7 PROJECT 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 interior products 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 blotchy surface contamination and discoloration.

## PART 2 - PRODUCTS

### 2.1 INTERIOR GYPSUM BOARD

- A. Panels, General:
  - 1. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
- B. Recycled Content of Gypsum Board: Provide minimum 80 percent recycled content for regular type gypsum board and provide minimum 10 percent recycled content for Type X and Moisture Resistant boards.
- C. Comply with ASTM C 1396, as applicable to type of gypsum board indicated.
- D. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. CertainTeed Corp.
  - 2. G-P Gypsum.
  - 3. Lafarge North America Inc.
  - 4. National Gypsum Company.
  - 5. Temple-Inland Incorporated
  - 6. USG Corporation.

- E. Type X:
  - 1. Thickness: 5/8-inch.
  - 2. Long Edges: Tapered.
- F. Ceiling Type: Manufactured to have more sag resistance than regular-type gypsum board.
  - 1. Thickness: 1/2 inch, unless indicated otherwise.
  - 2. Long Edges: Tapered.
- G. Abuse-Resistant Gypsum Board: ASTM C 1629, Level 2.
  - 1. Core: 5/8-inch Type X
  - 2. Long edges: tapered
  - 3. Mold Resistant: ASTM D 32736, score of 10 as rated according to ASTM D 3274.
- H. Moisture and Mold-Resistant Board:
  - 1. Application: As indicated.
  - 2. ASTM C 1396.
    - a. Treat core and face and back paper treated with biocides.
    - b. Type and Thickness: Regular, 5/8 inch. Unless otherwise indicated.
    - c. Product: Subject to compliance with requirements, provide one of the following:
      - 1) "Mold-Tough" by United States Gypsum Co.
      - 2) XP; National Gypsum Co.
    - d. Locations: All Toilet Rooms, Decon, Bathrooms, Environmental Services and Soiled. Excludes tiled walls where cement backer board is specified.

## 2.2 TILE BACKER BOARD

- A. Complies with ANSI A118.9 for test methods and specifications for cementitious backer units and complies with ASTM C1325 standards for non-asbestos fiber-mat reinforced cementitious backer units.
- B. Cement board: Formed in a continuous process of aggregated portland cement slurry with polymer-coated, glass-fiber mesh completely encompassing edges, back and front surfaces. Edges formed smooth. Ends square cut.
  - 1. 1/2-inch thickness unless otherwise indicated.
  - 2. Products: Subject to compliance with requirements:
    - a. Durock Cement Board Next Gen; USG Corp.
    - b. Or approved equal.

## 2.3 TRIM ACCESSORIES

### A. General Interior Trim: ASTM C 1047.

1. Material: Galvanized steel sheet.
2. Shapes:
  - a. Cornerbead.
  - b. Bullnose bead.
  - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
  - d. L-Bead: L-shaped; exposed long flange receives joint compound.
  - e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
  - f. Expansion (control) joint.
  - g. Curved-Edge Cornerbead: With notched or flexible flanges.

## 2.4 JOINT TREATMENT MATERIALS

### A. Comply with ASTM C 475/C 475M.

### B. Joint Tape:

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

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

1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type or drying-type taping compound.
3. Do not use topping compound for bedding and first coat.
4. Fill Coat: For second coat, use drying-type, sandable topping compound.
5. Finish Coat: For third coat, use drying-type, sandable topping compound.
6. Skim Coat: For final coat of Level 5 finish, use:
  - a. Setting-type, sandable topping compound.  
or
  - b. High-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.

### D. Joint Compound for Tile Backing Panels:

1. Cementitious Backing Panel: As recommended by backing panel manufacturer.

## 2.5 STEEL FRAMING FOR WALLS AND PARTITIONS

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

1. Steel Framing and Furring:
  - a. Clark/Dietrich Building Systems
  - b. Marino/Ware
  - c. Alabama Metal Industries Corporation; a Gibraltar Industries Company.

- B. Provide steel framing members complying with the following requirements:
1. Protective Coating: ASTM A 653, G 40 hot-dip galvanized coating.
- C. Steel Studs and Runners: ASTM C 645, with flange edges of studs bent back 90 degrees and doubled over to form 3/16-inch-wide minimum lip (return), and complying with the following requirements for minimum thickness of base (uncoated) metal and for depth:
1. Thickness:
    - a. General applications: 25-gage (0.0209 inch)
    - b. At door frames and openings, at all corridors, and wherever cement board is indicated: 20-gage (0.0329 inch).
    - c. Partitions that extend to deck above: 18 gage (0.0478 inch)
  2. Width: As indicated on Drawings for respective P-types.
  3. Depth: 1-1/2 inch.
  4. Spacing: Max of 16" o.c.
- D. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
1. Minimum Base Metal Thickness: 0.0179 inch.
  2. Depth: 7/8 inch or 1-1/2 inches as indicated.
- E. Steel Sheet For Blocking And Bracing: Provide steel flat strap and backing plate complying with ASTM A 653 or ASTM A 568, length and width as indicated, minimum 14 gage unless otherwise recommended by fabricator/manufacturer of item being supported. Backing plate must pass over minimum of 3 studs.
1. Provide backing in walls for all wall mounted specialties (Division 10), Equipment (Div. 11), and Furnishings (Div. 12).
  2. Backing for coat pegs shall be centered at 66".
  3. Provide backing behind shelving or fire rated 3/4" plywood.
  4. Provide backing behind door hold open devices.
  5. Provide backing for door bumpers.
  6. Provide backing for visual display boards, toilet compartment and urinal screen wall brackets, toilet accessories, window shades and other items. Comply with manufacturer's recommendations.
- F. Fasteners for Metal Framing: Provide fasteners of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel framing and furring members securely to substrates involved; complying with the recommendations of gypsum board manufacturers for applications indicated.
- G. Firestop Track: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
1. Products: Subject to compliance with requirements, one of the following:
    - a. Fire Trak Corp.; Fire Trak attached to studs with Fire Trak Slip Clip.
    - b. Metal-Lite, Inc.; The System.
  2. Subject to approval of the lightgage framing manufacturer and the Architect, field fabricated units may be acceptable.

## 2.6 STEEL GRID SYSTEM FOR GWB CEILINGS AND BULKHEADS

- A. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
- B. Manufacturers:
  - 1. Armstrong
  - 2. USG.
  - 3. Chicago Metallic.
- C. Components:
  - 1. 1-1/2" main beams and cross tees, fabricated of hot-dipped galvanized steel, with knurled flange.
  - 2. 1-1/4" x 1-1/4" angle molding.

## 2.7 AUXILIARY MATERIALS

- A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
  - 1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
  - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
  - 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
  - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
  - 2. Sustainability Requirements: Provide glass-fiber blanket insulation as follows:
    - a. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.
    - b. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05-ppm formaldehyde.
    - c. Provide products with an average recycled content of mineral fiber insulation products so postconsumer recycled content plus one-half of pre-consumer recycled content is not less than 25 percent.
- E. Acoustical Sealant: As specified in Division 7 Section "Joint Sealants."
- F. Thermal Insulation: As specified in Division 7 Section "Building Insulation."



## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, 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.
- D. See drawings for locations of specialty gypsum board types and waterproof membrane.

### 3.2 PREPARATION

- A. Ceiling Anchorages: Coordinate installation of ceiling grid systems with installation of overhead structural assemblies to ensure that inserts and other provisions for anchorages to building structure have been installed to receive ceiling hangers that will develop their full strength and at spacing required to support ceilings.

### 3.3 INSTALLING STEEL FRAMING, GENERAL

- A. Steel Framing Installation Standard: Comply with applicable requirements of ASTM C 754 and with ASTM C 840.
- B. Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Comply with details indicated and with recommendations of gypsum board manufacturer or, if nonavailable, with USG's "Gypsum Construction Handbook."
- C. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement. Comply with details shown on Drawings.
  - 1. Where building structure abuts ceiling perimeter or penetrates ceiling.
  - 2. Where partition framing and wall furring abut structure, except at floor.
  - 3. Install deflection track top runner to attain lateral support and avoid axial loading.
- D. Do not bridge building control and expansion joints with steel framing or furring members. Independently frame both sides of joints with framing or furring members as indicated.
- E. Install lightgauge steel supplementary framing, blocking, and reinforcing:
  - 1. To support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

### 3.4 INSTALLING STEEL FRAMING FOR WALLS AND PARTITIONS

- A. Install runners (tracks) at floors, ceilings, and structural walls and columns where gypsum board stud assemblies abut other construction.
  - 1. Where studs are installed directly against exterior walls, install foam gaskets between studs and wall.
- B. Installation Tolerances: Install each steel framing and furring member so that fastening surfaces do not vary more than 1/8 inch from the plane formed by the faces of adjacent framing.

- C. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.
  - 1. Cut studs 1/2 inch short of full height to provide perimeter relief.
  - 2. For fire-resistance-rated partitions that extend to the underside of floor/roof slabs and decks or other continuous solid structural surfaces to obtain ratings, install framing around structural and other members extending below floor/roof slabs and decks, as needed, to support gypsum board closures needed to make partitions continuous from floor to underside of solid structure.
- D. Install steel studs and furring in sizes and at spacings indicated.
- E. Install steel studs so flanges point in the same direction and leading edge or end of each gypsum board panel can be attached to open (unsupported) edges of stud flanges first.
- F. Frame door openings to comply with GA-219, and with applicable published recommendations of gypsum board manufacturer, unless otherwise indicated. Attach vertical studs at jambs with screws either directly to frames or to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
  - 1. Install 2 studs at each jamb, unless otherwise indicated.
  - 2. 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. Control joints shall be required at door opening(s) in excess of 36 inches only.
  - 3. Extend jamb studs through suspended ceilings and attach to underside of floor or roof structure above.
- G. Frame openings other than door openings to comply with details indicated or, if none indicated, as required for door openings. Install framing below sills of openings to match framing required above door heads.

### 3.5 INSTALLATION OF GRID SUSPENSION SYSTEMS

- A. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
  - 1. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

### 3.6 FIELD QUALITY CONTROL

- A. Above-Ceiling Observation: Architect will conduct an above-ceiling observation prior to installation of gypsum board ceilings and report any deficiencies in the Work observed. Do not proceed with installation of gypsum board to ceiling support framing until deficiencies have been corrected.
  - 1. Notify Architect one week in advance of the date and the time when the Project, or part of the Project, will be ready for an above-ceiling observation.
  - 2. Prior to notifying Architect, complete the following in areas to receive gypsum board ceilings:
    - a. Installation of 80 percent of lighting fixtures, powered for operation.
    - b. Installation, insulation, and leak and pressure testing of water piping systems.
    - c. Installation of air duct systems.
    - d. Installation of ceiling support framing.

### 3.7 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.

### 3.8 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
1. Type X: All assemblies unless otherwise indicated.
  2. Ceiling Type: Ceiling surfaces.
  3. Abuse-Resistant Type: Corridor/Lobby up to 8' Min A.F.F.
- 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), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
    - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
    - b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
  3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
  4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- C. Multilayer Application:
1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints 1 framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
  2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
  3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
  4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.
- D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.
- E. Moisture-Resistant Gypsum Backing Board: Install at all wet walls (where tile is not indicated) and other locations as indicated. Install with 1/4-inch gap where panels abut other construction or penetrations.

### 3.9 APPLYING TILE BACKING PANELS

- A. Cementitious Backing Panels: Comply with manufacturer's written installation instructions and install at locations indicated to receive tile. Install with 1/4-inch gap where panels abut other construction or penetrations.

- B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

### 3.10 INSTALLING TRIM ACCESSORIES

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

### 3.11 FINISHING GYPSUM BOARD

- A. Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
  - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated unless a higher level of finish is required for fire-resistance-rated assemblies and sound-rated assemblies.
  - 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 where surfaces to receive wall coverings and flat paints:
    - a. Primer and its application to surfaces are specified in other Division 09 Sections.
  - 5. Level 5: At surface areas to receive erasable paint, epoxy, gloss, semi-gloss, or eggshell paint.
    - a. Primer and its application to surfaces are specified in other Division 09 Sections.
- E. Cementitious Backing Panels: Finish according to manufacturer's written instructions.

### 3.12 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 09 29 00

## SECTION 09 30 00

### CERAMIC TILE

#### 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. This Section includes the following:
  - 1. Ceramic tile.
  - 2. Waterproof membrane for thin-set tile installations.
  - 3. Tile levelling system.
  - 4. Crack-suppression membrane for thin-set tile installations.
  - 5. Corner guards and metal edge strips (floor and wall) installed as part of tile installations.
- B. Related Sections include the following:
  - 1. Division 07 Section "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
  - 2. Division 09 Section "Gypsum Board Assemblies" for cementitious backer units.

##### 1.3 DEFINITIONS

- A. 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.
- B. Module Size: Actual tile size (minor facial dimension as measured per ASTM C 499) plus joint width indicated.
- C. Facial Dimension: Actual tile size (minor facial dimension as measured per ASTM C 499).
- D. Facial Dimension: Nominal tile size as defined in ANSI A137.1.

##### 1.4 PERFORMANCE REQUIREMENTS

- A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:
  - 1. Level Surfaces: Minimum 0.6.

##### 1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

- C. Samples for Verification:
1. Full-size units of each type and composition of tile and for each color and finish required.
  2. Assembled samples with grouted joints for each type and composition of tile and for each color and finish required, at least 12 inches square and mounted on rigid panel. Use grout of type and in color or colors approved for completed work.
  3. Full-size units of each type of trim and accessory for each color and finish required.
  4. Metal edge strips in 6-inch lengths.
- D. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
- E. Product Certificates: For each type of product, signed by product manufacturer.
- F. Qualification Data: For Installer.
- G. Material Test Reports: For each tile-setting and -grouting product.

## 1.6 QUALITY ASSURANCE

- A. Source Limitations for Tile: Obtain all tile of same type and color or finish from one source or producer.
1. Obtain tile 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 a single manufacturer and each aggregate from one source or producer.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section through one source from a single manufacturer for each product:
1. Stone thresholds.
  2. Waterproofing and crack isolation membranes.
  3. Metal edge strips.
- D. Mockups: Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution.
1. Build mockup of each type of floor tile installation.
  2. Build mockup of each type of wall tile installation.
  3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.7 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 requirement in ANSI A137.1 for labeling sealed 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 avoided.
- D. Store liquid latexes and emulsion adhesives in unopened containers and protected from freezing.



## 1.8 PROJECT 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.

## 1.9 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 5 percent of amount installed for each type, composition, color, pattern, and size indicated, plus any remainder.

## PART 2 - PRODUCTS

### 2.1 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.
  - 1. Provide tile complying with Standard grade requirements.
  - 2. For facial dimensions of tile, comply with requirements relating to tile sizes specified in Part 1 "Definitions" Article.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI standards referenced in "Setting and Grouting Materials" Article.
- C. FloorScore Compliance: tiles for floors shall comply with requirements of FloorScore Standard.
- D. Factory Blending: For tile exhibiting color variations within ranges selected during Sample submittals, 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.
- E. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer, unless otherwise indicated.
  - 1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

### 2.2 TILE PRODUCTS

- A. Glazed Ceramic Floor Tile at Restrooms: Provide flat tile complying with the following requirements:
  - 1. Manufacturer: Available products that may be incorporated into the Work include, but are not limited to Happy Floors, Inc.
  - 2. Product: Basis of design: Titan Wall Tile Collection (Edge, Deco and Touch) or comparable product approved by Architect prior to bid.
  - 3. Composition: Glazed white-body ceramic
  - 4. Nominal Facial Dimensions: 4" x 12"
  - 5. Nominal Thickness 5/16"

6. Finish: Glossy
7. Edge Type: Rectified
8. Color: Full color range
9. Grout: As selected by Architect from manufacturer's full range.

## 2.3 SETTING AND GROUTING MATERIALS

### A. Manufacturers:

1. Bonsal, W. R., Company.
2. Bostik.
3. LATICRETE International Inc.
4. MAPEI Corporation.

### B. Latex-Portland Cement Mortar (Thin-Set): ANSI A118.4, consisting of the following:

1. Prepackaged dry-mortar mix containing dry, redispersible, ethylene vinyl acetate additive to which only water must be added at Project site.
2. Prepackaged dry-mortar mix combined with styrene-butadiene-rubber liquid-latex additive.
  - a. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

### C. Polymer Modified Sanded Cement Grout: ANSI A108.10 and A118.7, for grout joints larger than 1/8 inch, consisting of the following;

1. Polymer Type: Ethylene vinyl acetate or acrylic additive, in dry, redispersible form, prepackaged with other dry ingredients
2. Colors as selected by the Architect from manufacturer's full range including all premium colors.

### D. Polymer Modified Unsanded Cement Grout: ANSI A108.10 and A118.7, for grout joints 1/8 inch and less, consisting of the following;

1. Polymer Type: Ethylene vinyl acetate or acrylic additive, in dry, redispersible form, prepackaged with other dry ingredients
2. Colors as selected by the Architect from manufacturer's full range including all premium colors.

## 2.4 TILE SETTING AND LEVELING SYSTEM

### A. Tile Setting and Leveling System: Modular tile shall be installed with a tile setting and leveling system to provide a plumb, level, and true surface between tiles with minimal to no lippage.

1. Basis of Design System: Tuscan Seam Clip Edge Leveling System.

## 2.5 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.

- B. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints that does not change color or appearance of grout.
  - 1. Products:
    - a. Bonsal, W. R., Company; Grout Sealer.
    - b. Bostik; CeramaSeal Grout Sealer.
    - c. MAPEI Corporation; KER 003, Silicone Spray Sealer for Cementitious Tile Grout.

## 2.6 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 installed tile.
  - 1. Verify that substrates for setting tile are firm; dry; clean; free of oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 Series of tile installation standards for installations indicated.
  - 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 before installing tile.
  - 3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Professional.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.
- B. Provide concrete substrates for tile floors installed with thin-set mortar that comply with flatness tolerances specified in referenced ANSI A108 Series of tile installation standards.
  - 1. Fill cracks, holes, and depressions with trowelable leveling and patching compound according to tile-setting material manufacturer's written instructions. Use product specifically recommended by tile-setting material manufacturer.
  - 2. Remove protrusions, bumps, and ridges by sanding or grinding.

- C. Blending: For tile exhibiting color variations within ranges selected during Sample submittals, 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 INSTALLATION, GENERAL

- A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.
- B. TCNA Installation Guidelines: TCNA's "Handbook for Ceramic Tile Installation." Comply with TCNA installation methods indicated in ceramic tile installation schedules.
- C. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. 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.
- F. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.
- G. Lay out tile wainscots and extensions around mirrors and other wall mounted items that extend above wainscots, to next full tile beyond dimensions indicated.
- H. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, or other flooring that finishes flush with or below top of tile and no threshold is indicated.
- I. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
  - 1. Locate joints in tile surfaces directly above joints in concrete substrates.
  - 2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."
- J. Grout tile to comply with requirements of the following tile installation standards:
  - 1. For ceramic tile grouts, comply with ANSI A108.10.

### 3.4 WALL TILE INSTALLATION

- A. Install types of tile designated for wall installations to comply with requirements in the Wall Tile Installation Schedule, including those referencing TCNA installation methods and ANSI setting-bed standards.
- B. Tile Installation: Thin-set mortar on cementitious backer units; TCA W244.
  - 1. Thin-set Mortar: Latex-Portland cement mortar.
  - 2. Grout: Polymer modified sanded grout.
- C. Joint Widths: As recommended by Tile Manufacturer and approved by Architect.
- D. Install metal edge closure trim pieces at top of wainscots and exposed edges of tile where this is no cap, outside corner, or inside corner tile present or available.

### 3.5 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
  - 1. Remove latex-portland cement 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.
- B. When recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.
- C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION 09 30 00

SECTION 09 51 13  
ACOUSTICAL PANEL CEILINGS

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. Ceilings composed of lay-in panels and exposed suspension systems.
  - 2. Ceilings composed of wood veneered lay-in panels and exposed suspension system.
  - 3. Prefinished channel trim at edge of acoustical ceiling where indicated.
  - 4. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings.

1.3 SUBMITTALS

- A. Product data for each type of product specified.
  - 1. For sealants, including printed statement of VOC content.
- B. Samples for verification of each type of exposed finish required, prepared on samples of size indicated below. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
  - 1. 6-inch- square samples of each acoustical panel type, pattern, and color.
  - 2. Set of 12-inch- long samples of exposed suspension system members, including moldings, and bulkhead trim, for each color and system type required.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For acoustical panel ceilings to include in maintenance manuals. Include the following:
  - 1. Methods for maintaining ceiling tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
  - 2. Precautions for cleaning materials and methods that could be detrimental to ceiling tile.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has completed acoustical panel ceilings similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

- B. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:
  - 1. Fire-response tests are performed by a qualified testing and inspecting agency. Qualified testing and inspecting agencies include Underwriters Laboratories (UL), Warnock Hersey, or another agency that is acceptable to authorities having jurisdiction and that performs testing and follow-up services.
  - 2. Fire-resistance-rated, acoustical panel ceilings are indicated by design designations listed in the UL "Fire Resistance Directory," in the Warnock Hersey "Certification Listings," or in the listing of another qualified testing and inspecting agency.
  - 3. Products are identified with appropriate markings of applicable testing and inspecting agency.
  - 4. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:
    - a. Smoke-Developed Index: 450 or less.
- C. Single-Source Responsibility for Ceiling Units: Obtain each type of acoustical ceiling panel from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.
- D. Single-Source Responsibility for Suspension System: Obtain each type of suspension system from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.
  - 1. Obtain both acoustical panels and suspension system from the same manufacturer.
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels and suspension system components to Project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
- C. Panels should not be installed in spaces where the temperature or humidity conditions vary greatly from the temperatures and conditions that will be normal in the occupied space.
- D. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

#### 1.7 PROJECT CONDITIONS

- A. Space Enclosure and Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet-work in spaces is completed and dry, work above ceilings is complete, and ambient temperature and humidity conditions are being maintained at the levels indicated for Project when occupied for its intended use.

## 1.8 COORDINATION

- A. Coordinate layout and installation of acoustical panels and suspension system components with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system components (if any), audiovisual/technology equipment, and partition assemblies (if any).

## 1.9 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Acoustical Ceiling Panels: Full-size panels equal to 2.0 percent of quantity of each type, size and pattern installed.
  - 2. Suspension System Components: Quantity of each exposed component equal to 2.0 percent of quantity of each type installed.

## PART 2 - PRODUCTS

### 2.1 ACOUSTICAL PANELS AND METAL SUSPENSION SYSTEMS

- A. Specific acoustical lay-in panels and suspension systems are indicated on the Finish Plans, to establish the design intent and required standard of quality. It is not intended to preclude the use of other acceptable manufacturers.
- B. Basis of Design manufacturer: Armstrong World Industries, Inc.
- C. Alternative manufacturers, subject to compliance with requirements, may include the following:
  - 1. USG Interiors.
  - 2. Certainteed.

### 2.2 MATERIALS

- A. Recycled Content: Provide acoustical panels with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 65 percent by weight.

### 2.3 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING – TYPE 1 & 2

- A. Acoustical Panel Ceiling:
  - 1. Perforated and Fissured Pattern: Units fitting ASTM E 1264 pattern designations C and D, with other panel characteristics as follows:
  - 2. Color/Light Reflectance Coefficient: White/LR 0.80 (min.).
  - 3. Color: White.
  - 4. Noise Reduction Coefficient: NRC 0.50, minimum.
  - 5. Ceiling Attenuation Class:
    - a. Non-Fire Rated: CSTC 35-39.
  - 6. Edge Detail: Square Tegular.
  - 7. Size: 24 inch by 24 inch by 5/8 inch.



8. Warranty: Ten years to withstand temperature and humidity conditions up to 104 degrees F / 90% relative humidity without visible sag.
9. Available Products: Subject to compliance with requirements, products which may be incorporated in the Work include, but are not limited to, the following:
  - a. Mineral-Base Panels – Water Felted, with Painted Finish and Perforated and Fissured Pattern, Non-Fire-Resistant Rated:
    - 1) “Fine Fissured Humi-Guard Plus”, Armstrong World Industries, Inc.
    - 2) “Radar Clima-Plus”, USG Interiors, Inc.

## 2.4 METAL SUSPENSION SYSTEMS

- A. Standard for Metal Suspension Systems: Provide manufacturer’s standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable ASTM C 635 requirements.
- B. Products:
  1. Wide-Faced Grid (AG1):
    - a. Exposed Tee, 15/16” face dimension
    - b. Hot dipped galvanized or electrogalvanized steel.
    - c. Baked enamel finish, white.
    - d. Basis of Design: Prelude XL; Armstrong World Industries.
- C. Finish and Colors: Manufacturer’s standard factory-applied finish, colors as selected by Architect.
- D. Attachment Devices: Size for 5 times design load indicated in ASTM C635, Table 1, Direct Hung unless otherwise indicated.
- E. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper.
  1. Gage: Sized so that stress at 3 times hanger design load (ASTM C 635, Table 1, Direct-Hung), will be less than yield stress of wire, but provide not less than 0.135-inch diameter (10 gage).
- F. Standard Wall Edge Moldings and Trim: Metal or extruded aluminum of types and profiles indicated, or if not indicated, manufacturer’s standard moldings for edges and penetrations that fit type of edge detail and suspensions system indicated.

## 2.5 ACCESSORIES

- A. Sheet-Metal Edge Moldings and Trim: Type and profile indicated, or if not indicated, manufacturer’s standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material and finish as that used for exposed flanges of suspension system runners.
- B. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer’s standard nonsag, paintable, nonstaining latex sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), 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.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and 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.
- B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold-damaged.
- C. Do not proceed with installation until unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Measure each ceiling area and establish the layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and conform to the layout shown on reflected ceiling plans.

### 3.3 INSTALLATION

- A. Install acoustical panel ceilings to comply with publications referenced below per manufacturer's instructions and Cisca "Ceiling Systems Handbook."
  - 1. Standard for Ceiling Suspension System Installations: Comply with ASTM C 636.
  - 2. Cisca Recommendations for Acoustical Ceilings: Comply with Cisca "Recommendations for Direct-Hung Acoustical Tile and Lay-In Panel Ceilings."
- 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 the supporting structure or of the 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 the location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
  - 4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of 3 tight turns. Connect hangers either directly to structures or to inserts, eye screws, or other devices that are secure, that are appropriate for substrate, and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
  - 5. Secure bracing wires to ceiling suspension members and to supports with a minimum of 4 tight turns. Fasten bracing wires to concrete with cast-in-place or postinstalled anchors.
  - 6. Do not attach hangers to steel deck tabs.
  - 7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
  - 8. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise shown; and provide hangers not more than 8 inches from ends of each member (including splices).

- 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 steel deck or steel deck tabs.
- 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 over 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.
  - 4. Do not attach edge moldings to aluminum curtainwall. Provide a compressible gasket at horizontal mullions.
- 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 fitted accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide neat, precise fit and cleanly cut edges.
  - 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 the cut panel edges remaining exposed after installation; match color of exposed panel surfaces using coating recommended for this purpose by acoustical panel manufacturer.

### 3.4 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's 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 09 51 13

## SECTION 09 65 00

### 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 other Division 01 Specification Sections, apply to this Section.

##### 1.2 SUMMARY

- A. Section Includes:
  - a. Resilient base.
  - b. Resilient molding accessories.
- B. Related Sections:
  - a. Division 09 Section "Resilient Tile Flooring" for resilient floor tile.
  - b. Division 09 Section "Resilient Sheet Flooring" for resilient floor sheeting.

##### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. 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.
- C. Product Schedule: For resilient products. Use same designations indicated on Drawings.

##### 1.4 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
  - a. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
- B. Mockups: Provide resilient products with mockups specified in other Sections.

##### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. 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.

## 1.6 PROJECT 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 resilient products during the following time periods:
  - a. 48 hours before installation.
  - b. During installation.
  - c. 48 hours after installation.
- B. 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. Install resilient products after other finishing operations, including painting, have been completed.

## 1.7 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - a. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

## PART 2 - PRODUCTS

### 2.1 RESILIENT BASE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Armstrong World Industries, Inc.
  - b. Flexco, Inc.
  - c. Johnsonite.
  - d. Mondo Rubber International, Inc.
  - e. Nora Rubber Flooring; Freudenberg Building Systems, Inc.
  - f. Roppe Corporation, USA.
- B. Resilient Base Standard: ASTM F 1861.
  - a. Material Requirement: Type TS (rubber, vulcanized thermoset).
  - b. Manufacturing Method: Group I (solid, homogeneous).
  - c. Style: Cove (base with toe).
- C. Minimum Thickness: 0.125 inch.
- D. Height: 4 inches unless noted otherwise.
- E. Lengths: Coils in manufacturer's standard length; if not available then in 48 inch lengths.
- F. Outside Corners: Job formed.
- G. Inside Corners: Job formed.
- H. Colors: As selected by Architect from full range of industry colors.

## 2.2 RESILIENT MOLDING ACCESSORIES

### A. Resilient Vinyl Nosing:

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

- a. Armstrong World Industries, Inc.
- b. Flexco, Inc.
- c. Johnsonite.
- d. Mondo Rubber International, Inc.
- e. Nora Rubber Flooring; Freudenberg Building Systems, Inc.
- f. Roppe Corporation, USA.

B. Description: Vinyl reducer strip for resilient flooring, transition from carpet to luxury vinyl tile and stair nosing(s).

C. Material: Vinyl

D. Profile and Dimensions: As indicated in drawings.

E. Colors and Patterns: As selected by Architect from full range of industry colors.

## 2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

C. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of tiles, and in maximum available lengths to minimize running joints.

## 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. Concrete Substrates for Resilient Stair Treads and Accessories: Prepare according to ASTM F 710.
  - a. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
  - b. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
  - c. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.
  - d. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
    - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install resilient products until they are same temperature as the space where they are to be installed.
  - a. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

### 3.3 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.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Job-Formed Corners:
  - a. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends.
  - b. Inside Corners: Use straight pieces of maximum lengths possible.

### 3.4 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:
  - a. Remove adhesive and other blemishes from exposed surfaces.
  - b. Sweep and vacuum surfaces thoroughly.
  - c. 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.
- D. Cover resilient products until Substantial Completion.

END OF SECTION 09 65 00



SECTION 09 65 19  
RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 THIS SECTION INCLUDES

- A. Resilient tile flooring as shown on the drawings and schedules and as indicated by the requirements of this section.

1.2 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract (including General and Supplementary Conditions and Division 1 sections) apply to the work in this section only.

1.3 RELATED SECTIONS

- A. Other Division 9 sections for floor finishes related to this section but not the work of this section.
- B. Division 3 Concrete - not included work this section.
- C. Division 6 Wood and Plastics - not included work this section.
- D. Division 7 Thermal and Moisture Protection - not included work this section.

1.4 QUALITY ASSURANCE AND REGULATORY REQUIREMENTS

- A. Qualifications of Installers: All work shall be done by installation firms specializing in commercial LVT installation. It is required, that the firm or individual shall be a member of the Floor Covering Installation Contractors Association (FCICA) and/or certified by the Certified Floorcovering Installers Association (CFI). Flooring contractor to be specialty contractor normally engaged in this type of work and shall have three (3) years minimum documented experience in commercial installation of these materials and participation in manufacturer's environmental program including responsible carpet removal, recycling, and installation.
- B. Flooring contractor will be responsible for the proper product installation, including floor preparation in all the areas indicated in the drawings to receive LVT.
- C. Flooring contractor to provide owner a written warranty that guarantees the completed installation to be free from defects in materials and workmanship for a period of no less than two (2) years after job completion.
- D. All warranties must be issued by the manufacturer as standard published warranties on all types of LVT within this document. Second source warranties that involve parties other than the LVT manufacturer are unacceptable. If the product fails to perform as warranted when installed according to the EF Contract Flooring installation instructions and maintained according to EF Contract Flooring maintenance instructions, the affected area will be repaired or replaced at the expense of the manufacturer. The LVT manufacturer will provide standard published written performance warranties for the following:

1. A Ten (10) Year warranty on manufacturing defects and a Ten (10) year wear warranty stating that product will not wear through (damage or affect) the printed film layer due to normal traffic. Manufacturer will pay all reasonable labor costs (these costs will be determined by manufacturer).
- E. LVT manufacturer to provide field service experts to assist in project start-up as required by the job. Manufacturer will notify owner, architect, general contractor, or another designated contact if any installation instructions are not followed.
- F. Provide flooring material to meet the following test performance criteria as tested by a recognized independent testing laboratory. Certified test reports shall be submitted by the carpet manufacturer for each test method. Requirements listed below must be met by all products being submitted for approval:
  1. Materials: Phthalates Free
  2. Indoor Air Quality: FloorScore® Certified
  3. LEED v4: Contributes to IAQ: Low Emitting Materials
  4. End of Life: 100% Recyclable
  5. Class / ASTM F1700: Class III Printed Film Vinyl Plank - Type B (embossed)
  6. Flooring Radiant Panel: Class 1
  7. ADA Compliance: Compliant For Accessible Routes
  8. ASTM F2055 (Size and Tolerance): Passes
  9. ASTM F386 (Thickness): Passes
  10. ASTM F1914 (Residual Indentation): Passes
  11. ASTM F137 (Flexibility): Passes
  12. ASTM F2199 (Dimensional Stability): Passes
  13. ASTM F925 (Chemical Resistance): Passes
  14. ASTM F1514 (Resistance to Heat): Passes
  15. ASTM F1515 (Resistance to Light): Passes
  16. ASTM E648 (Critical Radiant Flux): Passes
  17. ASTM E662 (Optical Smoke Density): Passes
  18. ASTM C1028 (Slip Resistance): Passes
  19. ASTM F970 (Static Load): Passes

#### 1.5 SUBMITTALS

- A. Submit to architect and/or owner, two (2) finished samples of the exact type of LVT proposed, including quality, pattern, and color.
- B. Submit manufacturer's warranties, installation instructions, and maintenance instructions.
- C. Submit the manufacturer's certification that the flooring has been tested by an independent laboratory and complies with the required fire tests as well as the test listed under 1.04 F.

#### 1.6 ENVIRONMENTAL/FIELD CONDITIONS

- A. Deliver all materials to the installation site in the manufacturer's original packaging and in good condition. Packaging to contain manufacturer's name and marks, identification number, shipping and handling instructions and related information.
- B. Delivered and stored materials must be available for inspection as required by the owner, architect, general contractor, and/or the manufacturer.

- C. Sub-floor preparation is to include all required work to prepare the existing floor for installation of the product as specified in this document. Sub-floor preparation shall meet all conditions as specified in EF Contract Flooring's Luxury Vinyl Tile installation instructions.
- D. Sub-floor preparation will include, as required, the removal and repair of the existing floor surface. It is required that the floor of a renovation project be inspected before the bid date.
- E. The building must be enclosed and the HVAC in continuous operation. The LVT and adhesive must be conditioned to room temperature for 3 days prior to installation, during the installation and continuous following completion of the installation. The ambient air relative humidity must be between 10%-65% with the floor and room temperature between 55- 85 degrees Fahrenheit. The indoor temperature should never fall below 55 degrees Fahrenheit or above 85 degrees Fahrenheit regardless of the age of the installation.
- F. Store cartons of tile or plank products flat and squarely on top of one another. Preferably, locate material in the "center" of the installation area (i.e. away from vents, direct sun- light, etc.) Storing cartons in direct sunlight may affect proper acclimation by inducing thermal expansion/contraction.
- G. When palletizing on a jobsite, vinyl plank or tiles need to be stacked 2 rows high side by side with no airspace between. Then quarter turned for 2 rows side by side, not to exceed 12 boxes high. A 5/8" or thicker plywood must also be placed on the pallet first. Do not stack pallets 2 high unless utilizing a 3/4" thick plywood cap between pallets.

## 1.7 SUBSTITUTIONS

- A. All Bid submittals must conform to the specifications in this document.
- B. All test results to be in accordance with a certified independent testing laboratory.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURER

- A. Basis of Design: Specified to establish the design intent and required standard of quality. It is not intended to preclude the use of other acceptable manufacturers.
  - 1. Specified products are specified due to unique visual or performance requirements required by the Architect. Due to this and/or other reasons best known to the Architect, there may be proposed alternatives that the Architect will not approve. In these matters, the decision of the Architect will be final.
  - 2. A ten (10) year warranty on manufacturing defects and a ten (10) year wear warranty stating that product will not wear through (damage or affect) the printed film layer due to normal traffic. If a verified material failure occurs, the manufacturer will pay 100% of all reasonable labor costs for the warranty period (these costs will be determined by manufacturer).
  - 3. Any manufacturer and/or product must meet or exceed those requirements specified under all sections of this document in pattern, color, and format. Any substitutions must be made in accordance with Section 1.00 of this document.

## 2.2 LUXURY VINYL FLOOR

- A. **LVT Type One** - EF Contract Flooring, P.O. Box 1287, Dalton, GA, 30722. (800) 241-4586. WWW.EFCONTRACTFLOORING.COM. Please contact Mike Megehee, (504) 249-1678, mike.megehee@efcontractflooring.com:
1. Product: Woodlands II EFCW2.
  2. Color: Sequoia 002.
  3. Added Antimicrobial: Yes.
  4. Added Antimicrobial: Yes.
  5. Finish / Coating: Enhanced UV Urethane w/ Ceramic Micro Bead.
  6. Ceramic bead with immersion rate greater than 5 micrograms/sf.
  7. Pattern Repeat: Random Wood
  8. Dimensions: 7" x 48"
  9. Backing Class: Commercial Grade
  10. Commercial Traffic: Heavy Commercial
- B. **LVT Type Two** - EF Contract Flooring, P.O. Box 1287, Dalton, GA, 30722. (800) 241-4586. WWW.EFCONTRACTFLOORING.COM. Please contact Mike Megehee, (504) 249-1678, mike.megehee@efcontractflooring.com:
1. Product: Melange 2.5MM EFCM2.
  2. Color: Café Au Lait 001.
  3. Added Antimicrobial: Yes.
  4. Added Antimicrobial: Yes.
  5. Finish / Coating: Enhanced UV Urethane w/ Ceramic Micro Bead.
  6. Ceramic bead with immersion rate greater than 5 micrograms/sf.
  7. Pattern Repeat: Random
  8. Dimensions: 9" x 48"
  9. Backing Class: Commercial Grade
  10. Commercial Traffic: Heavy Commercial

## 2.3 ADHESIVES

- A. Commercialon® Premium Modular/LVT Pressure Sensitive Adhesive, a premium modular flooring adhesive specifically formulated for bonding EF Contract Flooring's Luxury Vinyl Tile to the floor.

## 2.4 ACCESSORIES

- A. Provide transition/reducing strips tapered to meet abutting materials as indicated in the drawings (if required).
- B. Provide edge strips made of extruded aluminum with a mill finish, unless otherwise noted or specified elsewhere.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine and verify that sub-floor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive flooring.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive flooring.

- C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.
- D. Verify that concrete sub-floor surfaces are dry enough and ready for flooring installation by testing for moisture emission rate and alkalinity in accordance with ASTM F 710; obtain instructions if test results are not within limits recommended by carpet manufacturer and adhesive materials manufacturer.
- E. Verify that required floor-mounted utilities are in correct location.
- F. EF Contract Flooring requires that the Luxury Vinyl Tile be inspected prior to installation for proper style, color and potential defects. No claims will be honored if the LVT is installed with visible defects. Should there be a problem, call EF Contract Customer Relations at 800.241.4586.

### 3.2 PREPARATION

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. SURFACE PREPARATION- Dust, dirt, debris and noncompatible adhesive must be removed before the installation begins. Surfaces must be smooth and level with all holes and cracks filled with Portland cement-based patch reinforced with polymers or primed with Commercialon Premium Sealer.
- C. LATEX OR OLD ADHESIVES - Must be mechanically scraped down to a bare residue flat with the concrete substrate or covered with a skim coat of Portland cement-based patch reinforced with polymers. Any old adhesive residue must also be covered with Commercialon Premium Sealer. *Note: Failure to remove or seal old latex or cut back adhesive may cause installation failure, plasticizer migration, shifting, buckling or edge curling; these conditions will not be covered under warranty.*
- D. CUT BACK ADHESIVES - CUT BACK ADHESIVES - Must be wet mechanically scraped to a minimum residue and encapsulated with Commercialon Premium Sealer. *Note: Failure to remove or seal old latex or cut back adhesive may cause installation failure, plasticizer migration, shifting, buckling or edge curling; these conditions will not be covered under warranty.*
- E. CONCRETE MOISTURE TESTING and pH Testing - Substrate surfaces must be tested for moisture emission. It is the responsibility of the owner or owner's representative to perform moisture testing prior to starting the installation. ASTM-F2170-2 relative humidity probe moisture testing or ASTM-F1869 calcium chloride testing can be performed on the concrete to determine the surface moisture emission rate. Acceptable relative humidity probe testing results are up to 90% RH. An acceptable result for calcium chloride moisture testing is up to 5 lbs per 1,000 SF per 24 hours. Alkalinity tests should also be performed per ASTM-F710. The maximum acceptable pH is 9.0. EF Contract Flooring prefers relative humidity probe moisture testing over calcium chloride testing, as the results are more accurate and reliable. For test results that determine RH test readings of 90% - 95%, moisture emission rates of 5 lbs - 8 lbs, or pH readings of 9.0 - 11.00, Commercialon Premium Sealer is required.
- F. New Concrete - New concrete must be fully cured and free of moisture. New concrete requires a curing period of approximately 90 days.
- G. Old Concrete - Old concrete must be checked for moisture. Dry, dusty, porous floors must be primed; primers will not correct a moisture problem.

- H. Wood - Wood floors must be smooth and level. If the floor is uneven, an approved underlayment will be required. Old finishes must be tested for compatibility with adhesives or removed and porous wood primed with Commercialon Premium Sealer.
- I. Terrazzo / Marble - Level all grout lines with Portland cement-based patch reinforced with polymers. Glossy surfaces must be sanded for adhesive bond. Waxes and similar finishes must be removed.
- J. Hard Surfaces - Tiles must be well secured to the floor or removed. Broken, damaged, or loose tiles must be replaced. Waxes and similar finishes must be removed from VCT before applying adhesive. Existing sheet vinyl is not a suitable substrate for LVT installation and must be removed.
- K. Old Carpet - Remove old carpet and check adhesives for compatibility. If unsure, remove or cover adhesive with a Portland based patching compound or encapsulate with Commercialon Premium Sealer.

### 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, in pattern indicated on finish plans.
- 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. VCT: Lay tiles with grain direction alternating in adjacent tiles (quarter turn).
  - 2. Luxury Tile: As selected by Architect.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.
- G. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

### 3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
  - 1. Remove adhesive and other blemishes from exposed surfaces.
  - 2. Sweep and vacuum surfaces thoroughly.
  - 3. Damp-mop surfaces to remove marks and soil.

- C. Protect floor tile products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Remove soil, visible adhesive, and surface blemishes from floor tile surfaces.
- E. Cover floor tile until Substantial Completion.

END OF SECTION 09 65 19

## SECTION 09 68 00

### TILE CARPETING

#### 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 modular, tufted carpet tile.
- B. Related Requirements:
  - 1. Division 02 Section "Selective Demolition" for removing existing floor coverings.
  - 2. Division 03 Section "Cementitious Underlayment" for subfloor preparation.
  - 3. Division 09 Section "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

##### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
  - 2. Include installation recommendations for each type of substrate and transitions to other floor finishes.
- B. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
  - 1. Carpet Tile: Full-size Sample.
  - 2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- long Samples.
- C. Samples for initial selection in the form of manufacturer's color charts or Samples of materials showing the full range of colors, textures, and patterns available for each type of carpet indicated.
  - 1. 12-inch- (300-mm-) square Samples of each type of carpet material required.
  - 2. 12-inch (300-mm) Samples of each type of exposed edge stripping and accessory item.

##### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.
- C. Sample Warranty: For special warranty.



## 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
  - 1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
  - 2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

## 1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd.

## 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.
- B. Fire-Test-Response Ratings: Where indicated, provide carpet tile identical to those of assemblies tested for fire response according to NFPA 253 by a qualified testing agency.
- C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
  - 1. Build mockups at locations and in sizes shown on Drawings.
  - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI 104.

## 1.9 FIELD CONDITIONS

- A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at occupancy levels during the remainder of the construction period.
- C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

## 1.10 WARRANTY

- A. All warranties must be issued by the manufacturer as standard published warranties on all types of carpet within this document. Second source warranties that involve parties other than the carpet manufacturer are unacceptable. If the product fails to perform as warranted when installed according to the EF Contract Flooring carpet installation instructions and maintained according to EF Contract Flooring maintenance instructions, the affected area will be repaired or replaced at the expense of the manufacturer. The carpet manufacturer will provide standard published written performance warranties for the following:
1. Lifetime warranty against excessive surface wear. Excessive wear means no more than 10% loss of pile fiber weight measured before and after use as tested under ASTM D-3936.
  2. Lifetime static protection, meaning built-in protection below 3.0 kv as tested under AATCC-134.
  3. Tuft Bind (edge ravel, yarn pulls, zippering)
  4. Delamination
  5. Lifetime Moisture Barrier
  6. Lifetime Dimensional Stability (for modular products only)

## PART 2 - PRODUCTS

### 2.1 MANUFACTURER

- A. Basis of Design Manufacturer: Subject to compliance with requirements, provide EF Contract, 1502 Coronet Drive, Dalton, Georgia 30720. EFCONTRACTFLOORING.COM Please contact Mike Megehee, (504) 249-1678, [mike.megehee@efcontractflooring.com](mailto:mike.megehee@efcontractflooring.com)
1. Provide basis of design product, or comparable product approved by Architect prior to bid.
- B. Carpet Tile **Type 1**:
1. Product: VIP TVIP manufactured by EF Contract
  2. Color: Personality VIP45
  3. Construction: Patterned Loop
  4. Backing: Nexus Modular
  5. Dye Method: Solution Dyed
  6. Fiber Type: Encore® SD Ultima® (with recycled content)
  7. Face Weight: 16 oz./sy. (543 grams/m2)
  8. Pile Density: 6558 oz./y3. (243.17 kg/m3)
  9. Gauge: 1/8 (3.15 rows/cm)
  10. Stitches: 10.00 stitches/in (3.94 stitches/cm)
  11. Pattern Repeat: N/A
  12. Soil Release: Yes
  13. Stain Resistance: No
  14. Bleach Resistance: No
  15. Optional Treatments: Yes
  16. Standard Size: 18" x 36" (approx. (45.72cm x 45.72 cm)
  17. Warranties:

18. Testing Specifications - Pill Test: Yes
19. Testing Specifications - Flooring Radiant Panel: Class 1
20. Testing Specifications - Smoke Density: Less than 450.0 flaming (ASTM E 662)
21. Testing Specifications - Static Test: Less than 3.0kv (AATCC-134)
22. Testing Specifications - Lightfastness Test: 1

C. Carpet Tile **Type 2:**

1. Product: Modern Classic TMCC manufactured by EF Contract
2. Color: Up-to-date MCC45
3. Construction: Patterned Loop
4. Backing: Nexus Modular
5. Dye Method: Solution Dyed
6. Fiber Type: Encore® SD Ultima® (with recycled content)
7. Face Weight: 19 oz./sy. (644 grams/m<sup>2</sup>)
8. Pile Density: 9582 oz./y<sup>3</sup>. (355.31 kg/m<sup>3</sup>)
9. Gauge: 1/10 (3.94 rows/cm)
10. Stitches: 9.33 stitches/in (3.67 stitches/cm)
11. Pattern Repeat: N/A
12. Soil Release: Yes
13. Stain Resistance: No
14. Bleach Resistance: No
15. Optional Treatments: Yes
16. Standard Size: 18" x 36" (approx. (45.72cm x 45.72 cm)
17. Warranties:
18. Testing Specifications - Pill Test: Yes
19. Testing Specifications - Flooring Radiant Panel: Class 1
20. Testing Specifications - Smoke Density: Less than 450.0 flaming (ASTM E 662)
21. Testing Specifications - Static Test: Less than 3.0kv (AATCC-134)
22. Testing Specifications - Lightfastness Test: 1

## 2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.
  1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.
- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
  - 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond.
  - 2. Slab substrates meet adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
    - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    - b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75% relative humidity level measurement.
  - 3. Subfloor finishes comply with requirements specified in Division 03 Section "Cast-in-Place Concrete" for slabs receiving carpet tile.
  - 4. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

### 3.3 INSTALLATION

- A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: Glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive
- C. Maintain dye lot integrity. Do not mix dye lots in same area.

- D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
- G. Install pattern parallel to walls and borders.

#### 3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
  - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
  - 2. Remove yarns that protrude from carpet tile surface.
  - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with CRI 104, Section 16, "Protecting Indoor Installations."
- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 09 68 00

## SECTION 09 91 00

### PAINTING

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Interior paint and coating commercial systems including surface preparation.
- B. Exterior paint and coating systems including surface preparation.

##### 1.2 RELATED SECTIONS

- A. Section 03 30 00 - Cast-in-Place Concrete.
- B. Section 04 20 00 - Unit Masonry: Concrete Masonry Units (CMU) and brick.
- C. Section 05 50 00 - Metal Fabrications.
- D. Section 06 40 00 - Architectural Woodwork.
- E. Section 08 11 13.16 - Custom Hollow Metal Doors and Frames.
- F. Section 09 21 16.23 - Gypsum Board Shaft Wall Assemblies.
- G. Section 23 05 00 - Common Work Results for HVAC.
- H. Section 26 05 00 - Common Work Results for Electrical.

##### 1.3 REFERENCES

- A. Steel Structures Painting Council (SSPC):
  - 1. SSPC-SP 1 - Solvent Cleaning.
  - 2. SSPC-SP 2 - Hand Tool Cleaning.
  - 3. SSPC-SP 3 - Power Tool Cleaning.
  - 4. SSPC-SP5/NACE No. 1, White Metal Blast Cleaning.
  - 5. SSPC-SP6/NACE No. 3, Commercial Blast Cleaning.
  - 6. SSPC-SP7/NACE No. 4, Brush-Off Blast Cleaning.
  - 7. SSPC-SP10/NACE No. 2, Near-White Blast Cleaning.
  - 8. SSPC-SP11, Power Tool Cleaning to Bare Metal.
  - 9. SSPC-SP12/NACE No. 5, Surface Preparation and Cleaning of Metals by Water jetting Prior to Recoating.
  - 10. SSPC-SP 13 / NACE No. 6 Surface Preparation for Concrete.
- B. Material Safety Data Sheets / Environmental Data Sheets: Per manufacturer's MSDS/EDS for specific VOCs (calculated per 40 CFR 59.406). VOCs may vary by base and sheen.
- C. California Department of Public Health (CDPH):
  - 1. CDPH v1.1-2010 and V1.2-2017

##### 1.4 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

- B. Product Data: For each paint system indicated, including.
  - 1. Product characteristics.
  - 2. Surface preparation instructions and recommendations.
  - 3. Primer requirements and finish specification.
  - 4. Storage and handling requirements and recommendations.
  - 5. Application methods.
  - 6. Cautions for storage, handling and installation.
- C. Selection Samples: Submit a complete set of color chips that represent the full range of manufacturer's products, colors and sheens available.
- D. Verification Samples: For each finish product specified, submit samples that represent actual product, color, and sheen.
- E. Only submit complying products based on project requirements (i.e. LEED). One must also comply with the regulations regarding VOCs (CARB, OTC, SCAQMD, LADCO). To ensure compliance with district regulations and other rules, businesses that perform coating activities should contact the local district in each area where the coating will be used.
- F. USGBC LEED V4 Submittals:
  - 1. MRc2 Environmental Product Declaration Product Language: Products shall be selected with a preference to products that have product-specific environmental product declaration documentation.
  - 2. EQc2 Low Emitting Materials: The VOC content of all adhesives, sealants, paints and coatings in this Section shall not exceed the VOC limits established in Division 01 Sustainable Design sections.

## 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Paint exposed surfaces. If a color of finish, or a surface is not specifically mentioned, Architect will select from standard products, colors and sheens available.
- C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels unless indicated.
- D. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
  - 1. Finish surfaces for verification of products, colors and sheens.
  - 2. Finish area designated by Architect.
  - 3. Provide samples that designate primer and finish coats.
  - 4. Do not proceed with remaining work until the Architect approves the mock-up.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver manufacturer's unopened containers to the work site. Packaging shall bear the manufacturer's name, label, and the following list of information.
  - 1. Product name, and type (description).
  - 2. Application and use instructions.
  - 3. Surface preparation.
  - 4. VOC content.
  - 5. Environmental handling.

6. Batch date.
  7. Color number.
- B. Storage: Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.
- C. Store materials in an area that is within the acceptable temperature range, per manufacturer's instructions. Protect from freezing.
- D. Handling: Maintain a clean, dry storage area, to prevent contamination or damage to the coatings.

## 1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

## 1.8 EXTRA MATERIALS

- A. Furnish extra paint materials from the same production run as the materials applied and, in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.
- B. Furnish Owner with an additional one percent of each material and color, but not less than 1 gal (3.8 l) or 1 case, as appropriate.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Sherwin-Williams, which is located at: 101 Prospect Ave.; Cleveland, OH 44115; ASD Toll Free Tel: 800-524-5979; Tel: 216-566-2000; Fax: 440-826-1989; Email: request info [specifications@sherwin.com](mailto:specifications@sherwin.com); Web: [www.swspecs.com](http://www.swspecs.com).
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

### 2.2 APPLICATIONS/SCOPE

- A. Interior Paint and Coating Commercial Systems:
1. Masonry: Concrete masonry units, including split-face, scored, and smooth block.
  2. Metal: Structural steel, Hollow Metal Doors and Frames, Windows
  3. Wood: Millwork
  4. Drywall: Drywall board, Gypsum board.
- B. Exterior Paint and Coating Systems:
1. Concrete: Traffic Markings
  2. Metal: Aluminum, galvanized steel (Parking Bollards)
  3. Metal: Structural Steel, Hollow Metal Doors and Frames\
  4. CMU Block.



## 2.3 PAINT MATERIALS - GENERAL

- A. Paints and Coatings:
  - 1. Unless otherwise indicated, provide factory-mixed coatings. When required, mix coatings to correct consistency in accordance with manufacturer's instructions before application. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
  - 2. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color. Or follow manufacturer's product instructions for optimal color conformance.
- B. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
- C. Coating Application Accessories: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required, per manufacturer's specifications.
- D. Color: Refer to Finish Schedule for paint colors, and as selected.

## 2.4 INTERIOR PAINT AND COATING COMMERCIAL SYSTEMS

- A. Masonry CMU: Concrete, Split Face, Scored, Smooth, High Density, Low Density, and Fluted.
  - 1. Epoxy Systems; Waterbased:
    - a. Gloss Finish:
      - 1) 1st Coat: S-W Loxon Block Surfacers, LX01W200 (50-100 sq ft/gal).
      - 2) 2nd Coat: S-W Pro Industrial Waterbased Catalyzed Epoxy, B73-300 Series.
      - 3) 3rd Coat: S-W Pro Industrial Waterbased Catalyzed Epoxy, B73-300 Series (5 mils wet, mils dry per coat).
- B. Metal: Structural Steel.
  - 1. Epoxy Systems; Waterbased:
    - a. Gloss Finish:
      - 1) 1st Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series (5.0 mils wet, 2.0 mils dry).
      - 2) 2nd Coat: S-W Pro Industrial Waterbased Catalyzed Epoxy, B73-300 Series.
      - 3) 3rd Coat: S-W Pro Industrial Waterbased Catalyzed Epoxy, B73-300 Series (5 mils wet, mils dry per coat).
- C. Metal: Hollow Metal Doors and Frames.
  - 1. Alkyd Systems; Waterbased:
    - a. Semi-Gloss Finish:
      - 1) 1st Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series (5.0 mils wet, 2.0 mils dry).
      - 2) 2nd Coat: S-W Pro Industrial Waterbased Alkyd Urethane Enamel Semi-Gloss, B53-1150 Series.
      - 3) 3rd Coat: S-W Pro Industrial Waterbased Alkyd Urethane Enamel Semi-Gloss, B53-1150 Series (4.0-5.0 mils wet, 1.4 - 1.7 mils dry per coat).

- D. Wood: Millwork
  - 1. Latex Systems:
    - a. Semi - Gloss Finish:
      - 1) 1st Coat: S-W Premium Wall and Wood Primer, B28W8111 (4 mils wet, 1.8 mils dry).
      - 2) 2nd Coat: S-W Pro Industrial Waterbased Alkyd Urethane Enamel Semi-Gloss, B53-1150 Series.
      - 3) 3rd Coat: S-W Pro Industrial Waterbased Alkyd Urethane Enamel Semi-Gloss, B53-1150 Series (4.0-5.0 mils wet, 1.4 - 1.7 mils dry per coat).
  - 2. Stain Systems:
    - a. Semi - Gloss Finish:
      - 1) 1st Coat: Minwax Water-Based Pre-Stain Wood Conditioner.
      - 2) 2nd Coat: Minwax Wood Finish Water-Based Semi-Transparent Color Stain.
      - 3) 3rd Coat: Minwax Polycrylic Topcoat.
      - 4) 4th Coat: Minwax Polycrylic Topcoat.
- E. Drywall: Walls, Ceilings, Gypsum Board and similar items.
  - 1. Latex Systems:
    - a. Semi-Gloss Finish (Flat for Ceiling Locations):
      - 1) 1st Coat: S-W ProMar200 Zero VOC Interior Latex Primer, B28W2600 (4 mils wet, 1.5 mils dry).
      - 2) 2nd Coat: S-W Pro Industrial PreCatalyzed Waterbased Epoxy, K46 Series.
      - 3) 3rd Coat: S-W Pro Industrial PreCatalyzed Waterbased Epoxy, K46 Series (4 mils wet, 1.5 mils dry per coat).

## 2.5 EXTERIOR PAINT AND COATING SYSTEMS

- A. Metal – Exposed Structural Steel.
  - 1. Urethane System; Water Based:
    - a. Semi-Gloss Finish:
      - 1) 1st Coat: S-W Macropoxy 646-100 Fast Cure Epoxy, B58 Series (7.0-13.5 mils wet, 5.0-10.0 mils dry per coat).
      - 2) 2nd Coat: S-W Pro Industrial Acrolon 100 Waterbased Urethane Gloss, B65-720 Series.
      - 3) 3rd Coat: S-W Pro Industrial Acrolon 100 Waterbased Urethane Gloss, B65-720 Series. (4.0-8.0 mils wet, 1.8-3.6 mils dry per coat).
- B. Metal: Hollow Metal Doors and Frames.
  - 1. Alkyd Systems; Waterbased:
    - a. Semi-Gloss Finish:
      - 1) 1st Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series (5.0 mils wet, 2.0 mils dry).
      - 2) 2nd Coat: S-W Pro Industrial Waterbased Alkyd Urethane Enamel Semi-Gloss, B53-1150 Series.
      - 3) 3rd Coat: S-W Pro Industrial Waterbased Alkyd Urethane Enamel Semi-Gloss, B53-1150 Series (4.0-5.0 mils wet, 1.4 - 1.7 mils dry per coat).

- C. Masonry CMU: Concrete, Split Face, Scored, Smooth, High Density, Low Density, and Fluted.
  - 1. High Build Acrylic Masonry Waterproofing
    - a. Flat Finish
      - 1) 1<sup>st</sup> Coat: S-W Loxon Acrylic Block Surfer, LX1W200 (16.0 mils wet, 8.8 mils dry)
      - 2) 2<sup>nd</sup> Coat: S-W Loxon XP Waterproofing Masonry Coating, LX11-50 Series.
      - 3) 3<sup>rd</sup> Coat: S-W Loxon XP Waterproofing Masonry Coating, LX11-50 Series, (14.5 mils wet, 6.5 mils dry minimum per coat).

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared; notify Architect of unsatisfactory conditions before proceeding. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- B. Proceed with work only after conditions have been corrected and approved by all parties, otherwise application of coatings will be considered as an acceptance of surface conditions.
- C. Previously Painted Surfaces: Verify that existing painted surfaces do not contain lead based paints, notify Architect immediately if lead based paints are encountered.

### 3.2 SURFACE PREPARATION

- A. General: Surfaces shall be dry and in sound condition. Remove oil, dust, dirt, loose rust, peeling paint or other contamination to ensure good adhesion.
  - 1. Prior to attempting to remove mildew, it is recommended to test any cleaner on a small, inconspicuous area prior to use. Bleach and bleaching type cleaners may damage or discolor existing paint films. Bleach alternative cleaning solutions are advised.
  - 2. Remove mildew before painting by washing with a solution of 1 part liquid household bleach and 3 parts of warm water. Apply solution and scrub the mildewed area. Allow solution to remain on the surface for 10 minutes. Rinse thoroughly with clean water and allow surface to dry before painting. Wear protective glasses or goggles, waterproof gloves, and protective clothing. Quickly wash off any of the mixture that comes in contact with your skin. Do not add detergents or ammonia to the bleach/water solution.
  - 3. Remove items including but not limited to thermostats, electrical outlets, switch covers and similar items prior to painting. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
  - 4. No exterior painting should be done immediately after a rain, during foggy weather, when rain is predicted, or when the temperature is below 50 degrees F (10 degrees C), unless products are designed specifically for these conditions. On large expanses of metal siding, the air, surface and material temperatures must be 50 degrees F (10 degrees F) or higher to use low temperature products.
- B. Aluminum: Remove all oil, grease, dirt, oxide and other foreign material by cleaning per SSPC-SP1, Solvent Cleaning.

- C. Block (Cinder and Concrete): Remove all loose mortar and foreign material. Surface must be free of laitance, concrete dust, dirt, form release agents, moisture curing membranes, loose cement, and hardeners. Concrete and mortar must be cured at least 30 days at 75 degrees F (24 degrees C). The pH of the surface should be between 6 and 9 unless the products are designed to be used in high pH environments. On tilt-up and poured-in-place concrete, commercial detergents and abrasive blasting may be necessary to prepare the surface. Fill bug holes, air pockets, and other voids with a cement patching compound.
- D. Concrete, SSPC-SP13 or NACE 6: This standard gives requirements for surface preparation of concrete by mechanical, chemical, or thermal methods prior to the application of bonded protective coating or lining systems. The requirements of this standard are applicable to all types of cementitious surfaces including cast-in-place concrete floors and walls, precast slabs, masonry walls, and shotcrete surfaces. An acceptable prepared concrete surface should be free of contaminants, laitance, loosely adhering concrete, and dust, and should provide a sound, uniform substrate suitable for the application of protective coating or lining systems.
- E. Cement Composition Siding/Panels: Remove all surface contamination by washing with an appropriate cleaner, rinse thoroughly and allow to dry. Existing peeled or checked paint should be scraped and sanded to a sound surface. Pressure clean, if needed, with a minimum of 2100 psi pressure to remove all dirt, dust, grease, oil, loose particles, laitance, foreign material, and peeling or defective coatings. Allow the surface to dry thoroughly. The pH of the surface should be between 6 and 9 unless the products are designed to be used in high pH environments.
- F. Copper and Stainless Steel: Remove all oil, grease, dirt, oxide and other foreign material by cleaning per SSPC-SP 2, Hand Tool Cleaning.
- G. Exterior Composition Board (Hardboard): Some composition boards may exude a waxy material that must be removed with a solvent prior to coating. Whether factory primed or unprimed, exterior composition board siding (hardboard) must be cleaned thoroughly and primed with an alkyd primer.
- H. Drywall - Exterior: Must be clean and dry. All nail heads must be set and spackled. Joints must be taped and covered with a joint compound. Spackled nail heads and tape joints must be sanded smooth and all dust removed prior to painting. Exterior surfaces must be spackled with exterior grade compounds.
- I. Drywall - Interior: Must be clean and dry. All nail heads must be set and spackled. Joints must be taped and covered with a joint compound. Spackled nail heads and tape joints must be sanded smooth and all dust removed prior to painting.
- J. Galvanized Metal: Clean per SSPC-SP1 using detergent and water or a degreasing cleaner to remove greases and oils. Apply a test area, priming as required. Allow the coating to dry at least one week before testing. If adhesion is poor, Brush Blast per SSPC-SP16 is necessary to remove these treatments.
- K. Plaster: Must be allowed to dry thoroughly for at least 30 days before painting unless the products are designed to be used in high pH environments. Room must be ventilated while drying; in cold, damp weather, rooms must be heated. Damaged areas must be repaired with an appropriate patching material. Bare plaster must be cured and hard. Textured, soft, porous, or powdery plaster should be treated with a solution of 1 pint household vinegar to 1 gallon of water. Repeat until the surface is hard, rinse with clear water and allow to dry.

- L. Steel: Structural, Plate, And Similar Items: Should be cleaned by one or more of the surface preparations described below. These methods are used throughout the world for describing methods for cleaning structural steel. Visual standards are available through the Society of Protective Coatings. A brief description of these standards together with numbers by which they can be specified follow.
1. Solvent Cleaning, SSPC-SP1: Solvent cleaning is a method for removing all visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants. Solvent cleaning does not remove rust or mill scale. Change rags and cleaning solution frequently so that deposits of oil and grease are not spread over additional areas in the cleaning process. Be sure to allow adequate ventilation.
  2. Hand Tool Cleaning, SSPC-SP2: Hand Tool Cleaning removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Beforehand tool cleaning, remove visible oil, grease, soluble welding residues, and salts by the methods outlined in SSPC-SP1.
  3. Power Tool Cleaning, SSPC-SP3: Power Tool Cleaning removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Before power tool cleaning, remove visible oil, grease, soluble welding residues, and salts by the methods outlined in SSPC-SP1.
  4. White Metal Blast Cleaning, SSPC-SP5 or NACE 1: A White Metal Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
  5. Commercial Blast Cleaning, SSPC-SP6 or NACE 3: A Commercial Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except for staining. Staining shall be limited to no more than 33 percent of each square inch of surface area and may consist of light shadows, slight streaks, or minor discoloration caused by stains of rust, stains of mill scale, or stains of previously applied paint. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
  6. Brush-Off Blast Cleaning, SSPC-SP7 or NACE 4: A Brush-Off Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, loose mill scale, loose rust, and loose paint. Tightly adherent mill scale, rust, and paint may remain on the surface. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP 1 or other agreed upon methods.
  7. Power Tool Cleaning to Bare Metal, SSPC-SP11: Metallic surfaces that are prepared according to this specification, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxide corrosion products, and other foreign matter. Slight residues of rust and paint may be left in the lower portions of pits if the original surface is pitted. Prior to power tool surface preparation, remove visible deposits of oil or grease by any of the methods specified in SSPC-SP1, Solvent Cleaning, or other agreed upon methods.

8. Near-White Blast Cleaning, SSPC-SP10 or NACE 2: A Near White Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except for staining. Staining shall be limited to no more than 5 percent of each square inch of surface area and may consist of light shadows, slight streaks, or minor discoloration caused by stains of rust, stains of mill scale, or stains of previously applied paint. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
  9. High- and Ultra-High Pressure Water Jetting for Steel and Other Hard Materials: SSPC-SP12 or NACE 5: This standard provides requirements for the use of high- and ultra-high pressure water jetting to achieve various degrees of surface cleanliness. This standard is limited in scope to the use of water only without the addition of solid particles in the stream.
  10. Water Blasting, SSPC-SP12/NACE No. 5: Removal of oil grease dirt, loose rust, loose mill scale, and loose paint by water at pressures of 2,000 to 2,500 psi at a flow of 4 to 14 gallons per minute.
- M. Vinyl Siding, Architectural Plastics, EIFS and Fiberglass: Clean vinyl siding thoroughly by scrubbing with a warm, soapy water solution. Rinse thoroughly. Do not paint vinyl siding with any color darker than the original color unless the paint system features Sherwin-Williams VinylSafe technology. Painting with darker colors that are not Sherwin-Williams VinylSafe may cause siding to warp. Follow all painting guidelines of the vinyl manufacturer when painting. Only paint properly installed vinyl siding. Deviating from the manufacturer's painting guidelines may cause the warranty to be voided.
- N. Stucco: Must be clean and free of any loose stucco. If recommended procedures for applying stucco are followed, and normal drying conditions prevail, the surface may be painted in 30 days. The pH of the surface should be between 6 and 9 unless the products are designed to be used in high pH environments such as Loxon.
- O. Wood: Must be clean and dry. Prime and paint as soon as possible. Knots and pitch streaks must be scraped, sanded, and spot primed before a full priming coat is applied. Patch all nail holes and imperfections with a wood filler or putty and sand smooth.

### 3.3 INSTALLATION

- A. Apply all coatings and materials with the manufacturer's specifications in mind. Mix and thin coatings according to manufacturer's recommendations.
- B. Do not apply to wet or damp surfaces. Wait at least 30 days before applying to new concrete or masonry. Or follow manufacturer's procedures to apply appropriate coatings prior to 30 days. Test new concrete for moisture content. Wait until wood is fully dry after rain or morning fog or dew.
- C. Apply coatings using methods recommended by manufacturer.
- D. Uniformly apply coatings without runs, drips, or sags, without brush marks, and with consistent sheen.
- E. Apply coatings at spreading rate required to achieve the manufacturers recommended dry film thickness.
- F. Regardless of number of coats specified, apply as many coats as necessary for complete hide, and uniform appearance.

- G. Inspection: The coated surface must be inspected and approved by the Architect just prior to the application of each coat.

#### 3.4 PROTECTION

- A. Protect finished coatings from damage until completion of project.
- B. Touch-up damaged coatings after substantial completion, following manufacturer's recommendation for touch up or repair of damaged coatings. Repair any defects that will hinder the performance of the coatings.

END OF SECTION 09 91 00

## SECTION 10 14 00

### SIGNAGE

#### 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. This Section includes the following types of signs:
  - 1. Panel signs

##### 1.1 COORDINATION

- A. Furnish templates for placement of sign-anchorage devices embedded in permanent construction by others installers.

##### 1.2 SUBMITTALS

- A. Product Data: Include manufacturer's construction details relative to materials, dimensions of individual components, profiles, and finishes for each type of sign required.
- B. Shop Drawings:
  - 1. Include fabrication and installation details and attachments to other work.
  - 2. Show mounting heights, locations of supplementary supports to be provided by others, and accessories.
  - 3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign type at least half size.
- C. Samples for Verification: For each type of sign assembly, provide samples for verification of color, pattern, and texture for signs and cast letters.
  - 1. Panel Signs: Full size sample, including frame and accent bars and interchangeable name slot.
- D. Sign Schedule: Use same designations specified or indicated on Drawings or in a sign schedule.
- E. Maintenance Data: For plaques and signs to include in maintenance manuals indicating precautions against harmful cleaning materials and methods..

##### 1.3 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines.



## 1.4 FIELD CONDITIONS

- A. Field Measurements: Verify locations of anchorage devices embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Plastic Laminate: Provide high-pressure plastic laminate in finishes and colors as selected from manufacturer's standards that comply with ADA legislation.
- B. Fasteners: Use concealed fasteners fabricated from metals that are not corrosive to the sign material and mounting surface.
- C. Aluminum Extrusions: Provide aluminum extrusions of alloy and temper recommended by the sign manufacturer for the type of use and finish indicated, and with not less than the strength and durability properties specified in ASTM B 209 for 5005-H15.
- D. Aluminum Castings: Provide aluminum castings of alloy and temper recommended by the sign manufacturer for the casting process used and for the use and finish indicated.
- E. Anchors and Inserts: Use nonferrous metal or hot-dipped galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

### 2.2 INTERIOR PANEL SIGNS

- A. Panel Signs: Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.
  - 1. Panel Material: Matte-finished opaque acrylic sheet.
    - a. Color as selected by Architect.
- B. Framed Panel Signs: Fabricate frames to profile indicated; comply with the following requirements for materials and corner conditions:
  - 1. Material: Aluminum extrusion.
    - a. Finish: Brushed or satin silver.
  - 2. Corner Condition: Square with mitered corner.
- C. Raised Copy: Machine-cut copy characters from matte-finish opaque acrylic sheet and chemically weld onto the acrylic sheet forming sign panel face. Produce precisely formed characters with square cut edges free from burrs and cut marks.

- D. Sign Characteristics: All framed panel signs provided for this Project shall comply with the following requirements.
1. Characters: Copy must have characters raised a thickness of 1/32". Characters shall be all upper case and type styles shall be Caslon. Raised characters must be a minimum of 5/8" and a maximum of 2 inches high (based on upper case "X"). Characters and background shall be eggshell, matte, or other non-glare finish and must contrast with the background (either light on dark or dark on light).
  2. Pictograms (Symbols): Where pictograms are indicated to be provided, the minimum sign dimension shall be 6 inches. Pictograms can be any size within the minimum sign dimension. Pictogram shall be raised a thickness of 1/32". Where pictograms occur on signage, equivalent written description must be placed directly below pictogram.
  3. Braille Characters: All signage copy shall be accompanied by Grade 2 Braille.
- E. Type A Sign: Provide one individual framed panels sign with square corners, 6" x 8", of the following type at each restroom location:
1. Universal Symbol of Handicapped Accessibility.
  2. International Male or Female Symbol, as applicable.
  3. Copy for space identification (RESTROOM, MEN, or WOMEN as applicable).
- F. Type B Sign: Provide one individual unframed panel with square corners, 4" x 4", of the following type at each accessible restroom stall location:
1. Universal Symbol of Handicapped Accessibility.
- G. Type C Sign: Provide one individual framed panels sign with square corners, 4" x 6", of the following type at each exterior door location:
1. Copy shall read "EXIT".
- H. Type D Sign: Provide one individual framed panel sign with square corners, 8" x 8" at each remaining Door.
1. Copy shall consist of Room Name and Number.

## 2.1 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
1. Use concealed fasteners and anchors unless indicated to be exposed.
  2. Exposed Metal-Fastener Components, General:
    - a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.

- 3. Dimensional Letter Mounting Fasteners:
  - a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material or screwed into back of sign assembly, unless otherwise indicated.
- 4. Inserts: Furnish inserts to be set by other trades into concrete or masonry work.
- B. Adhesives: As recommended by sign manufacturer and with a VOC content of 70 g/L or less for adhesives used inside the weatherproofing system and applied on-site when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

## 2.2 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, Class I, 0.010 mm or thicker.

## 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 signage work.
- B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
- C. Verify that anchor inserts are correctly sized and located to accommodate signs.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. General: Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.
  - 1. Install level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.
- B. Interior Framed Panel Signage: Mount signage on wall adjacent to the latch side of the door at a height of 60" to centerline of sign.
  - 1. Distance from jamb of door shall assure that a person can approach within 3 inches of the sign location and will not restrict swing of door and will not obstruct any protruding objects.

### 3.1 CLEANING AND PROTECTION

- A. At completion of the installation, clean soiled sign surfaces in accordance with the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

END OF SECTION 10 14 00

## SECTION 10 21 00

### TOILET COMPARTMENTS

#### 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. This Section includes stock, manufactured toilet compartments as follows:
  - 1. Types of toilet compartments include:
    - a. Solid-plastic toilet compartments configured as toilet enclosures and urinal screens.
  - 2. Styles of toilet compartments include:
    - a. Overhead braced.
  - 3. Styles of screens include:
    - a. Floor supported and wall-hung.
- B. Related work.
  - 1. Division 06 Section "Rough Carpentry" for blocking for attaching compartments to walls.
  - 2. Division 10 Section "Toilet Accessories," for toilet accessories such as toilet paper holders and grab bars and similar accessories mounted on toilet compartments.

##### 1.3 SUBMITTALS

- A. Product data for materials, fabrication, and installation including catalog cuts of anchors, hardware, fastenings, and accessories.
- B. Shop drawings for fabrication and erection of toilet compartment assemblies not fully described by product drawings, templates, and instructions for installation of anchorage devices built into other work.
  - 1. Show location of cutouts for compartment-mounted toilet accessories.
- C. Samples for Verification: Full range of finishes for each type of unit required. Submit 6 inch square samples of each finish on same substrate to be used in work, for color verification after selections have been made.
- D. Maintenance Data: For toilet compartments to include in maintenance manuals.

## 1.4 QUALITY ASSURANCE

- A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible, to ensure proper fitting of work. However, allow for adjustments where taking of field measurements before fabrication might delay work.
- B. Surface Burning Characteristics: As determined by testing identical products according to ASTM E 84, or another standard acceptable to authorities having jurisdiction, by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame Spread Index: 25 or less.
  - 2. Smoke Developed Index: 450 or less.
- C. Coordination: Furnish inserts and anchorages which must be built into other work for installation of toilet compartments and related items. Coordinate delivery with other work to avoid delay.
- D. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities for toilet compartments designated as accessible.

## 1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

## PART 2 - PRODUCTS

### 2.1 SOLID-PLASTIC TOILET COMPARTMENTS

- A. Basis of Design Product: Subject to compliance with requirements, provide Scranton Products "Hiny Hider Series" or comparable product by one of the following:
  - 1. Accurate Partitions Corporation.
  - 2. Bradley Corporation, Mills Partitions.
  - 3. General Partitions Mfg. Corp.
  - 4. Santana Products, Inc.
- B. Toilet-Enclosure Style: Overhead braced.
- C. Urinal-Screen Style: Floor anchored.
- D. Door, Panel, Screen, and Pilaster Construction: Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch thick, seamless, with eased edges, no-sightline system, and with homogenous color and pattern throughout thickness of material.
  - 1. Integral Hinges: Configure doors and pilasters to receive continuous hinges.
  - 2. Continuous Strike: Configure doors and pilasters to receive continuous strike.
  - 3. Heat-Sink Strip: Manufacturer's standard continuous, stainless-steel strip fastened to exposed bottom edges of solid-plastic components to hinder malicious combustion.
  - 4. Color and Pattern: One color and pattern as indicated on Drawings.
- E. Pilaster Shoes and Sleeves (Caps): Manufacturer's standard design; stainless steel.
- F. Urinal-Screen Post: Manufacturer's standard post design of material matching the thickness and construction of pilasters with shoe and sleeve (cap) matching that on the pilaster.

G. Brackets (Fittings):

1. Stirrup Type: Ear or U-brackets, clear-anodized aluminum.

## 2.2 HARDWARE AND ACCESSORIES

- A. Hardware and Accessories: Manufacturer's standard operating hardware and accessories.
1. Material: Clear-anodized aluminum.
  2. Hinges: Manufacturer's standard continuous, cam type that swings to a closed or partially open position, allowing emergency access by lifting door.
  3. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
  4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories or adjacent wall surfaces.
  5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
  6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.
- B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.
- C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless-steel, hot-dip galvanized-steel, or other rust-resistant, protective-coated steel compatible with related materials.

## 2.3 MATERIALS

- A. Aluminum Castings: ASTM B 26/B 26M.
- B. Aluminum Extrusions: ASTM B 221 ([ASTM B 221M](#)).
- C. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.
- D. Stainless-Steel Castings: ASTM A 743/A 743M.

## 2.4 FABRICATION

- A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.
- B. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- C. Floor-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.
- D. Door Size and Swings: Unless otherwise indicated, provide 24-inch-wide, in-swinging doors for standard toilet compartments and 36-inch-wide, out-swinging doors with a minimum 32-inch-wide, clear opening for compartments designated as accessible.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.
  - 1. Confirm location and adequacy of blocking and supports required for installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Comply with manufacturer's written installation instructions. Install units rigid, straight, plumb, and level.
  - 1. Provide clearances of not more than 1/2 inch between pilasters and panels and not more than 1 inch between panels and walls.
  - 2. Secure units in position with manufacturer's recommended anchoring devices.
- B. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than three brackets attached at midpoint and near top and bottom of panel.
  - 1. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
  - 2. Align brackets at pilasters with brackets at walls.
- C. Overhead Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.
- D. Floor Anchored Screens: Set pilasters with anchors penetrating not less than 2 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Level, plumb, and tighten pilasters. Attach panels to walls with anchoring devices to suite supporting structure. Set units level and plumb and to resist lateral impact.

### 3.3 ADJUST AND CLEAN

- A. Hardware Adjustment: Adjust and lubricate hardware for proper operation. Set hinges on in-swinging doors to hold open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors (and entrance swing doors) to return to fully closed position.
- B. Clean exposed surfaces of partition systems using materials and methods recommended by manufacturer, and provide protection as necessary to prevent damage during remainder of construction period.

END OF SECTION 10 21 00

SECTION 10 28 00  
TOILET ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Accessories furnished and installed by the Contractor.
- B. Related Sections:
  - 1. Division 6 Section "Rough Carpentry"
  - 2. Division 22 Section "Plumbing Fixtures" for custodial accessory items, under lavatory guards, and toilet and bath accessories furnished integral or as component of Plumbing Fixtures.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:
  - 1. Construction details and dimensions.
  - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
  - 3. Material and finish descriptions.
  - 4. Features that will be included for Project.
  - 5. Manufacturer's warranty.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
  - 1. Identify locations using room designations indicated.
  - 2. Identify products using designations indicated.
- C. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.
- D. Warranty: Sample of special warranty.
- E. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.



#### 1.4 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and applications.

#### 1.5 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. Recycled Content: Provide steel with minimum 30 percent recycled content including at least 25 percent post-consumer recycled content.
- B. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.
- C. 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.
- D. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.
- E. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.
- F. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- G. 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.
- H. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear tempered glass mirrors, nominal 6.0 mm thick.

#### 2.2 MANUFACTURERS

- A. Washroom Accessories
  - 1. Basis-of-Design Product: Bobrick Washroom Equipment, Inc.
  - 2. Subject to compliance with requirements, comparable products by one of the following:
    - a. A & J Washroom Accessories, Inc.
    - b. American Specialties, Inc.
    - c. Bradley Corporation.

## 2.3 ACCESSORIES TO BE FURNISHED AND INSTALLED BY THE CONTRACTOR

- A. Soap Dispensers: Bobrick B-2111
- B. Toilet Tissue Dispenser: Bobrick B-4288
- C. Paper Towel Dispenser: Tork H-9492W
- D. Paper Towel Dispenser: Bobrick B-253
- E. Waste Receptacle: By Owner
- F. 42" Stainless Steel Grab Bar: Bobrick B-6806x42 with Series 256 anchor plates or 258 anchor kits as applicable for wood studs or Concrete Block walls.
- G. 36" Stainless Steel Grab Bar: Bobrick B-6806x36 with Series 256 anchor plates or 258 anchor kits as applicable for wood studs or Concrete Block walls.
- H. Mirror With Stainless Steel Frame: Bobrick B-290; Size: 24 x 36 inches.
- I. Mop & Broom Holder: Bobrick B-239x34.

## 2.4 FABRICATION

- A. 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.
  - 1. Comply with ADAAG and ANSI A 117.1 for all locations and mounting heights of all toilet and bath accessories.
- B. Secure mirrors to walls in concealed, tamperproof manner with special hangers, toggle bolts, or screws. Set units plumb, level, and square at locations indicated, in accordance with manufacturer's instructions for type of substrate involved.
- C. 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.

## PART 4 - TOILET AND CONCESSIONS ACCESSORIES SCHEDULE

### 4.1 Group No.1:

Locations: Women's Toilet Room 102

- a. (2) Toilet Paper Dispensers
- b. (1) Soap Dispensers
- c. (1) Paper Towel Dispensers
- d. (1) 42" Grab Bars
- e. (1) 36" Grab Bars
- f. (1) Mirror(s)

### Group No.2:

Locations: Men's Toilet Room 103

- a. (1) Toilet Paper Dispensers
- b. (1) Soap Dispensers
- c. (1) Paper Towel Dispensers
- d. (1) 42" Grab Bars
- e. (1) 36" Grab Bars
- f. (1) Mirror(s)

### Group No.3:

Locations: Breakroom 109

- a. (1) Soap Dispensers
- b. (1) Paper Towel Dispenser (B-253)

### Group No.4:

Locations: Janitor 123

- a. (1) Mop & Broom Holder
- b. (1) Paper Towel Dispenser (H-9492W)

END OF SECTION 10 28 00

SECTION 10 44 13  
FIRE EXTINGUISHER CABINETS

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. Fire protection cabinets for portable fire extinguishers.
- B. Indicated on Drawings as Follows:
  - 1. Recessed cabinet.
  - 2. Semi-recessed cabinet.
- C. Related Sections:
  - 1. Division 10 Section "Fire Extinguishers".

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire protection cabinets.
  - 1. Fire Protection Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.
- B. Shop Drawings: For fire protection cabinets. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples for Initial Selection: For each type of fire protection cabinet indicated.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
  - 1. Size: 6 by 6 inches square.
- E. Product Schedule: For fire protection cabinets. Coordinate final fire protection cabinet schedule with fire extinguisher schedule to ensure proper fit and function. Use same designations indicated on Drawings.
- F. Maintenance Data: For fire protection cabinets to include in maintenance manuals.

#### 1.4 QUALITY ASSURANCE

- A. Fire-Rated, Fire Protection Cabinets: When installed in rated wall locations, provide units that are listed and labeled to comply with the requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.

#### 1.5 COORDINATION

- A. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate sizes and locations of fire protection cabinets with wall depths.
- C. Provide at each indicated fire extinguisher location unless extinguisher is specifically noted for wall bracket hanging condition only.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
- B. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:
  - 1. Sheet: ASTM B 209.
  - 2. Extruded Shapes: ASTM B 221.
- C. Clear Float Glass: ASTM C 1036, Type I, Class 1, Quality q3, 6 mm thick.

#### 2.2 FIRE PROTECTION CABINET

- A. Cabinet Type: Suitable for fire extinguisher.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. J. L. Industries, Inc., a division of Activar Construction Products Group.
    - b. Kidde Residential and Commercial Division, Subsidiary of Kidde plc.
    - c. Larsen's Manufacturing Company.
    - d. Potter Roemer LLC.
    - e. Watrous Division, American Specialties, Inc.
- B. Cabinet Construction: Nonrated at typical applications unless installation is within a rated wall.
  - 1. Fire-Rated Cabinets: At rated walls, provide fire-rated cabinets with double walls fabricated from 0.0428-inch-thick, cold-rolled steel sheet with minimum 5/8-inch-thick, fire-barrier materials. Provide factory drilled mounting holes.
- C. Cabinet Material: Steel sheet.
  - 1. Shelf: Same metal and finish as cabinet.

- D. Recessed Cabinet: Cabinet box recessed in walls of sufficient depth to suit style of trim indicated.
1. Exposed Flat Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
- E. Semi recessed 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. Square-Edge Trim: 1-1/4- to 1-1/2-inch backbend depth.
- F. Cabinet Trim Material: Aluminum sheet.
- G. Door Material: Aluminum sheet.
- H. Door Style: Center glass with frame.
- I. Door Glazing: Clear float glass.
- J. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
1. Provide projecting lever handle with cam-action latch.
  2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.
- K. Accessories:
1. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
  2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.
    - a. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER."
      - 1) Location: Applied to cabinet door glazing.
      - 2) Application Process: Silk-screened.
      - 3) Lettering Color: Red.
      - 4) Orientation: Vertical.
- L. Finishes:
1. Manufacturer's standard baked-enamel paint for interior of cabinet:
  2. Aluminum: Clear anodic.

## 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 corners, 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. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
  - 2. Miter and weld perimeter door frames.
- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

## 2.4 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces of fire protection cabinets from damage by applying a strippable, temporary protective covering before shipping.
- C. Finish fire protection cabinets after assembly.
- D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## 2.5 ALUMINUM FINISH – (Exterior framing, trim and doors)

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

## 2.6 STEEL FINISHES – (Cabinet body and interior cabinet finish)

- A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning" or SSPC-SP 8, "Pickling". After cleaning, apply a conversion coating suited to the organic coating to be applied over it.
- B. Factory Prime Finish: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
- C. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.
  - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine walls and partitions for suitable framing depth and blocking where recessed and/or semirecessed cabinets will be installed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Prepare recesses for fire protection cabinets as required by type and size of cabinet and trim style.

### 3.3 INSTALLATION

- A. Install fire protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
  - 1. Fire Protection Cabinets: 54 inches above finished floor to top of cabinet.
- B. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.
  - 1. Unless otherwise indicated, provide semi-recessed fire protection cabinets. If wall thickness is not adequate for recessed cabinets, provide semi-recessed fire protection cabinets.

### 3.4 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as fire protection cabinets are installed unless otherwise indicated in manufacturers 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 10 44 13



SECTION 10 44 16  
FIRE EXTINGUISHERS

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. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
- B. Section includes portable (hand-carried) fire extinguishers and mounting brackets for fire extinguishers.
- C. Location on Drawings indicated as follows:
  - 1. Semi-recessed cabinet.
  - 2. Recessed cabinets.
- D. Related Sections:
  - 1. Division 10 Section "Fire Extinguisher Cabinets."

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.
- B. Product Schedule: For fire extinguishers. Coordinate final fire extinguisher schedule with fire protection cabinet schedule to ensure proper fit and function. Use same designations indicated on Drawings.
- C. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.
- D. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
  - 1. Provide fire extinguishers approved, listed, and labeled by FMG.

## 1.5 COORDINATION

- A. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

## 1.6 WARRANTY

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

## PART 2 - PRODUCTS

### 2.1 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each fire protection cabinet indicated.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. J. L. Industries, Inc.; a division of Activar Construction Products Group.
    - b. Kidde Residential and Commercial Division; Subsidiary of Kidde plc.
    - c. Larsen's Manufacturing Company.
    - d. Potter Roemer LLC.
  - 2. Valves: Manufacturer's standard.
  - 3. Handles and Levers: Manufacturer's standard.
  - 4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.
- B. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 4-A:60-B:C, 10-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.
  - 1. Locations: Unless noted otherwise, located in all noted cabinets and bracket mounted locations noted within drawings. (Verify fit with cabinet matching size, style and construction of the existing, adjacent classroom building.)

## 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. Install fire extinguishers in locations indicated and in compliance with requirements of authorities having jurisdiction.

END OF SECTION 10 44 16

## SECTION 10 71 01

### ALUMINUM WALL HUNG CANOPIES

#### PART 1 - GENERAL

##### 1.1 DISCRIPTION OF WORK

- A. Work in this section includes fabrication and installation of extruded aluminum overhead. Diagonal support arm, cantilever and mono-slope design canopies.
- B. Design Considerations:
  - 1. Flashing of various configurations as required by the attachment design approach.
  - 2. Determine wall construction and blocking requirements.
  - 3. Site Specific Engineering per local codes.
  - 4. Direction of water drainage and methods.
  - 5. Field verification of dimensions, existing structures, obstructions or materials.

##### 1.2 QUALITY ASSURANCE

- A. Products meeting these specifications as established by standard of quality required as manufactured by Awning Works, Inc. Florida, Phone 1-866-873-2941 or approved equal manufacturer.

##### 1.3 FIELD MEASUREMENT

- A. Confirm site dimensions prior to manufacturing.
- B. If requested, supply manufacturer's standard literature and specifications for canopies.
- C. Provide engineered shop drawings showing structural component locations/positions, material dimensions and details of construction and assembly.

##### 1.4 PERFORMANCE REQUIREMENTS

- A. Canopy must conform to IBC 2021 minimum code for building location wind speed, exposure and all other pertinent local and state building codes.
- B. Determine if specific load requirements have been established for canopies and provide stamped Engineering calculations for location in which canopy is installed.

##### 1.5 DELIVER, STORAGE, HANDLING

- A. Deliver and store all canopy components in protected areas defined by the customer or general contractor.

#### PART 2 - PRODUCTS

##### 2.1 MANUFACTURE

- A. Basis of Design - Awning Works Inc., [www.awningworksinc.com](http://www.awningworksinc.com)  
10820 US Hwy 19 N, Clearwater Florida 33764  
Phone: 1.866.873.2941, Fax 727.524.3110  
Email: [awnings@awningworksinc.com](mailto:awnings@awningworksinc.com)

Or approved equal as submitted, reviewed, approved and as published in addendum.

## 2.2 MATERIALS

- A. Perimeter framing (fascia), bracing and diagonal support arms shall be minimum extruded aluminum, alloy 6063-T5, in profile and thickness as determined by the engineering requirements.
- B. Inset paneling, decking, standing seam panels or louvers shall be the style, material and thickness as specified in the drawing.
- C. All attachment hardware shall be rust resistant or stainless steel as specified.

## 2.3 FINISHES

- A. Standard options are mill, anodized, Kynar 500, marine grade powder coat, automotive grade enamel. Steel panels are available in 20-year Kynar and Galvalume finishes. Roll formed panels are available as stock factory ESP baked enamel finish I white, bronze or ivory.

## 2.4 FABRICATION

- A. All framework connections shall be MIG or TIG welded. Mechanical connections shall be used for panel integration and support members. Locknuts shall be used exclusively.
- B. Panels shall be designed as interlocking aluminum members, except for sheet designs and louvers with mechanical fasteners shop applied whenever possible to provide structural integrity for the completed assembly. Completed sections will be field assembled.
- C. Drainage. Water shall drain from covered surfaces to the front edge of the canopy, into integral fascia gutter or directed to the rear for ground level discharge via one or more designated downspouts.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Confirm that surrounding area is ready for the canopy installation.
- B. Installer shall confirm dimensions and elevations to be as shown on drawings provided by Awning Works Inc.
- C. Erection shall be performed by an approved installer and scheduled after all painting, concrete, masonry and roofing in the area is completed.

### 3.2 INSTALLATION

- A. Installation shall be in strict accordance with manufacturer's shop drawings. Particular attention should be given to protecting the finish during handling and erection. Field touch up paint will be applied to any marred areas.
- B. Post installation, the work site and canopy shall be left in a clean condition.

END OF SECTION 10 73 01

## SECTION 12 36 61

### SOLID SURFACING COUNTERTOPS

#### PART 1 - GENERAL

##### 1.1 SECTION INCLUDES

- A. Solid surfacing countertops.
- B. Solid surfacing millwork and windowsills (at MRI).
- C. Adhesives and sealants.

##### 1.2 RELATED REQUIREMENTS

- A. Section 01 3000 - Submittals.
- B. Section 01 7800 - Closeout Submittals.
- C. Section 05 5000 - Metal Fabrications.
- D. Section 06 1000 - Rough Carpentry.
- E. Section 06 40 23 – Interior Architectural Woodwork.
- F. Division 22 - Plumbing Sections.

##### 1.3 REFERENCES

- A. Reference Standards:
  - 1. ASTM C 834: Standard Specification for Latex Sealants.
  - 2. ASTM C 920: Standard Specification for Elastomeric Joint Sealants.
  - 3. ASTM D 256: Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.
  - 4. ASTM D 570: Standard Test Method for Water Absorption of Plastics.
  - 5. ASTM D 638: Standard Test Method for Tensile Properties of Plastics
  - 6. ASTM D 696: Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C with a Vitreous Silica Dilatometer.
  - 7. ASTM D 790: Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
  - 8. ASTM D 792: Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
  - 9. ASTM D 2583: Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.
  - 10. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 11. ASTM G 21: Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
  - 12. ASTM G 22: Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Bacteria.
  - 13. ASTM G 155: Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials.

14. NEMA LD-3: High Pressure Decorative Laminates.
15. NSF/ANSI Standard 51: Food Equipment Materials.
16. SCAQMD Rule 1168: Adhesive and Sealant Applications.
17. UL 2818: GREENGUARD Certification Program for Chemical Emissions for Building Materials, Finishes and Furnishings.

#### 1.4 SUBMITTALS

- A. Submit under provisions of Section 01 3000 - Submittals.
- B. Product Data:
  1. Submit product data for each specified product. Include manufacturer's technical data sheets and published instruction instructions.
  2. Submit Material Safety Data Sheets (MSDS) for adhesives and sealants.
- C. Shop Drawings:
  1. Submit fully dimensioned shop drawings showing countertop windowsill layouts, joinery, terminating conditions, substrate construction, cutouts and holes. Show plumbing installation provisions. Include elevations, section details, and large scale details.
- D. Samples:
  1. Submit selection and verification samples for each color, pattern, and finish required.
- E. Quality Assurance Submittals:
  1. Test Reports: Submit certified test reports showing compliance with specified performance characteristics and physical properties, if required.
  2. Warranty: Specimen copy of specified warranty.
- F. Maintenance Data: Submit manufacturer's published maintenance manual with closeout submittals.

#### 1.5 REGULATORY REQUIREMENTS

- A. Accessibility Requirements: Comply with the U.S. Architectural & Transportation Barriers Compliance Board ADA-ABA Accessibility Guidelines for Buildings and Facilities.
- B. Adhesives, Sealants, and Sealant Primers:
  1. SCAQMD (South Coast Air Quality Management District) Rule 1168.

#### 1.6 QUALITY ASSURANCE

- A. Qualifications:
  1. Fabricator Qualifications: Minimum of three years documented experience in fabricating solid surfacing countertops similar in scope and complexity to this Project. Currently certified by the manufacturer as an acceptable fabricator.
  2. Installer Qualifications: Minimum of three years documented installation experience for projects similar in scope and complexity to this Project, and currently certified by the manufacturer as an acceptable installer.

- B. Mock-Ups:
  - 1. Install at Project using acceptable products and manufacturer approved installation methods. Obtain Architect's acceptance of color, pattern, finish, fabrication, and installation standards.
  - 2. Mock-Up Location: Build mockup of typical countertop as shown on Drawings.
  - 3. 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. Delivery: Deliver sinks in original containers.
- B. Storage and Protection: Store materials protected from exposure to harmful weather conditions, at temperature and humidity conditions recommended by manufacturer. Store sheet materials flat on pallets or similar rack-type storage to preclude damage.

#### 1.8 PROJECT CONDITIONS

- A. Field Measurements: Verify actual measurements and openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.
- B. Adhesive: Acclimatize adhesives to occupancy room temperatures with maximum temperature not to exceed 75 deg F.

#### 1.9 WARRANTY

- A. Manufacturer's Limited Warranty: Provide manufacturer's standard 10 Year Commercial Limited Warranty against defects in solid surface sheet materials.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURER

- A. Basis of Design: Specified to establish the design intent and required standard of quality. It is not intended to preclude the use of other acceptable manufacturers
  - 1. Specified product is specified due to unique visual or performance requirements required by the Architect. Due to this and/or other reasons best known to the Architect, there may be proposed alternatives that the Architect will not approve. In these matters, the decision of the Architect will be final.

#### 2.2 SOLID SURFACE SHEET MATERIAL

- A. "Wilsonart Solid Surface" as manufactured by Wilsonart LLC, 2501 Wilsonart Drive, Temple, TX 76504 Tel 254.207.7000, [www.wilsonart.com](http://www.wilsonart.com)
- B. Composition: Acrylic resins, fire-retardant mineral fillers, and proprietary coloring agents. Through-the-body color for full thickness of sheet material.
- C. Material Thickness: 1/2 inch, nominal.



D. Conformance Standards:

1. UL 2818:

- a. GREENGUARD - Emission levels in UL 2818, Section 7.1 are applicable for furniture products.
- b. GREENGUARD Gold - Emission levels in UL 2818, Section 7.2 are applicable for building materials, finishes, and furnishings.

E. Physical Characteristics:

1. Tensile Strength: [6800 psi]; ASTM D 638.
2. Tensile Modulus: [ $1.5 \times 10^6$  psi]; ASTM D 638.
3. Tensile Elongation: 0.4 percent minimum; ASTM D 638.
4. Flexural Strength: [10,000 psi]; ASTM D 790.
5. Flexural Modulus: [ $1.5 \times 10^6$  psi]; ASTM D 790.
6. Thermal Expansion Coefficient:  $1.37 \times 10^{-5}$  in./in.°F; ASTM D 696.
7. Hardness (Barcol Impressor): 55-62; ASTM D 2583.
8. Impact Resistance: [144 in.] drop with no fracture; NEMA LD-3, Method 3.8.
9. Izod Impact: 0.28 (ft-lb.)/in.; ASTM D 256, Method A.
10. Light Resistance - Xenon: No effect; NEMA LD-3, Method 3.3.
11. Stain Resistance: Pass; ANSI Z 124.3, modified.
12. Wear and Cleanability: Pass; ANSI Z 124.3.
13. Fungi Resistance: Pass; ASTM G 21.
14. Bacterial Resistance: Pass; ASTM G 22.
15. Boiling Water Resistance: No effect; NEMA LD-3, Method 3.5.
16. High Temperature Resistance: No effect; NEMA LD-3, Method 3.6.
17. Weatherability: Delta E less than 5; ASTM G 155.
18. Moisture Absorption: Less than 0.25 percent; ASTM D 570, long term.
19. Specific Gravity: [ $1.7 \text{ gram/cm}^3$ ]; ASTM D 792.
20. Weight: [4.4 lb./ft<sup>2</sup>].
21. Surface Burning Characteristics: Class I and Class A; ASTM E 84.

F. Color, Pattern, and Finish Design: Selected from manufacturer's standard offerings.

G. Edge Detail: Selected from manufacturer's standard offerings.

## 2.3 ACCESSORY MATERIALS

A. Joint Adhesive: Methacrylate-based adhesive for chemically bonding solid surfacing seams. Color complementary to solid surfacing sheet material. UL 2818 GREENGUARD Gold certified and complies with SCAQMD Rule 1168.

1. Product: "Wilsonart Hard Surface Adhesive."

B. Elastomeric Sealant: Mildew-resistant silicone sealant for filling gaps between countertops and terminating substrates in wet environment applications. Complies with ASTM C 920, Type S (single component), Grade NS (nonsag).

1. Product: Acceptable to countertop manufacturer.
2. Color: Selected from sealant manufacturer's standard offerings.

- C.     Siliconized Acrylic Sealant: Siliconized acrylic latex sealant. For general applications to fill gaps between countertops and at terminating substrates. Complies with ASTM C 834, Type OP, Grade NF, and SCAQMD Rule 1168.
  - 1.       Product: "Wilsonart Color Matched Caulk".
  - 2.       Color: Selected from sealant manufacturer's standard offerings.
- D.     Construction Adhesive: Countertop manufacturer's recommended silicone-based construction adhesive for backsplashes, end splashes, and other applications according to manufacturer's published fabrication instructions.

## 2.4     FABRICATION

- A.     Fabricate components in shop, to greatest extent practicable, in sizes and shapes indicated according to approved shop drawings and Wilsonart published fabrication requirements.
- B.     Form joint seams between solid surfacing components with specified seam adhesive. Completed joints inconspicuous in appearance and without voids. Provide joint reinforced if required by manufacturer for particular installation conditions.
- C.     Provide holes and cutouts indicated on approved shop drawings. Rout cutouts and complete by sanding all edges smooth.

## PART 3 - EXECUTION

### 3.1     EXAMINATION

- A.     Examine substrates and conditions that could adversely affect the work of this Section.
- B.     Substrates must be sound, flat, smooth, and free from dust or other surface contaminants.
- C.     Commencement of work will constitute acceptance of substrates and conditions to receive the work.

### 3.2     COUNTERTOP INSTALLATION

- A.     Install solid surfacing components plumb, level, and true according to approved shop drawings and manufacturer's published installation instructions. Use woodworking and specialized fabrication tools acceptable to manufacturer.
- B.     Form joint seams with specified seam adhesive. Seams to be inconspicuous in completed work. Seams in locations shown on approved shop drawings and acceptable to manufacturer. Promptly remove excess adhesive.
- C.     Provide minimum 1/2 inch radius for countertop inside corners.
- D.     Fill gaps between countertop and terminating substrates with specified silicone sealant.
- E.     Rout sink cutouts to manufacturer's template. Adhere solid surface cast sink units to countertops with specified adhesive.
- F.     Install backsplashes and end splashes where indicated on Drawings. Adhere to countertops with specified construction adhesive.

- G. Vanities: Secure front panels to solid substrate with specified construction adhesive. Maintain 1/16 inch gap between fixed and removable panels.
  - 1. ADA Vanities: Angled front panel to permit wheelchair access to comply with referenced accessibility standard.

### 3.3 REPAIRS

- A. If permissible to Architect, minor surface marring for solid surfacing components may be repaired according to manufacturer's published installation instructions.
- B. Remove and replace solid surfacing components that are damaged and cannot be satisfactorily repaired.

### 3.4 CLEANING AND PROTECTION

- A. Clean solid surfacing components according to manufacturer's published maintenance instructions. Completely remove excess adhesives and sealants from finished surfaces.
- B. Protect completed work from damage during remainder of construction period.

END OF SECTION 12 36 61

SECTION 15050 - BASIC MECHANICAL MATERIALS AND METHODS  
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Piping materials and installation instructions common to most piping systems.
  - 2. Transition fittings.
  - 3. Dielectric fittings.
  - 4. Mechanical sleeve seals.
  - 5. Sleeves.
  - 6. Escutcheons.
  - 7. Grout.
  - 8. Equipment installation requirements common to equipment sections.
  - 9. Painting and finishing.
  - 10. Concrete bases.
  - 11. Supports and anchorages.

1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- F. The following are industry abbreviations for plastic materials:
  - 1. ABS: Acrylonitrile-butadiene-styrene plastic.
  - 2. CPVC: Chlorinated polyvinyl chloride plastic.
  - 3. PE: Polyethylene plastic.
  - 4. PVC: Polyvinyl chloride plastic.

- G. The following are industry abbreviations for rubber materials:
  - 1. EPDM: Ethylene-propylene-diene terpolymer rubber.
  - 2. NBR: Acrylonitrile-butadiene rubber.

#### 1.4 SUBMITTALS

- A. Product Data: For the following:
    - 1. Transition fittings.
    - 2. Dielectric fittings.
    - 3. Mechanical sleeve seals.
    - 4. Escutcheons.
    - 5. Refer to each section for submittal requirements.
  - B. Welding Certificates.
- #### 1.5 QUALITY ASSURANCE
- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
  - B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
    - 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
    - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
  - C. Electrical Characteristics for Mechanical Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

#### 1.7 COORDINATION

- A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for mechanical installations.
- B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

- C. Coordinate requirements for access panels and doors for mechanical items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 8 Section "Access Doors and Frames."

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

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

### 2.2 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 15 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

### 2.3 JOINING MATERIALS

- A. Refer to individual Division 15 piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
  - 1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
    - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
    - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
  - 2. AWWA C110, rubber, flat face, 1/8-inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- E. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

- F. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- G. Solvent Cements for Joining Plastic Piping:
  - 1. ABS Piping: ASTM D 2235.
  - 2. CPVC Piping: ASTM F 493.
  - 3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
  - 4. PVC to ABS Piping Transition: ASTM D 3138.

## 2.4 DIELECTRIC FITTINGS

- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.
- C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.
  - 1. Manufacturers:
    - a. Capitol Manufacturing Co.
    - b. Central Plastics Company.
    - c. Eclipse, Inc.
    - d. Epco Sales, Inc.
    - e. Hart Industries, International, Inc.
    - f. Watts Industries, Inc.; Water Products Div.
    - g. Zurn Industries, Inc.; Wilkins Div.
- D. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.
  - 1. Manufacturers:
    - a. Calpico, Inc.
    - b. Lochinvar Corp.
- E. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.
  - 1. Manufacturers:
    - a. Perfection Corp.
    - b. Precision Plumbing Products, Inc.
    - c. Sioux Chief Manufacturing Co., Inc.
    - d. Victaulic Co. of America.

## 2.5 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

- C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
  - 1. Underdeck Clamp: Clamping ring with set screws.
- E. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.
- F. PVC Pipe: ASTM D 1785, Schedule 40.
- G. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

## 2.6 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Cast-Brass Type: With set screw.
  - 1. Finish: Polished chrome-plated.

## 2.7 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
  - 1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
  - 2. Design Mix: 5000-psi, 28-day compressive strength.
  - 3. Packaging: Premixed and factory packaged.

# PART 3 - EXECUTION

## 3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 15 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.



- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping to permit valve servicing.
- G. Install piping at indicated slopes.
- H. Install piping free of sags and bends.
- I. Install fittings for changes in direction and branch connections.
- J. Install piping to allow application of insulation.
- K. Select system components with pressure rating equal to or greater than system operating pressure.
- L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:
  - 1. New Piping:
    - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
    - b. Insulated Piping: One-piece, stamped-steel type with spring clips.
    - c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
    - d. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
    - e. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with rough-brass finish.
    - f. Bare Piping in Equipment Rooms: One-piece, cast-brass type.
    - g. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.
- M. Sleeves are not required for core-drilled holes.
- N. Permanent sleeves are not required for holes formed by removable PE sleeves.
- O. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
- P. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
  - 1. Cut sleeves to length for mounting flush with both surfaces.
    - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
  - 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
  - 3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
    - a. Steel Pipe Sleeves: For pipes smaller than NPS 6.

- b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.
    - c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Division 7 Section "Sheet Metal Flashing and Trim" for flashing.
      - 1) Seal space outside of sleeve fittings with grout.
  - 4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 7 Section "Joint Sealants" for materials and installation.
- Q. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- 1. Install steel pipe for sleeves smaller than 6 inches in diameter.
  - 2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
  - 3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- R. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- 1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- S. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 7 Section "Through-Penetration Firestop Systems" for materials.
- T. Verify final equipment locations for roughing-in.
- U. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.
- ### 3.2 PIPING JOINT CONSTRUCTION
- A. Join pipe and fittings according to the following requirements and Division 15 Sections specifying piping systems.
  - B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
- F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
  - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
  - 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
  - 2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
  - 3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
  - 4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
  - 5. PVC Nonpressure Piping: Join according to ASTM D 2855.
  - 6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.
- J. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.
- K. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
  - 1. Plain-End Pipe and Fittings: Use butt fusion.
  - 2. Plain-End Pipe and Socket Fittings: Use socket fusion.
- L. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

### 3.3 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
  - 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
  - 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
  - 3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
  - 4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

### 3.4 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.

### 3.5 PAINTING

- A. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

### 3.6 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.
- B. Field Welding: Comply with AWS D1.1.

### 3.7 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

- A. Coordinate with general contractor to provide wood blocking and bracing as required to accommodate new hot water heater stand.
- B. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor mechanical materials and equipment.
- C. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.

- D. Attach to substrates as required to support applied loads.

### 3.8 GROUTING

- A. Mix and install grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

END OF SECTION 15050

## SECTION 15055 - MOTORS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes basic requirements for factory-installed and field-installed motors.
- B. Related Sections include the following:
  - 1. Division 15 Sections for mounting motors and vibration isolation and seismic-control devices.
  - 2. Division 15 Sections for application of motors and reference to specific motor requirements for motor-driven equipment.

#### 1.3 DEFINITIONS

- A. Factory-Installed Motor: A motor installed by motorized-equipment manufacturer as a component of equipment.
- B. Field-Installed Motor: A motor installed at Project site and not factory installed as an integral component of motorized equipment.

#### 1.4 SUBMITTALS

- A. Product Data for Field-Installed Motors: For each type and size of motor, provide nameplate data and ratings; shipping, installed, and operating weights; mounting arrangements; size, type, and location of winding terminations; conduit entry and ground lug locations; and information on coatings or finishes.
- B. Shop Drawings for Field-Installed Motors: Dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Include the following:
  - 1. Each installed unit's type and details.
  - 2. Nameplate legends.
  - 3. Diagrams of power and control wiring. Provide schematic wiring diagram for each type of motor and for each control scheme.
- C. Coordination Drawings: Floor plans showing dimensioned layout, required working clearances, and required area above and around field-installed motors. Show motor layout, mechanical power transfer link, driven load, and relationship between electrical components and adjacent structural and mechanical elements. Show support locations, type of support, and weight on each support. Indicate field measurements.
- D. Qualification Data: For testing agency.
- E. Test Reports: Written reports specified in Parts 2 and 3.

- F. Operation and Maintenance Data: For field-installed motors to include in emergency, operation, and maintenance manuals.

## 1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
- B. Source Limitations: Obtain field-installed motors of a single type through one source from a single manufacturer.
- C. Product Options for Field-Installed Motors: Drawings indicate size, profiles, and dimensional requirements of motors and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- E. Comply with NFPA 70.

## 1.6 COORDINATION

- A. Coordinate features of motors, installed units, and accessory devices. Provide motors that are:
  - 1. Compatible with the following:
    - a. Magnetic controllers.
    - b. Multispeed controllers.
    - c. Reduced-voltage controllers.
  - 2. Designed and labeled for use with variable frequency controllers, and suitable for use throughout speed range without overheating.
  - 3. Matched to torque and horsepower requirements of the load.
  - 4. Matched to ratings and characteristics of supply circuit and required control sequence.
- B. Coordinate motor support with requirements for driven load; access for maintenance and motor replacement; installation of accessories, belts, belt guards; and adjustment of sliding rails for belt tensioning.
- C. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section.

## PART 2 - PRODUCTS

### 2.1 MOTOR REQUIREMENTS

- A. Motor requirements apply to factory-installed and field-installed motors except as follows:
  - 1. Different ratings, performance, or characteristics for a motor are specified in another Section.

2. Manufacturer for a factory-installed motor requires ratings, performance, or characteristics, other than those specified in this Section, to meet performance specified.

## 2.2 MOTOR CHARACTERISTICS

- A. Frequency Rating: 60 Hz.
- B. Voltage Rating: NEMA standard voltage selected to operate on nominal circuit voltage to which motor is connected.
- C. Service Factor: 1.15 for open dripproof motors; 1.0 for totally enclosed motors.
- D. Duty: Continuous duty at ambient temperature of 105 deg F and at altitude of 3300 feet above sea level.
- E. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.
- F. Enclosure: Open dripproof.

## 2.3 POLYPHASE MOTORS

- A. Description: NEMA MG 1, Design B, medium induction motor.
- B. Efficiency: Premium efficiency.
- C. Stator: Copper windings, unless otherwise indicated.
  1. Multispeed motors shall have separate winding for each speed.
- D. Rotor: Squirrel cage, unless otherwise indicated.
- E. Bearings: Double-shielded, prelubricated ball bearings suitable for radial and thrust loading.
- F. Temperature Rise: Match insulation rating, unless otherwise indicated.
- G. Insulation: Class F, unless otherwise indicated.
- H. Code Letter Designation:
  1. Motors 15 HP and Larger: NEMA starting Code F or G.
  2. Motors Smaller Than 15 HP: Manufacturer's standard starting characteristic.
- I. Enclosure: Cast iron for motors 7.5 hp and larger; rolled steel for motors smaller than 7.5 hp.
  1. Finish: Gray enamel.

## 2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS



- A. Motors Used with Reduced-Inrush Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.
- B. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
  - 1. Designed with critical vibration frequencies outside operating range of controller output.
  - 2. Temperature Rise: Matched to rating for Class B insulation.
  - 3. Insulation: Class H.
  - 4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.
- C. Source Quality Control: Perform the following tests on each motor according to NEMA MG 1:
  - 1. Measure winding resistance.
  - 2. Read no-load current and speed at rated voltage and frequency.
  - 3. Measure locked rotor current at rated frequency.
  - 4. Perform high-potential test.

## 2.5 SINGLE-PHASE MOTORS

- A. Type: One of the following, to suit starting torque and requirements of specific motor application:
  - 1. Permanent-split capacitor.
  - 2. Split-phase start, capacitor run.
  - 3. Capacitor start, capacitor run.
- B. Shaded-Pole Motors: For motors 1/20 hp and smaller only.
- C. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.
- D. Bearings: Ball type for belt-connected motors and other motors with high radial forces on motor shaft; sealed, pre-lubricated-sleeve type for other single-phase motors.
- E. Source Quality Control: Perform the following tests on each motor according to NEMA MG 1:
  - 1. Measure winding resistance.
  - 2. Read no-load current and speed at rated voltage and frequency.
  - 3. Measure locked rotor current at rated frequency.
  - 4. Perform high-potential test.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas to receive field-installed motors for compliance with requirements, installation tolerances, and other conditions affecting performance.
- B. Examine roughing-in of conduit systems to verify actual locations of conduit connections before motor installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 MOTOR INSTALLATION

- A. Anchor each motor assembly to base, adjustable rails, or other support, arranged and sized according to manufacturer's written instructions. Attach by bolting. Level and align with load transfer link.
- B. Install motors on concrete bases complying with Division 3.
- C. Comply with mounting and anchoring requirements specified in Division 15 Section "Mechanical Vibration and Seismic Controls."

### 3.3 FIELD QUALITY CONTROL

- A. Prepare for acceptance tests as follows:
  - 1. Run each motor with its controller. Demonstrate correct rotation, alignment, and speed at motor design load.
  - 2. Test interlocks and control features for proper operation.
  - 3. Verify that current in each phase is within nameplate rating.
- B. Testing: Owner will engage a qualified testing agency to perform the following field quality-control testing:
- C. Testing: Engage a qualified testing agency to perform the following field quality-control testing:
- D. Testing: Perform the following field quality-control testing:
  - 1. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.15.1. Certify compliance with test parameters.
  - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- E. Manufacturer's Field Service: Engage a factory-authorized service representative to perform the following:
  - 1. Inspect field-assembled components, equipment installation, and piping and electrical connections for compliance with requirements.
  - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
  - 3. Verify bearing lubrication.
  - 4. Verify proper motor rotation.

5. Test Reports: Prepare a written report to record the following:
  - a. Test procedures used.
  - b. Test results that comply with requirements.
  - c. Test results that do not comply with requirements and corrective action taken to achieve compliance.

### 3.4 ADJUSTING

- A. Align motors, bases, shafts, pulleys and belts. Tension belts according to manufacturer's written instructions.

### 3.5 CLEANING

- A. After completing equipment installation, inspect unit components. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.
- B. Clean motors, on completion of installation, according to manufacturer's written instructions.

END OF SECTION 15055

## SECTION 15060 - HANGERS AND SUPPORTS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes hangers and supports for mechanical system piping and equipment.
- B. Related Sections include the following: List below only products that the reader might expect to find in this Section but are specified elsewhere.
  - 1. Division 15 Sections for vibration isolation and seismic restraint devices.

#### 1.3 DEFINITIONS

- A. MSS: Manufacturers Standardization Society for the Valve and Fittings Industry.
- B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Design channel support systems for piping to support multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.
- B. Design heavy-duty steel trapezes for piping to support multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.

#### 1.5 SUBMITTALS

- A. Product Data: For each type of pipe hanger, channel support system component, and thermal-hanger shield insert indicated.
- B. Shop Drawings: Signed and sealed by a qualified professional engineer for multiple piping supports and trapeze hangers. Include design calculations and indicate size and characteristics of components and fabrication details.
- C. Welding Certificates: Copies of certificates for welding procedures and operators.

#### 1.6 QUALITY ASSURANCE

- A. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

- B. Engineering Responsibility: Design and preparation of Shop Drawings and calculations for each multiple pipe support and trapeze by a qualified professional engineer.
- C. Engineering Responsibility: Design and preparation of Shop Drawings and calculations for each multiple pipe support, trapeze, and seismic restraint by a qualified professional engineer.
  - 1. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of hangers and supports that are similar to those indicated for this Project in material, design, and extent.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Pipe Hangers:
    - a. AAA Technology and Specialties Co., Inc.
    - b. B-Line Systems, Inc.
    - c. Carpenter & Patterson, Inc.
    - d. Empire Tool & Manufacturing Co., Inc.
    - e. Globe Pipe Hanger Products, Inc.
    - f. Grinnell Corp.
    - g. GS Metals Corp.
    - h. Michigan Hanger Co., Inc.
    - i. National Pipe Hanger Corp.
    - j. PHD Manufacturing, Inc.
    - k. PHS Industries, Inc.
    - l. Piping Technology & Products, Inc.
  - 2. Channel Support Systems:
    - a. B-Line Systems, Inc.
    - b. Grinnell Corp.; Power-Strut Unit.
    - c. GS Metals Corp.
    - d. Michigan Hanger Co., Inc.; O-Strut Div.
    - e. National Pipe Hanger Corp.
    - f. Thomas & Betts Corp.
    - g. Unistrut Corp.
    - h. Wesanco, Inc.
  - 3. Powder-Actuated Fastener Systems:

- a. Gunnebo Fastening Corp.
- b. Hilti, Inc.
- c. ITW Ramset/Red Head.
- d. Masterset Fastening Systems, Inc.

## 2.2 MANUFACTURED UNITS

- A. Pipe Hangers, Supports, and Components: MSS SP-58, factory-fabricated components. Refer to "Hanger and Support Applications" Article in Part 3 for where to use specific hanger and support types.
  - 1. Galvanized, Metallic Coatings: For piping and equipment that will not have field-applied finish.
  - 2. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- B. Channel Support Systems: MFMA-2, factory-fabricated components for field assembly.
  - 1. Coatings: Manufacturer's standard finish, unless bare metal surfaces are indicated.
  - 2. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.

## 2.3 MISCELLANEOUS MATERIALS

- A. Powder-Actuated Drive-Pin Fasteners: Powder-actuated-type, drive-pin attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.
- B. Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.
- C. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars, black and galvanized.
- D. Grout: ASTM C 1107, Grade B, factory-mixed and -packaged, nonshrink and nonmetallic, dry, hydraulic-cement grout.
  - 1. Characteristics: Post hardening and volume adjusting; recommended for both interior and exterior applications.
  - 2. Properties: Nonstaining, noncorrosive, and nongaseous.
  - 3. Design Mix: 5000-psi, 28-day compressive strength.

## PART 3 - EXECUTION

### 3.1 HANGER AND SUPPORT APPLICATIONS

- A. Specific hanger requirements are specified in Sections specifying equipment and systems.
- B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Specification Sections.

- C. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Adjustable Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.
  2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of 120 to 450 deg F pipes, NPS 4 to NPS 16, requiring up to 4 inches of insulation.
  3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes, NPS 3/4 to NPS 24, requiring clamp flexibility and up to 4 inches of insulation.
  4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes, NPS 1/2 to NPS 24, if little or no insulation is required.
  5. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
  6. Adjustable Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated stationary pipes, NPS 3/4 to NPS 8.
  7. Adjustable Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
  8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
  9. Adjustable Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 2.
  10. Split Pipe-Ring with or without Turnbuckle-Adjustment Hangers (MSS Type 11): For suspension of noninsulated stationary pipes, NPS 3/8 to NPS 8.
  11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated stationary pipes, NPS 3/8 to NPS 3.
- D. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20.
  2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.
- E. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
  2. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.
- F. Building Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction to attach to top flange of structural shape.
  2. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
  3. C-Clamps (MSS Type 23): For structural shapes.

4. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
  5. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
- G. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
  2. Protection Shields (MSS Type 40): Of length recommended by manufacturer to prevent crushing insulation.
  3. Thermal-Hanger Shield Inserts: For supporting insulated pipe, 360-degree insert of high-density, 100-psi minimum compressive-strength, water-repellent-treated calcium silicate or cellular-glass pipe insulation, same thickness as adjoining insulation with vapor barrier and encased in 360-degree sheet metal shield.
- H. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
  2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
  3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41 roll hanger with springs.
  4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
  5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from hanger.
  6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from base support.
  7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from trapeze support.
  8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:
    - a. Horizontal (MSS Type 54): Mounted horizontally.
    - b. Vertical (MSS Type 55): Mounted vertically.
    - c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.

### 3.2 HANGER AND SUPPORT INSTALLATION



- A. Pipe Hanger and Support Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.
- B. Channel Support System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled channel systems.
  - 1. Field assemble and install according to manufacturer's written instructions.
- C. Heavy-Duty Steel Trapeze Installation: Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated, heavy-duty trapezes.
  - 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
  - 2. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D-1.1.
- D. Install building attachments within concrete slabs or attach to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, and expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- E. Install powder-actuated drive-pin fasteners in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
- F. Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- G. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- H. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- I. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- J. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9, "Building Services Piping," is not exceeded.
- K. Insulated Piping: Comply with the following:
  - 1. Attach clamps and spacers to piping.

- a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
  - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
  - c. Do not exceed pipe stress limits according to ASME B31.9.
- 2. Install MSS SP-58, Type 39 protection saddles, if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
  - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
- 3. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields shall span arc of 180 degrees.
  - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
- 4. Shield Dimensions for Pipe: Not less than the following:
  - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
  - b. NPS 4: 12 inches long and 0.06 inch thick.
  - c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
  - d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
  - e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.
- 5. Pipes NPS 8 and Larger: Include wood inserts.
- 6. Insert Material: Length at least as long as protective shield.
- 7. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

### 3.3 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure above or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make smooth bearing surface.

### 3.4 METAL FABRICATION

- A. Cut, drill, and fit miscellaneous metal fabrications for heavy-duty steel trapezes and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field-weld connections that cannot be shop-welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and 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. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

### 3.5 ADJUSTING

- A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

### 3.6 PAINTING

- A. Touching Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
  1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- B. Touching Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 9 Section "Painting."
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 15060

## SECTION 15075 - MECHANICAL IDENTIFICATION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following mechanical identification materials and their installation:
  - 1. Equipment nameplates.
  - 2. Equipment markers.
  - 3. Equipment signs.
  - 4. Access panel and door markers.
  - 5. Pipe markers.
  - 6. Duct markers.
  - 7. Stencils.
  - 8. Valve tags.
  - 9. Valve schedules.
  - 10. Warning tags.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For color, letter style, and graphic representation required for each identification material and device.
- C. Valve numbering scheme.
- D. Valve Schedules: For each piping system. Furnish extra copies (in addition to mounted copies) to include in maintenance manuals.

#### 1.4 QUALITY ASSURANCE

- A. ASME Compliance: Comply with ASME A13.1, "Scheme for the Identification of Piping Systems," for letter size, length of color field, colors, and viewing angles of identification devices for piping.

## 1.5 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with location of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

## PART 2 - PRODUCTS

### 2.1 EQUIPMENT IDENTIFICATION DEVICES

- A. Equipment Nameplates: Metal, with data engraved or stamped, for permanent attachment on equipment.
  - 1. Data:
    - a. Manufacturer, product name, model number, and serial number.
    - b. Capacity, operating and power characteristics, and essential data.
    - c. Labels of tested compliances.
  - 2. Location: Accessible and visible.
  - 3. Fasteners: As required to mount on equipment.
- B. Equipment Markers: Engraved, color-coded laminated plastic. Include contact-type, permanent adhesive.
  - 1. Terminology: Match schedules as closely as possible.
  - 2. Data:
    - a. Name and plan number.
    - b. Equipment service.
    - c. Design capacity.
    - d. Other design parameters such as pressure drop, entering and leaving conditions, and speed.
  - 3. Size: 2-1/2 by 4 inches for control devices, dampers, and valves; 4-1/2 by 6 inches for equipment.
- C. Equipment Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.
  - 1. Data: Instructions for operation of equipment and for safety procedures.

2. Engraving: Manufacturer's standard letter style, of sizes and with terms to match equipment identification.
  3. Thickness: 1/16 inch 1/8 inch], unless otherwise indicated.
  4. Thickness: 1/16 inch for units up to 20 sq. in. or 8 inches in length, and 1/8 inch for larger units.
  5. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.
- D. Access Panel and Door Markers: 1/16-inch- thick, engraved laminated plastic, with abbreviated terms and numbers corresponding to identification. Provide 1/8-inch center hole for attachment.
1. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.

## 2.2 PIPING IDENTIFICATION DEVICES

- A. Manufactured Pipe Markers, General: Preprinted, color-coded, with lettering indicating service, and showing direction of flow.
1. Colors: Comply with ASME A13.1, unless otherwise indicated.
  2. Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length.
  3. Pipes with OD, Including Insulation, Less Than 6 Inches: Full-band pipe markers extending 360 degrees around pipe at each location.
  4. Pipes with OD, Including Insulation, 6 Inches and Larger: Either full-band or strip-type pipe markers at least three times letter height and of length required for label.
  5. Arrows: Integral with piping system service lettering to accommodate both directions; or as separate unit on each pipe marker to indicate direction of flow.
- B. Pretensioned Pipe Markers: Precoiled semirigid plastic formed to cover full circumference of pipe and to attach to pipe without adhesive.
- C. Shaped Pipe Markers: Preformed semirigid plastic formed to partially cover circumference of pipe and to attach to pipe with mechanical fasteners that do not penetrate insulation vapor barrier.
- D. Self-Adhesive Pipe Markers: Plastic with pressure-sensitive, permanent-type, self-adhesive back.
- E. Plastic Tape: Continuously printed, vinyl tape at least 3 mils thick with pressure-sensitive, permanent-type, self-adhesive back.
1. Width for Markers on Pipes with OD, Including Insulation, Less Than 6 Inches: 3/4 inch minimum.

2. Width for Markers on Pipes with OD, Including Insulation, 6 Inches or Larger: 1-1/2 inches minimum.

## 2.3 DUCT IDENTIFICATION DEVICES

- A. Duct Markers: Engraved, color-coded laminated plastic. Include direction and quantity of airflow and duct service (such as supply, return, and exhaust). Include contact-type, permanent adhesive.

## 2.4 STENCILS

- A. Stencils: Prepared with letter sizes according to ASME A13.1 for piping; minimum letter height of 1-1/4 inches for ducts; and minimum letter height of 3/4 inch for access panel and door markers, equipment markers, equipment signs, and similar operational instructions.
  1. Stencil Material: Aluminum.
  2. Stencil Paint: Exterior, gloss, black, unless otherwise indicated. Paint may be in pressurized spray-can form.
  3. Identification Paint: Exterior, acrylic enamel in colors according to ASME A13.1, unless otherwise indicated.

## 2.5 VALVE TAGS

- A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers, with numbering scheme approved by Engineer. Provide 5/32-inch hole for fastener.
  1. Material: 0.032-inch- thick aluminum.
  2. Valve-Tag Fasteners: Brass S-hook.

## 2.6 VALVE SCHEDULES

- A. Valve Schedules: For each piping system, on standard-size bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
  1. Valve-Schedule Frames: Glazed display frame for removable mounting on masonry walls for each page of valve schedule. Include mounting screws.
  2. Frame: Extruded aluminum.
  3. Glazing: ASTM C 1036, Type I, Class 1, Glazing Quality B, 2.5-mm, single-thickness glass.

## 2.7 WARNING TAGS

- A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags; of plasticized card stock with matte finish suitable for writing.
  - 1. Size: Approximately 4 by 7 inches
  - 2. Fasteners: Brass grommet and wire.
  - 3. Nomenclature: Large-size primary caption such as DANGER, CAUTION, or DO NOT OPERATE.
  - 4. Color: Yellow background with black lettering.

## PART 3 - EXECUTION

### 3.1 APPLICATIONS, GENERAL

- A. Products specified are for applications referenced in other Division 15 Sections. If more than single-type material, device, or label is specified for listed applications, selection is Installer's option.

### 3.2 EQUIPMENT IDENTIFICATION

- A. Install and permanently fasten equipment nameplates on each major item of mechanical equipment that does not have nameplate or has nameplate that is damaged or located where not easily visible. Locate nameplates where accessible and visible. Include nameplates for the following general categories of equipment:
  - 1. Fuel-burning units, including boilers, furnaces, heaters, stills, and absorption units.
  - 2. Pumps, compressors, chillers, condensers, and similar motor-driven units.
  - 3. Heat exchangers, coils, evaporators, cooling towers, heat recovery units, and similar equipment.
  - 4. Fans, blowers, primary balancing dampers, and mixing boxes.
  - 5. Packaged HVAC central-station and zone-type units.
- B. Install equipment markers with permanent adhesive on or near each major item of mechanical equipment. Data required for markers may be included on signs, and markers may be omitted if both are indicated.
  - 1. Letter Size: Minimum 1/4 inch for name of units if viewing distance is less than 24 inches , 1/2 inch for viewing distances up to 72 inches , and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
  - 2. Data: Distinguish among multiple units, indicate operational requirements, indicate safety and emergency precautions, warn of hazards and improper operations, and identify units.



3. Locate markers where accessible and visible. Include markers for the following general categories of equipment:
  - a. Main control and operating valves, including safety devices and hazardous units such as gas outlets.
  - b. Fire department hose valves and hose stations.
  - c. Meters, gages, thermometers, and similar units.
  - d. Fuel-burning units, including boilers, furnaces, heaters, stills, and absorption units.
  - e. Pumps, compressors, chillers, condensers, and similar motor-driven units.
  - f. Heat exchangers, coils, evaporators, cooling towers, heat recovery units, and similar equipment.
  - g. Fans, blowers, primary balancing dampers, and mixing boxes.
  - h. Packaged HVAC central-station and zone-type units.
  - i. Tanks and pressure vessels.
  - j. Strainers, filters, humidifiers, water-treatment systems, and similar equipment.
- C. Stenciled Equipment Marker Option: Stenciled markers may be provided instead of laminated-plastic equipment markers, at Installer's option, if lettering larger than 1 inch (25 mm) high is needed for proper identification because of distance from normal location of required identification.
- D. Install equipment signs with screws or permanent adhesive on or near each major item of mechanical equipment. Locate signs where accessible and visible.
  1. Identify mechanical equipment with equipment markers in the following color codes:
    - a. Green: For cooling equipment and components.
    - b. Yellow : For heating equipment and components.
    - c. Brown: For energy-reclamation equipment and components.
  2. Letter Size: Minimum 1/4 inch for name of units if viewing distance is less than 24 inches , 1/2 inch for viewing distances up to 72 inches , and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
  3. Data: Distinguish among multiple units, indicate operational requirements, indicate safety and emergency precautions, warn of hazards and improper operations, and identify units.
  4. Include signs for the following general categories of equipment:
    - a. Main control and operating valves, including safety devices and hazardous units such as gas outlets.
    - b. Fuel-burning units, including boilers, furnaces, heaters, stills, and absorption units.
    - c. Pumps, compressors, chillers, condensers, and similar motor-driven units.

- d. Heat exchangers, coils, evaporators, cooling towers, heat recovery units, and similar equipment.
  - e. Fans, blowers, primary balancing dampers, and mixing boxes.
  - f. Packaged HVAC central-station and zone-type units.
  - g. Tanks and pressure vessels.
  - h. Strainers, filters, humidifiers, water-treatment systems, and similar equipment.
- E. Stenciled Equipment Sign Option: Stenciled signs may be provided instead of laminated-plastic equipment signs, at Installer's option, if lettering larger than 1 inch high is needed for proper identification because of distance from normal location of required identification.
- F. Install access panel markers with screws on equipment access panels.

### 3.3 PIPING IDENTIFICATION

- A. Install manufactured pipe markers indicating service on each piping system. Install with flow indication arrows showing direction of flow.
  - 1. Pipes with OD, Including Insulation, Less Than 6 Inches : Pretensioned pipe markers. Use size to ensure a tight fit.
  - 2. Pipes with OD, Including Insulation, Less Than 6 Inches : Self-adhesive pipe markers. Use color-coded, self-adhesive plastic tape, at least 3/4 inch, 1-1/2 inches ] wide, lapped at least 1-1/2 inches at both ends of pipe marker, and covering full circumference of pipe.
  - 3. Pipes with OD, Including Insulation, 6 Inches and Larger: Shaped pipe markers. Use size to match pipe and secure with fasteners.
  - 4. Pipes with OD, Including Insulation, 6 Inches and Larger: Self-adhesive pipe markers. Use color-coded, self-adhesive plastic tape, at least 1-1/2 inches wide, lapped at least 3 inches at both ends of pipe marker, and covering full circumference of pipe.
- B. Stenciled Pipe Marker Option: Stenciled markers may be provided instead of manufactured pipe markers, at Installer's option. Install stenciled pipe markers with painted, color-coded bands or rectangles on each piping system.
  - 1. Identification Paint: Use for contrasting background.
  - 2. Stencil Paint: Use for pipe marking.
- C. Locate pipe markers and color bands where piping is exposed in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior nonconcealed locations as follows:
  - 1. Near each valve and control device.

2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and nonaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced markers.

### 3.4 DUCT IDENTIFICATION

- A. Install duct markers with permanent adhesive on air ducts in the following color codes:
  1. Blue: For cold-air supply ducts.
  2. Yellow: For hot-air supply ducts.
  3. Green: For exhaust-, outside-, relief-, return-, and mixed-air ducts.
  4. ASME A13.1 Colors and Designs: For hazardous material exhaust.
  5. Letter Size: Minimum 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
- B. Stenciled Duct Marker Option: Stenciled markers, showing service and direction of flow, may be provided instead of laminated-plastic duct markers, at Installer's option, if lettering larger than 1 inch high is needed for proper identification because of distance from normal location of required identification.
- C. Locate markers near points where ducts enter into concealed spaces and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system.

### 3.5 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; plumbing fixture supply stops; shutoff valves; faucets; convenience and lawn-watering hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following:
  1. Valve-Tag Size and Shape:

- a. Cold Water: [1-1/2 inches (38 mm)] [2 inches (50 mm)], [round] [square].
  - b. Hot Water: [1-1/2 inches (38 mm)] [2 inches (50 mm)], [round] [square].
  - c. Fire Protection: [1-1/2 inches (38 mm)] [2 inches (50 mm)], [round] [square].
  - d. Gas: [1-1/2 inches (38 mm)] [2 inches (50 mm)], [round] [square].
2. Valve-Tag Color:
- a. Cold Water: Blue.
  - b. Hot Water: Natural.
  - c. Fire Protection: Red.
  - d. Gas: Yellow.
3. Letter Color:
- a. Cold Water: White.
  - b. Hot Water: Black.
  - c. Fire Protection: Black.
  - d. Gas: Black.

### 3.6 VALVE-SCHEDULE INSTALLATION

- A. Mount valve schedule on wall in accessible location in each major equipment room.

### 3.7 WARNING-TAG INSTALLATION

- A. Write required message on, and attach warning tags to, equipment and other items where required.

### 3.8 ADJUSTING

- A. Relocate mechanical identification materials and devices that have become visually blocked by other work.

### 3.9 CLEANING

- A. Clean faces of mechanical identification devices and glass frames of valve schedules.

END OF SECTION 15075

## SECTION 15480 – WASTE WATER DISPOSAL

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

- A. Connect to existing sanitary sewer system as indicated on plans.
- B. The system of sewage and drainage shall be in DWV PVC below grade as hereinbefore specified except where space or medical requirements necessitate the use of Type "DWV" copper. No hub cast iron shall be used above grade.
- C. All work shall be in strict conformity with Chapter XIV of the Universal Plumbing Code and in accordance with all local codes. Piping shall be routed as shown on plans or in an acceptable manner to meet building conditions.
- D. Connections between traps and cast iron pipes are to be made with heavy brass ferrules.
- E. Provide reducers, increasers, special flanges, and fittings where required between piping work and fixtures in order to connect and complete work and render it ready for use. Make any offsets required to avoid construction.
- F. All water closets shall be mounted with cast iron closet bends.
- G. All lines 3" and smaller shall be sloped 1/4" per foot and all lines 4" and larger shall be sloped 1/8" per foot. Piping shall be laid so slope is continuous.
- H. All vents shall extend 10" above roof and terminate in an appropriate lead flashing collar. No sewer vents shall terminate 10'-0" from any fresh air intakes. No vents shall penetrate roof within 48" of an exterior wall. Offset in ceiling as required. All back vents shall be taken off as near trap as possible.

### PART 2 - PRODUCTS

Not Used.

### PART 3 - EXECUTION

#### 3.1 TESTING

- A. Test all plumbing sewer lines, vents, waste, etc. with a minimum of 10' water head, for 24 hours in accordance with the Universal Plumbing Code.

END OF SECTION 15480

## SECTION 15481 - DOMESTIC HOT WATER HEATER

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes electric storage-type water heaters for heating and storing hot water.

#### 1.3 REFERENCES

- A. NFPA 70 – National Electrical Code.
- B. UL 174 – Electric Storage Tank Water Heaters.
- C. NSF 61 – Drinking Water System Components.
- D. Local plumbing code.

#### 1.4 SUBMITTALS

- A. Product Data: Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories for each model indicated.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, required clearances, and method of field assembly, components, and location and size of each field connection.
  - 1. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer installed and field installed wiring.
- C. Source Quality Control Tests and Inspection Reports: Indicate and interpret test results for compliance with performance requirements before shipping.
- D. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
- E. Maintenance Data: Include in the maintenance manuals specified in Division 1. Include parts list, maintenance guide, and wiring diagrams for each water heater.

#### 1.5 QUALITY ASSURANCE

- A. Listing and Labeling: Provide electrically operated components specified in this Section that are listed and labeled.
  - 1. The Terms “Listed” and “Labeled”: As defined in NFPA 70, Article 100.
  - 2. Listing and Labeling Agency Qualifications: A “Nationally Recognized Testing Laboratory” as defined in OSHA Regulation 1910.7.

B. Comply with NFPA 70 for electrical components and installation.

C. Controls:

1. Water heater shall be provided with factory-installed, self-contained controls.
2. Provide adjustable immersion thermostat with temperature range of 100°F to 180°F.
3. Provide integral high-temperature limit control (manual reset) to shut off power upon excessive temperature.
4. Provide factory-installed internal wiring and control components complete and ready for connection to power supply.
5. Coordinate control components with electrical characteristics of unit.

## 1.6 WARRANTY

- A. General Warranty: Installing contractor shall provide one (1) year of warranty parts and labor.
- B. Tank Warranty: Installing contractor shall provide manufacturer's standard tank warranty, minimum five (5) years.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Manufacturers: Manufacturer shall be a company specializing in manufacturing electric water heaters with minimum five (5) years experience. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Design: Water heater shall be factory-assembled, electric, vertical storage type. Unit shall be UL listed and designed for operation at 150 psig working pressure. Tank shall be glass-lined steel with corrosion protection and insulated with foam or fiberglass insulation. Unit shall include factory-installed electric resistance heating elements, thermostat, and high temperature limit control. Provide complete unit ready for connection to electrical service.
- C. Controls: Water heater shall include factory-installed adjustable thermostat and integral high temperature limit control (manual reset). Provide internal wiring complete for single point electrical connection
- D. Manufacturers: Provide water heater by Rheem / Ruud or approved equal.

### 2.2 COMPONENTS

- A. Tank: Glass-lined steel tank with corrosion-resistant coating and magnesium anode rod. Rated for 150 psig working pressure. Provide top water connection as per manufacturer's recommendations.
- B. Insulation: Minimum 2-inch foam or fiberglass insulation with steel outer jacket.
- C. Heating Elements: Immersion type, stainless steel electric resistance elements. Non-simultaneous operation.

- D. Recirculation Pump: Provide in-line bronze domestic hot water recirculation pump sized for system flow and head. Pump shall be suitable for potable water service and rated for continuous operation. Provide check valve, isolation valves, and timer or aquastat control. Coordinate pump voltage with water heater electrical service.
- E. Controls: Factory-installed adjustable thermostat and integral high temperature limit control (manual reset).
- F. Electrical: Unit shall be factory wired for single-point electrical connection. Provide junction box and wiring in accordance with NFPA 70.
- G. Accessories: Temperature and pressure relief valve (ASME rated), drain valve, thermometer, and dielectric unions.
- H. Thermal Expansion Tank: Provide potable water thermal expansion tank sized for system volume and pressure. Tank shall be ASME rated, pre-charged, diaphragm type, and suitable for domestic hot water service. Minimum size shall be 2 gallons unless noted otherwise. Install on cold water inlet to water heater.

## 2.3 SOURCE QUALITY CONTROL

- A. Test and inspect water heaters in accordance with applicable UL standards and manufacturer's quality control procedures. Water heaters shall be factory tested and labeled.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine area to receive water heater for compliance with requirements for installation tolerances and other conditions affecting water heater performance. Do not proceed with installation until unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install water heaters level and plumb, according to manufacturer's written instructions and referenced standards.
- B. Install electrical devices furnished with water heater, but not specified to be factory mounted.
- C. Provide factory-installed drain valve at water heater.

### 3.3 CONNECTIONS

- A. Connect cold water supply to water heater inlet with shutoff valve and union.
- B. Connect hot water outlet to domestic hot water piping with union.
- C. Connect domestic hot water recirculation piping to water heater and recirculation pump. Install pump on return line to water heater.
- D. Provide check valve in recirculation line.



- E. Install piping from temperature and pressure relief valve to nearest floor drain.
- F. Electrical: Comply with requirements in Division 26 Sections.
- G. Ground equipment.
  - 1. Tighten electrical connectors and terminals according to manufacturer's published torque values or UL 486A and UL 486B.

### 3.4 FIELD QUALITY CONTROL

- A. Inspect installation for compliance with manufacturer's instructions and Contract Documents.
- B. Verify proper electrical connections and grounding.
- C. Fill tank, energize unit, and verify proper operation of thermostat and high temperature limit control.

### 3.5 CLEANING

- A. Flush and clean water heaters on completion of installation, according to manufacturer's written instructions.
- B. After installation, inspect exposed surfaces. Remove debris and repair damaged finishes in accordance with manufacturer's recommendations.

### 3.6 COMMISSIONING

- A. Verify installation complies with manufacturer's instructions and Contract Documents.
- B. Verify electrical connections and grounding are complete and correct.
- C. Fill water heater, purge air, and check for leaks.
- D. Energize unit and verify operation of thermostat and high temperature limit control.
- E. Verify temperature rise and proper hot water delivery.
- F. Verify recirculation pump operation and proper flow through system.

### 3.7 DEMONSTRATION

- A. Demonstrate operation of water heater to Owner.
  - 1. Show normal operation and temperature adjustment.
  - 2. Review basic maintenance procedures.
  - 3. Review operation and maintenance manuals.

END OF SECTION - 15480

## SECTION 15490 – WATER SUPPLY

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

- A. Provide new water service as indicated on plans.

### PART 2 - PRODUCTS

#### 2.1 WATER PIPING

- A. All water supply piping shall be of materials as specified in Section 15140. Contractor shall make provisions for expansion and contraction of hot water lines by means of expansion bends or loops as required.
- B. All water lines shall be disinfected in accordance with the Universal Plumbing Code.
- C. Water lines run underground shall have a minimum cover of 24" from the top of pipe to finished grade and hot water lines and cold water lines running parallel shall be run a minimum of 18" apart.
- D. This Contractor shall make up a complete water supply system. Connect water lines to all fixtures and outlets requiring water and provide valve stub outs for continuation by other trades where so called for.
- E. At each fixture or group of fixtures, furnish and install a 12" high air chamber of same size as the branch feed line except at fixtures with quick closing valves such as dishwashers, etc., in which case provide "shocktrol", Wade, Zurn, Josam or equal and properly sized for each unit.

### PART 3 - EXECUTION

#### 3.1 TESTING

- A. All domestic water lines shall be tested under 160 psig hydrostatic pressure for a minimum of five (5) hours unless elsewhere specified.

END OF SECTION 15490

## SECTION 15600 - PLUMBING

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

- A. Furnish all labor and materials as before specified, indicated or reasonably implied for the complete installation of the following systems:
  - 1. Cold Water System
  - 2. Hot Water System
  - 3. Sanitary Drainage System

### PART 2 - PRODUCTS

#### 2.1 CLEANOUTS

- A. Cleanouts shall be provided where shown on plans, at each change of direction of the building drain greater than 45 degrees and at or near the foot of each vertical waste or soil stack. Location of all cleanouts shall be same size as piping up to 4". Larger pipes shall have 4" cleanouts except at exterior mains or unless noted otherwise. Every cleanout shall be installed so that the cleanout opens in the direction of flow of the drainage line or at right angle there. Floor cleanouts shall be adjustable type, double drainage flange, clamping collar, 2# lead flashing, nickel bronze cover. Top of cleanout shall be level with top of finished floor so there is a continuous surface. Floor cleanouts shall be Jay R. Smith 646, Josam Y-710-B, or Wade W-8190. Wall cleanouts shall be nickel bronze access frame and cover Zurn Z-1320-2, Jay R. Smith 920, Josam Y-1560-B or Wade W-8460-S. Outside cleanouts shall be as detailed on plans.

#### 2.2 DRAINS

- A. Floor drains shall be Wade, Zurn or J.R. Smith. Wade numbers are used to set a standard. Strainers shall be Nikaloy 5" diameter for 2: floor drains. 8" diameter for 4" floor drains.
  - 1. Floor drains-brass finish Wade model 1100 with trap primer areas. Provide trap primer connection.

#### 2.4 ISOLATION

- A. Isolate all dissimilar metals with isolators equaling or exceeding the quality of "EPCO" dielectric unions, Maloney, or W&K.

#### 2.5 PLUMBING FIXTURES

- A. Plumbing Contractor shall furnish and install all plumbing fixtures shown on

accompanying drawings. Refer to both plumbing and architectural drawings and provide all fixtures shown on either. Fixtures shall be complete with all necessary brass and accessories required for a complete installation including traps, escutcheons, angle supplies, basin cocks, etc. All fixtures shall be new and must be delivered to the building properly crated in perfect condition.

- B. All brass must be of the best quality; lightweight goods will not be accepted. All brass pipe shall be seamless brass tubing and nipples shall be extra heavy. All fittings and trim shall be cast brass with cleanouts. All exposed piping shall be chromium plated. Provide cut-off valves at each fixture in both hot and cold water piping.

## 2.6 WATER HAMMER ARRESTOR

- A. Provide water hammer arrestors at all quick-closing valves, including but not limited to flush valves, solenoid valves, ice makers, dishwashers, and similar fixtures.
- B. Arrestors shall comply with ASSE 1010 and be pre-charged, sealed, piston-type units.
- C. Size and locate in accordance with PDI-WH 201 or manufacturer recommendations.
- D. Install as close as practical to the source of shock, in accessible locations.
- E. Manufacturers: Sioux Chief, Zurn, Watts, or approved equal.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. All plumbing fixtures shall be installed as per International Plumbing Code, 2015 Edition, and local code requirements.
- B. All tests shall be in accordance with the Louisiana International Plumbing Code, 2015 Edition, and local code requirements.

END OF SECTION 15600

## SECTION 15738 – SPLIT-SYSTEM HEAT PUMP AIR-CONDITIONING UNITS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes split-system heat pump air-conditioning units consisting of separate evaporator-fan and compressor-condenser components.
- B. System shall provide both cooling and heating via reverse-cycle heat pump operation.

#### 1.3 DEFINITIONS

- A. Evaporator-Fan Unit: The part of the split-system air-conditioning unit that contains a coil for cooling (heat rejection for heating operation in heat pump units) and a fan to circulate air to conditioned space.
- B. Compressor-Condenser Heat Pump Unit: The part of the split-system air-conditioning unit that contains a refrigerant compressor and a coil for condensing refrigerant (evaporator for heating operation in heat pump units).

#### 1.4 SUBMITTALS

- A. Product Data: Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories for each type of product indicated. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.
- B. Shop Drawings: Diagram power, signal, and control wiring and differentiate between manufacturer-installed and field-installed wiring.
- C. Samples for Initial Selection: Manufacturer's color charts consisting of units of sections of units showing the full range of colors available for units with factory-applied color finishes.
- D. Maintenance Data: For split-system air-conditioning units to include in maintenance manuals specified in Division 1.
- E. Warranties: Special warranties specified in this Section.

## 1.5 QUALITY ASSURANCE

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of split-system units and are based on the specific system indicated. Other manufacturers' systems with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

## 1.6 WARRANTY

- A. General Warranty: The A/C Heat Pump and Temperature Control Systems shall have a Five (5) Year Complete Warranty including Parts, Labor and Refrigerant
- B. Compressor Warranty: Compressor shall have a Complete Ten (10) Year Parts and Labor Warranty

## 1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Filters: One set of filters for each unit.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. RUUD
  - 2. Lennox
  - 3. Mitsubishi
  - 4. Trane Co. (The); Unitary Products Group.
  - 5. York (JCI).
  - 6. Daikin

## 2.2 CONCEALED EVAPORATOR-FAN COMPONENTS

- A. Chassis: Galvanized steel with flanged edges, removable panels for servicing, and insulation on back of panel.
  - 1. Insulation: Foil Faced, glass-fiber duct liner.
  - 2. Drain Pans: Galvanized steel, with connection for drain; insulated.
- B. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.
- C. Fan: Forward-curved, double-width wheel of galvanized steel; directly connected to motor.
- D. Fan Motor: Variable speed Electrically Commutated.
- E. Disposable Filters: 1 inch (25 mm) thick, in fiberboard frames.
- F. Wiring Terminations: Connect motor to chassis wiring with plug connection.

## 2.3 AIR-COOLED HEAT PUMP COMPONENTS

- A. Casing: Steel, finished with baked enamel, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
- B. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
  - 1. Compressor Type: inverter-driven scroll compressor suitable for heat pump operation.
  - 2. Variable Speed compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.
- C. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with liquid subcooler.
- D. Fan: Aluminum-propeller type, directly connected to motor.
- E. Motor: Permanently lubricated, with integral thermal-overload protection.
- F. Mounting Base: Polyethylene.
- G. Heat pump operation: unit shall be capable of reverse-cycle heating operation with factory-installed reversing valve and automatic defrost controls.

## 2.4 ACCESSORIES

- A. Thermostat: Low voltage, heat pump compatible with heating/cooling changeover.
- B. Automatic-reset timer to prevent rapid cycling of compressor.
- C. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install units level and plumb.
- B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.
- C. Install ground-mounted, compressor-condenser components on 4-inch-~~thick~~ thick, reinforced concrete base; 4 inches larger on each side than unit.
- D. Install heat pump components on restrained, spring isolators with a minimum static deflection of 1 inch (25 mm).
- E. Connect pre-charged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

### 3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to unit to allow service and maintenance.
- C. Unless otherwise indicated, connect piping with unions and shutoff valves to allow units to be disconnected without draining piping. Refer to piping system Sections for specific valve and specialty arrangements.
- D. Ground equipment.
  - 1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.



### 3.3 FIELD QUALITY CONTROL

- A. Installation Inspection: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including piping and electrical connections, and to prepare a written report of inspection.
- B. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
- C. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new components, and retest.
- D. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

### 3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units.
  - 1. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining units.
  - 2. Review data in maintenance manuals. Refer to Division 1 Section "Contract Closeout."
  - 3. Review data in maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data."
  - 4. Schedule training with Owner, through Architect, with at least seven days' advance notice.

END OF SECTION 15738

## SECTION 15815 – METAL DUCTS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes metal ducts for supply, return, outside, and exhaust air-distribution systems in pressure classes from minus 2- to plus 10-inch wg. Metal ducts include the following:
  - 1. Rectangular ducts and fittings.
- B. Related Sections include the following:
  - 1. Division 15 Section "Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

#### 1.3 DEFINITIONS

- A. FRP: Fiberglass-reinforced plastic.

#### 1.4 SYSTEM DESCRIPTION

- A. Duct system design, as indicated, has been used to select size and type of air-moving and -distribution equipment and other air system components. Changes to layout or configuration of duct system must be specifically approved in writing by Engineer. Accompany requests for layout modifications with calculations showing that proposed layout will provide original design results without increasing system total pressure.

#### 1.5 SUBMITTALS

- A. Shop Drawings: CAD-generated and drawn to 1/8 inch equals 1 foot scale. Show fabrication and installation details for metal ducts.
  - 1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
  - 2. Duct layout indicating sizes and pressure classes.
  - 3. Elevations of top and bottom of ducts.
  - 4. Dimensions of main duct runs from building grid lines.
  - 5. Fittings.
  - 6. Reinforcement and spacing.
  - 7. Seam and joint construction.
  - 8. Penetrations through fire-rated and other partitions.
  - 9. Equipment installation based on equipment being used on Project.

10. Duct accessories, including access doors and panels.
  11. Hangers and supports, including methods for duct and building attachment, vibration isolation, and seismic restraints.
- B. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
1. Ceiling suspension assembly members.
  2. Other systems installed in same space as ducts.
  3. Ceiling- and wall-mounting access doors and panels required to provide access to dampers and other operating devices.
- C. Welding certificates.
- D. Field quality-control test reports.

## 1.6 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," for hangers and supports and AWS D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.
- B. NFPA Compliance:
1. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
  2. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

### 2.2 SHEET METAL MATERIALS

- A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having G60 coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.

- C. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts.
- D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

## 2.3 SEALANT MATERIALS

- A. Joint and Seam Sealants, General: The term "sealant" is not limited to materials of adhesive or mastic nature but includes tapes and combinations of open-weave fabric strips and mastics.
- B. Water-Based Joint and Seam Sealant: Flexible, adhesive sealant, resistant to UV light when cured, UL 723 listed, and complying with NFPA requirements for Class 1 ducts.

## 2.4 HANGERS AND SUPPORTS

- A. Building Attachments: Structural-steel fasteners appropriate for construction materials to which hangers are being attached.
  - 1. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
  - 2. Exception: Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
- B. Hanger Materials: Galvanized sheet steel or threaded steel rod.
  - 1. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for steel sheet width and thickness and for steel rod diameters.
- C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- D. Trapeze and Riser Supports: Steel shapes complying with ASTM A 36/A 36M.
  - 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.

## 2.5 RECTANGULAR DUCT FABRICATION

- A. Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" and complying with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.
  - 1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure class.
  - 2. Deflection: Duct systems shall not exceed deflection limits according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

- B. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches and larger and 0.0359 inch thick or less, with more than 10 sq. ft. of non-braced panel area unless ducts are lined.

## 2.6 ROUND AND FLAT-OVAL DUCT AND FITTING FABRICATION

- A. Diameter as applied to flat-oval ducts in this Article is the diameter of a round duct with a circumference equal to the perimeter of a given size of flat-oval duct.
- B. Round, Longitudinal- and Spiral Lock-Seam Ducts: Fabricate supply ducts of galvanized steel according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
- C. Duct Joints:
  - 1. Ducts up to 20 Inches in Diameter: Interior, center-beaded slip coupling, sealed before and after fastening, attached with sheet metal screws.
  - 2. Round Ducts: Prefabricated connection system consisting of double-lipped, EPDM rubber gasket. Manufacture ducts according to connection system manufacturer's tolerances.
    - a. Manufacturers:
      - 1) Lindab Inc.
- D. 90-Degree Tees and Laterals and Conical Tees: Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," with metal thicknesses specified for longitudinal-seam straight ducts.
- E. Fabricate elbows using die-formed, gored, pleated, or mitered construction. [Bend radius of die-formed, gored, and pleated elbows shall be 1-1/2 times duct diameter.] Unless elbow construction type is indicated, fabricate elbows as follows:
  - 1. Mitered-Elbow Radius and Number of Pieces: Welded construction complying with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," unless otherwise indicated.
  - 2. Round Mitered Elbows: Welded construction with the following metal thickness for pressure classes from minus 2- to plus 2-inch wg:
    - a. Ducts 3 to 36 Inches in Diameter: 0.034 inch.
    - b. Ducts 37 to 50 Inches in Diameter: 0.040 inch.
    - c. Ducts 52 to 60 Inches in Diameter: 0.052 inch.
    - d. Ducts 62 to 84 Inches in Diameter: 0.064 inch.
  - 3. Round Mitered Elbows: Welded construction with the following metal thickness for pressure classes from 2- to 10-inch wg:
    - a. Ducts 3 to 26 Inches in Diameter: 0.034 inch.
    - b. Ducts 27 to 50 Inches in Diameter: 0.040 inch.
    - c. Ducts 52 to 60 Inches in Diameter: 0.052 inch.
    - d. Ducts 62 to 84 Inches in Diameter: 0.064 inch.
  - 4. 90-Degree, 2-Piece, Mitered Elbows: Use only for supply systems or for material-handling Class A or B exhaust systems and only where space restrictions do not permit using radius elbows. Fabricate with single-thickness turning vanes.

5. Round Elbows 8 Inches and Less in Diameter: Fabricate die-formed elbows for 45- and 90-degree elbows and pleated elbows for 30, 45, 60, and 90 degrees only. Fabricate nonstandard bend-angle configurations or nonstandard diameter elbows with gored construction.
6. Round Elbows 9 through 14 Inches in Diameter: Fabricate gored or pleated elbows for 30, 45, 60, and 90 degrees unless space restrictions require mitered elbows. Fabricate nonstandard bend-angle configurations or nonstandard diameter elbows with gored construction.
7. Round Elbows Larger Than 14 Inches in Diameter: Fabricate gored elbows unless space restrictions require mitered elbows.
8. Round Gored-Elbow Metal Thickness: Same as non-elbow fittings specified above.

## PART 3 - EXECUTION

### 3.1 DUCT APPLICATIONS

- A. Static-Pressure Classes: Unless otherwise indicated, construct ducts according to the following:
  1. Supply Ducts (before Air Terminal Units): 3-inch wg.
  2. Supply Ducts (after Air Terminal Units): 1-inch wg.
  3. Supply Ducts (in Mechanical Equipment Rooms): 3-inch wg.
  4. Return Ducts (Negative Pressure): 1-inch wg.
  5. Exhaust Ducts (Negative Pressure): 2-inch wg.

### 3.2 DUCT INSTALLATION

- A. Construct and install ducts according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," unless otherwise indicated.
- B. Install round ducts in lengths not less than 12 feet unless interrupted by fittings.
- C. Install ducts with fewest possible joints.
- D. Install fabricated fittings for changes in directions, size, and shape and for connections.
- E. Install couplings tight to duct wall surface with a minimum of projections into duct. Secure couplings with sheet metal screws. Install screws at intervals of 12 inches, with a minimum of 3 screws in each coupling.
- F. Install ducts, unless otherwise indicated, vertically and horizontally and parallel and perpendicular to building lines; avoid diagonal runs.
- G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

- I. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions unless specifically indicated.
- J. Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.
- K. Seal all joints and seams. Apply sealant to male end connectors before insertion, and afterward to cover entire joint and sheet metal screws.
- L. Electrical Equipment Spaces: Route ducts to avoid passing through transformer vaults and electrical equipment spaces and enclosures.
- M. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls and are exposed to view, conceal spaces between construction openings and ducts or duct insulation with sheet metal flanges of same metal thickness as ducts. Overlap openings on 4 sides by at least 1-1/2 inches.
- N. Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, install appropriately rated fire dampers, sleeves, and firestopping sealant. Fire and smoke dampers are specified in Division 15 Section "Duct Accessories." Firestopping materials and installation methods are specified in Division 7 Section "Through-Penetration Firestop Systems."
- O. Protect duct interiors from the elements and foreign materials until building is enclosed. [Follow SMACNA's "Duct Cleanliness for New Construction."]
- P. Paint interiors of metal ducts, that do not have duct liner, for 24 inches upstream of registers and grilles. Apply one coat of flat, black, latex finish coat over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Division 9 painting Sections.

### 3.3 SEAM AND JOINT SEALING

- A. Seal duct seams and joints according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for duct pressure class indicated.
  - 1. For pressure classes lower than 2-inch wg, seal transverse joints.
- B. Seal ducts before external insulation is applied.

### 3.4 HANGING AND SUPPORTING

- A. Support horizontal ducts within 24 inches of each elbow and within 48 inches of each branch intersection.
- B. Support vertical ducts at maximum intervals of 16 feet and at each floor.

- C. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.

### 3.5 CONNECTIONS

- A. Make connections to equipment with flexible connectors according to Division 15 Section "Duct Accessories."
- B. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

### 3.6 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections according to SMACNA's "HVAC Air Duct Leakage Test Manual" and prepare test reports:
  - 1. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
  - 2. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If pressure classes are not indicated, test entire system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure. Give seven days' advance notice for testing.
  - 3. Maximum Allowable Leakage: Comply with requirements for Leakage Class 3 for round and flat-oval ducts, Leakage Class 12 for rectangular ducts in pressure classes lower than and equal to 2-inch wg (both positive and negative pressures), and Leakage Class 6 for pressure classes from 2- to 10-inch wg.
  - 4. Remake leaking joints and retest until leakage is equal to or less than maximum allowable.

### 3.7 CLEANING NEW SYSTEMS

- A. Mark position of dampers and air-directional mechanical devices before cleaning, and perform cleaning before air balancing.
- B. Use service openings, as required, for physical and mechanical entry and for inspection.
  - 1. Create other openings to comply with duct standards.
  - 2. Disconnect flexible ducts as needed for cleaning and inspection.
  - 3. Remove and reinstall ceiling sections to gain access during the cleaning process.
- C. Vent vacuuming system to the outside. Include filtration to contain debris removed from HVAC systems, and locate exhaust down wind and away from air intakes and other points of entry into building.
- D. Clean the following metal duct systems by removing surface contaminants and deposits:
  - 1. Air outlets and inlets (registers, grilles, and diffusers).
  - 2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.



3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
  4. Coils and related components.
  5. Return-air ducts, dampers, and actuators except in ceiling plenums and mechanical equipment rooms.
  6. Supply-air ducts, dampers, actuators, and turning vanes.
- E. Mechanical Cleaning Methodology:
1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
  2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
  3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
  4. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
- F. Cleanliness Verification:
1. Visually inspect metal ducts for contaminants.
  2. Where contaminants are discovered, re-clean and reinspect ducts.

END OF SECTION 15815

## SECTION 15820 – DUCT ACCESSORIES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:

- 1. Backdraft dampers.
- 2. Volume dampers.
- 3. Motorized control dampers.
- 4. Fire dampers.
- 5. Turning vanes.
- 6. Duct-mounting access doors.
- 7. Flexible connectors.
- 8. Flexible ducts.
- 9. Duct accessory hardware.

- B. Related Sections include the following:

- 1. Division 16 Section "Fire Alarm" for duct-mounting fire and smoke detectors.
- 2. Division 15 Section "HVAC Instrumentation and Controls" for electric and pneumatic damper actuators.

#### 1.3 SUBMITTALS

- A. Product Data: For the following:

- 1. Backdraft dampers.
- 2. Volume dampers.
- 3. Motorized control dampers.
- 4. Fire dampers.
- 5. Turning vanes.
- 6. Duct-mounting access doors.
- 7. Flexible connectors.
- 8. Flexible ducts.

- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

- 1. Special fittings.
- 2. Manual-volume damper installations.

3. Motorized-control damper installations.
4. Fire-damper, smoke-damper, and combination fire- and smoke-damper installations, including sleeves and duct-mounting access doors.
5. Wiring Diagrams: Power, signal, and control wiring.

#### 1.4 QUALITY ASSURANCE

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

#### 1.5 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  1. Fusible Links: Furnish quantity equal to ten (10) percent of amount installed.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

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

#### 2.2 SHEET METAL MATERIALS

- A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated.
- B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having G60 coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.
- C. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

#### 2.3 BACKDRAFT DAMPERS

- A. Manufacturers:

1. Air Balance, Inc.
2. American Warming and Ventilating.
3. CESCO Products.
4. Duro Dyne Corp.
5. Greenheck.
6. Penn Ventilation Company, Inc.
7. Prefco Products, Inc.
8. Ruskin Company.
9. Vent Products Company, Inc.
10. Pottoroff

B. Description: Multiple-blade, parallel action gravity balanced, with center-pivoted blades of maximum 6-inch width, with sealed edges, assembled in rattle-free manner with 90-degree stop, steel ball bearings, and axles; adjustment device to permit setting for varying differential static pressure.

C. Frame: 0.052-inch-thick, galvanized sheet steel, with welded corners and mounting flange.

D. Blades: 0.050-inch-thick aluminum sheet.

E. Blade Seals: Vinyl.

F. Blade Axles: Galvanized steel.

G. Tie Bars and Brackets: Galvanized steel.

H. Return Spring: Adjustable tension.

## 2.4 VOLUME DAMPERS

A. Manufacturers:

1. Air Balance, Inc.
2. American Warming and Ventilating.
3. Flexmaster U.S.A., Inc.
4. McGill AirFlow Corporation.
5. METALAIRE, Inc.
6. Nailor Industries Inc.
7. Penn Ventilation Company, Inc.
8. Ruskin Company.
9. Vent Products Company, Inc.
10. Pottoroff

B. General Description: Factory fabricated, with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.

1. Pressure Classes of 3-Inch wg or Higher: End bearings or other seals for ducts with axles full length of damper blades and bearings at both ends of operating shaft.
- C. Standard Volume Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, standard leakage rating, with linkage outside airstream, and suitable for horizontal or vertical applications.
1. Steel Frames: Hat-shaped, galvanized sheet steel channels, minimum of 0.064 inch thick, with mitered and welded corners; frames with flanges where indicated for attaching to walls and flangeless frames where indicated for installing in ducts.
  2. Roll-Formed Steel Blades: 0.064-inch-thick, galvanized sheet steel.
  3. Blade Axles: Galvanized steel.
  4. Bearings: Oil-impregnated bronze.
  5. Tie Bars and Brackets: Galvanized steel.
- D. Damper Hardware: Zinc-plated, die-cast core with dial and handle made of 3/32-inch-thick zinc-plated steel, and a 3/4-inch hexagon locking nut. Include center hole to suit damper operating-rod size. Include elevated platform for insulated duct mounting.

## 2.5 MOTORIZED CONTROL DAMPERS

- A. Manufacturers:
1. Air Balance, Inc.
  2. American Warming and Ventilating.
  3. CESCO Products.
  4. Duro Dyne Corp.
  5. Greenheck.
  6. McGill AirFlow Corporation.
  7. METALAIRE, Inc.
  8. Nailor Industries Inc.
  9. Penn Ventilation Company, Inc.
  10. Ruskin Company.
  11. Vent Products Company, Inc.
  12. Pottoroff
- B. General Description: AMCA-rated, opposed-blade design; minimum of 0.1084-inch-thick, galvanized-steel frames with holes for duct mounting; minimum of 0.0635-inch-thick, galvanized-steel damper blades with maximum blade width of 8 inches.
1. Secure blades to 1/2-inch-diameter, zinc-plated axles using zinc-plated hardware, with nylon blade bearings, blade-linkage hardware of zinc-plated steel and brass, ends sealed against spring-stainless-steel blade bearings, and thrust bearings at each end of every blade.
  2. Operating Temperature Range: From minus 40 to plus 200 deg F.
  3. Provide closed-cell neoprene edging.

## 2.6 FIRE DAMPERS

- A. Manufacturers:
  - 1. Air Balance, Inc.
  - 2. CESCO Products.
  - 3. Greenheck.
  - 4. McGill AirFlow Corporation.
  - 5. METALAIRE, Inc.
  - 6. Nailor Industries Inc.
  - 7. Penn Ventilation Company, Inc.
  - 8. Prefco Products, Inc.
  - 9. Ruskin Company.
  - 10. Vent Products Company, Inc.
  - 11. Ward Industries, Inc.
  - 12. Pottoroff
- B. Fire dampers shall be labeled according to UL 555.
- C. Fire Rating: 1-1/2 hours.
- D. Frame: Curtain type with blades inside airstream; fabricated with roll-formed, 0.034-inch-thick galvanized steel; with mitered and interlocking corners.
- E. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel.
  - 1. Minimum Thickness: 0.052 or 0.138 inch thick as indicated and of length to suit application.
  - 2. Exceptions: Omit sleeve where damper frame width permits direct attachment of perimeter mounting angles on each side of wall or floor, and thickness of damper frame complies with sleeve requirements.
- F. Mounting Orientation: Vertical or horizontal as indicated.
- G. Blades: Roll-formed, interlocking, 0.034-inch-thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch-thick, galvanized-steel blade connectors.
- H. Horizontal Dampers: Include blade lock and stainless-steel closure spring.
- I. Fusible Links: Replaceable, 165 deg F rated.

## 2.7 TURNING VANES

- A. All rectangular supply and return ductwork shall be complete with turning vanes at elbow connections.
- B. Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for vanes and vane runners. Vane runners shall automatically align vanes.

- C. Manufactured Turning Vanes: Fabricate 1-1/2-inch-wide, double-vane, curved blades of galvanized sheet steel set 3/4 inch o.c.; support with bars perpendicular to blades set 2 inches o.c.; and set into vane runners suitable for duct mounting.

1. Manufacturers:

- a. Ductmate Industries, Inc.
- b. Duro Dyne Corp.
- c. METALAIRE, Inc.
- d. Ward Industries, Inc.

- D. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

## 2.8 DUCT-MOUNTING ACCESS DOORS

- A. General Description: Fabricate doors airtight and suitable for duct pressure class.

- B. Door: Double wall, duct mounting, and rectangular; fabricated of galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class. Include vision panel where indicated. Include 1-by-1-inch butt or piano hinge and cam latches.

1. Manufacturers:

- a. American Warming and Ventilating.
- b. CESCO Products.
- c. Ductmate Industries, Inc.
- d. Flexmaster U.S.A., Inc.
- e. Greenheck.
- f. McGill AirFlow Corporation.
- g. Nailor Industries Inc.
- h. Ventfabrics, Inc.
- i. Ward Industries, Inc.

2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.

3. Provide number of hinges and locks as follows:

- a. Less Than 12 Inches Square: Secure with two sash locks.
- b. Up to 18 Inches Square: Two hinges and two sash locks.
- c. Up to 24 by 48 Inches: Three hinges and two compression latches with outside and inside handles.
- d. Sizes 24 by 48 Inches and Larger: One additional hinge.

- C. Door: Double wall, duct mounting, and round; fabricated of galvanized sheet metal with insulation fill and 1-inch thickness. Include cam latches.

1. Manufacturers:

- a. Flexmaster U.S.A., Inc.

2. Frame: Galvanized sheet steel, with spin-in notched frame.

- D. Seal around frame attachment to duct and door to frame with neoprene or foam rubber.

- E. Insulation: 1-inch-thick, fibrous-glass or polystyrene-foam board.

## 2.9 FLEXIBLE CONNECTORS

- A. Manufacturers:
  - 1. Duro Dyne Corp.
  - 2. Ventfabrics, Inc.
  - 3. Ward Industries, Inc.
- B. General Description: Flame-retardant or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.
- C. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches (89 mm) inches wide attached to two strips of 2-3/4-inch-wide, 0.028-inch-thick, galvanized sheet steel or 0.032-inch-thick aluminum sheets. Select metal compatible with ducts.
- D. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
  - 1. Minimum Weight: 26 oz./sq. yd.
  - 2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
  - 3. Service Temperature: Minus 40 to plus 200 deg F.

## 2.10 FLEXIBLE DUCTS

- A. Manufacturers:
  - 1. Ductmate Industries, Inc.
  - 2. Flexmaster U.S.A., Inc.
  - 3. Hart & Cooley, Inc.
  - 4. McGill AirFlow Corporation.
- B. Insulated-Duct Connectors: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene vapor barrier film.
  - 1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
  - 2. Maximum Air Velocity: 4000 fpm.
  - 3. Temperature Range: Minus 10 to plus 160 deg F.
- C. Flexible Duct Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action, in sizes 3 through 18 inches to suit duct size.

## 2.11 DUCT ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct insulation thickness.



- B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

## PART 3 - EXECUTION

### 3.1 APPLICATION AND INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.
- B. Provide duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
- C. Install backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
- D. Provide balancing dampers at points on supply, return, and exhaust systems where branches lead from larger ducts as required for air balancing. Install at a minimum of two duct widths from branch takeoff.
- E. Provide test holes at fan inlets and outlets and elsewhere as indicated.
- F. Install fire and smoke dampers, with fusible links, according to manufacturer's UL-approved written instructions.
- G. Install duct silencers rigidly to ducts.
- H. Install duct access doors to allow for inspecting, adjusting, and maintaining accessories and terminal units as follows:
  - 1. On both sides of duct coils.
  - 2. Downstream from automatic dampers, and equipment.
  - 3. Adjacent to fire or smoke dampers, providing access to reset or reinstall fusible links.
  - 4. On sides of ducts where adequate clearance is available.
- I. Install the following sizes for duct-mounting, rectangular access doors:
  - 1. One-Hand or Inspection Access: 8 by 5 inches.
  - 2. Two-Hand Access: 12 by 6 inches.
  - 3. Head and Hand Access: 18 by 10 inches.
  - 4. Head and Shoulders Access: 21 by 14 inches.
  - 5. Body Access: 25 by 14 inches.
  - 6. Body Plus Ladder Access: 25 by 17 inches.
- J. Install the following sizes for duct-mounting, round access doors:
  - 1. One-Hand or Inspection Access: 8 inches in diameter.
  - 2. Two-Hand Access: 10 inches in diameter.

3. Head and Hand Access: 12 inches in diameter.
4. Head and Shoulders Access: 18 inches in diameter.
5. Body Access: 24 inches in diameter.

- K. Label access doors according to Division 15 Section "Mechanical Identification."
- L. Install flexible connectors immediately adjacent to equipment in ducts associated with fans and motorized equipment supported by vibration isolators.
- M. For fans developing static pressures of 5-inch wg and higher, cover flexible connectors with loaded vinyl sheet held in place with metal straps.
- N. Connect terminal units to supply ducts directly or with maximum 12-inch lengths of flexible duct. Do not use flexible ducts to change directions.
- O. Connect diffusers or light troffer boots to low pressure ducts directly or with maximum 60-inch lengths of flexible duct clamped or strapped in place.
- P. Connect flexible ducts to metal ducts with draw bands.
- Q. Install duct test holes where indicated and required for testing and balancing purposes.

### 3.2 ADJUSTING

- A. Adjust duct accessories for proper settings.
- B. Adjust fire and smoke dampers for proper action.
- C. Final positioning of manual-volume dampers is specified in Division 15 Section "Testing, Adjusting, and Balancing."

END OF SECTION 15820

## SECTION 15837 – CENTRIFUGAL FANS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes centrifugal fans.

#### 1.3 SUBMITTALS

- A. Product Data: Include fan capacities, electrical characteristics, dimensions, accessories, and installation requirements.
- B. Operation and Maintenance Data: Include manufacturer's instructions for operation and maintenance.

#### 1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Electrical components shall be listed and labeled in accordance with NFPA 70.
- B. AMCA Compliance: Fans shall bear AMCA Certified Ratings Seal

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver fans as factory-assembled units, to the extent allowable by shipping limitations, with protective crating and covering.
- B. Disassemble and reassemble units, as required for moving to the final location, according to manufacturer's written instructions.
- C. Lift and support units with manufacturer's designated lifting or supporting points.

#### 1.6 COORDINATION

- A. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Pennbarry
  - 2. Cook, Loren Company.
  - 3. Greenheck.
  - 4. New York Blower Company (The).

### 2.2 ROOF-MOUNTED EXHAUST FANS

- A. Fans shall be factory-assembled, direct-drive, centrifugal roof exhaust fans suitable for continuous operation.
- B. Provide aluminum or galvanized steel housing with weather-resistant finish.
- C. Provide ECM motor with built-in thermal overload protection.
- D. Provide gravity backdraft damper.
- E. Provide bird screen.
- F. Provide factory roof curb.
- G. Provide factory approved disconnect switch.
- H. Provide solid-state speed controller where indicated.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install fans level and plumb in accordance with manufacturer's written instructions.
- B. Install fans on factory roof curb complete with roof flashing and weather seal.
- C. Coordinate electrical work with Division 26.

### 3.2 CONNECTIONS

- A. Duct installation and connection requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of ducts and duct accessories. Make

final duct connections with flexible connectors. Flexible connectors are specified in Division 15 Section "Duct Accessories."

- B. Install ducts adjacent to fans to allow service and maintenance.
- C. Ground equipment.
- D. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

### 3.3 FIELD QUALITY CONTROL

- A. Verify proper fan rotation and operation.
- B. Verify proper operation of disconnect switch and speed controller

### 3.4 CLEANING

- A. On completion of installation, internally clean fans according to manufacturer's written instructions. Remove foreign material and construction debris. Vacuum fan wheel and cabinet.
- B. After completing system installation, including outlet fitting and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finishes.

END OF SECTION 15837

## SECTION 15855 – DIFFUSERS, REGISTERS, AND GRILLES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes ceiling- and wall-mounted diffusers, registers, and grilles.

#### 1.3 SUBMITTALS

- A. Product Data: For each product indicated, include the following:
  - 1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
  - 2. Diffuser, Register, and Grille Schedule: Indicate Drawing designation, room location, quantity, model number, size, and accessories furnished.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

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

#### 2.2 GRILLES AND REGISTERS

- A. See Grille Schedules.

#### 2.3 SOURCE QUALITY CONTROL

- A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

### PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install diffusers, registers, and grilles level and plumb.
- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practicable. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

### 3.3 ADJUSTING

- A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 15855

## SECTION 15950 – TESTING, ADJUSTING, AND BALANCING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes TAB to produce design objectives for the following:
  - 1. Air Systems.
  - 2. Domestic Hot Water Return
  - 3. HVAC equipment quantitative-performance settings.
  - 4. Verifying that automatic control devices are functioning properly.
  - 5. Reporting results of activities and procedures specified in this Section.
- B. Balance contractor shall be **Coastal Air Balance or Acadian Air Balance.**

#### 1.3 DEFINITIONS

- A. Adjust: To regulate fluid flow rate and air patterns at the terminal equipment, such as to reduce fan speed or adjust a damper.
- B. Balance: To proportion flows within the distribution system, including submains, branches, and terminals, according to indicated quantities.
- C. Barrier or Boundary: Construction, either vertical or horizontal, such as walls, floors, and ceilings that are designed and constructed to restrict the movement of airflow, smoke, odors, and other pollutants.
- D. Draft: A current of air, when referring to localized effect caused by one or more factors of high air velocity, low ambient temperature, or direction of airflow, whereby more heat is withdrawn from a person's skin than is normally dissipated.
- E. NC: Noise criteria.
- F. Procedure: An approach to and execution of a sequence of work operations to yield repeatable results.
- G. RC: Room criteria.
- H. Report Forms: Test data sheets for recording test data in logical order.
- I. Smoke-Control System: An engineered system that uses fans to produce airflow and pressure differences across barriers to limit smoke movement.



- J. Static Head: The pressure due to the weight of the fluid above the point of measurement. In a closed system, static head is equal on both sides of the pump.
- K. System Effect Factors: Allowances used to calculate a reduction of the performance ratings of a fan when installed under conditions different from those presented when the fan was performance tested.
- L. TAB: Testing, adjusting, and balancing.
- M. Terminal: A point where the controlled medium, such as fluid or energy, enters or leaves the distribution system.
- N. Test: A procedure to determine quantitative performance of systems or equipment.
- O. Testing, Adjusting, and Balancing (TAB) Firm: The entity responsible for performing and reporting TAB procedures.

#### 1.4 SUBMITTALS

- A. Qualification Data: Within fifteen (15) days from Contractor's Notice to Proceed, submit six (6) copies of evidence that TAB firm and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
- B. Contract Documents Examination Report: Within fifteen (15) days from Contractor's Notice to Proceed, submit two (2) copies of the Contract Documents review report as specified in Part 3.
- C. Strategies and Procedures Plan: Within thirty (30) days from Contractor's Notice to Proceed, submit two (2) copies of TAB strategies and step-by-step procedures as specified in Part 3 "Preparation" Article. Include a complete set of report forms intended for use on this Project.
- D. Certified TAB Reports: Submit two (2) copies of reports prepared, as specified in this Section, on approved forms certified by TAB firm.
- E. Sample Report Forms: Submit two (2) sets of sample TAB report forms.
- F. Warranties specified in this Section.

#### 1.5 QUALITY ASSURANCE

- A. TAB Firm Qualifications: Engage a TAB firm certified by either AABC or NEBB.
- B. TAB Conference: Meet with Owner's and Architect's representatives on approval of TAB strategies and procedures plan to develop a mutual understanding of the details. Ensure the participation of TAB team members, equipment manufacturers' authorized service representatives, HVAC controls installers, and other support personnel. Provide seven days' advance notice of scheduled meeting time and location.

1. Agenda Items: Include at least the following:
  - a. Submittal distribution requirements.
  - b. The Contract Documents examination report.
  - c. TAB plan.
  - d. Work schedule and Project-site access requirements.
  - e. Coordination and cooperation of trades and subcontractors.
  - f. Coordination of documentation and communication flow.
- C. Certification of TAB Reports: Certify TAB field data reports. This certification includes the following:
  1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
  2. Certify that TAB team complied with approved TAB plan and the procedures specified and referenced in this Specification.
- D. TAB Report Forms: Use standard forms from AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems" or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."
- E. Instrumentation Type, Quantity, and Accuracy: As described in AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems" or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems," Section II, "Required Instrumentation for NEBB Certification."
- F. Instrumentation Calibration: Calibrate instruments at least every six months or more frequently if required by instrument manufacturer.
  1. Keep an updated record of instrument calibration that indicates date of calibration and the name of party performing instrument calibration.

## 1.6 PROJECT CONDITIONS

- A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.
- B. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

## 1.7 COORDINATION

- A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist TAB activities.
- B. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.

- C. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

## 1.8 WARRANTY

- A. National Project Performance Guarantee: Provide a guarantee on AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems" forms stating that AABC will assist in completing requirements of the Contract Documents if TAB firm fails to comply with the Contract Documents. Guarantee includes the following provisions:
  - 1. The certified TAB firm has tested and balanced systems according to the Contract Documents.
  - 2. Systems are balanced to optimum performance capabilities within design and installation limits.
- B. Special Guarantee: Provide a guarantee on NEBB forms stating that NEBB will assist in completing requirements of the Contract Documents if TAB firm fails to comply with the Contract Documents. Guarantee shall include the following provisions:

## PART 2 - PRODUCTS (Not Applicable)

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
  - 1. Contract Documents are defined in the General and Supplementary Conditions of Contract.
  - 2. Verify that balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are required by the Contract Documents. Verify that quantities and locations of these balancing devices are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- B. Examine approved submittal data of HVAC systems and equipment.
- C. Examine Project Record Documents described in Division 1 Section "Project Record Documents."

- D. Examine design data, including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine equipment performance data including fan and pump curves. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system. Calculate system effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from those presented when the equipment was performance tested at the factory. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," Sections 7 through 10; or in SMACNA's "HVAC Systems--Duct Design," Sections 5 and 6. Compare this data with the design data and installed conditions.
- F. Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Sections have been performed.
- G. Examine system and equipment test reports.
- H. Examine HVAC system and equipment installations to verify that indicated balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are properly installed, and that their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- I. Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.
- J. Examine HVAC equipment to ensure that clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- K. Examine plenum ceilings used for supply air to verify that they are airtight. Verify that pipe penetrations and other holes are sealed.
- L. Examine system pumps to ensure absence of entrained air in the suction piping.
- M. Examine equipment for installation and for properly operating safety interlocks and controls.
- N. Examine automatic temperature system components to verify the following:
  - 1. Dampers, valves, and other controlled devices are operated by the intended controller.
  - 2. Dampers and valves are in the position indicated by the controller.
  - 3. Integrity of valves and dampers for free and full operation and for tightness of fully closed and fully open positions.

4. Thermostats and humidistats are located to avoid adverse effects of sunlight, drafts, and cold walls.
  5. Sensors are located to sense only the intended conditions.
  6. Sequence of operation for control modes is according to the Contract Documents.
  7. Controller set points are set at indicated values.
  8. Interlocked systems are operating.
  9. Changeover from heating to cooling mode occurs according to indicated values.
- O. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

### 3.2 PREPARATION

- A. Prepare a TAB plan that includes strategies and step-by-step procedures.
- B. Complete system readiness checks and prepare system readiness reports. Verify the following:
1. Permanent electrical power wiring is complete.
  - 2.
  3. Automatic temperature-control systems are operational.
  4. Equipment and duct access doors are securely closed.
  5. Balance, smoke, and fire dampers are open.
  6. Isolating and balancing valves are open and control valves are operational.
  7. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
  8. Windows and doors can be closed so indicated conditions for system operations can be met.

### 3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems" or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and this Section.
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to insulation Specifications for this Project.
- C. Mark equipment and balancing device settings with paint or other suitable, permanent identification material, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP).

### 3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. Determine the best locations in main and branch ducts for accurate duct airflow measurements.
- D. Check airflow patterns from the outside-air louvers and dampers and the return- and exhaust-air dampers, through the supply-fan discharge and mixing dampers.
- E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- F. Verify that motor starters are equipped with properly sized thermal protection.
- G. Check dampers for proper position to achieve desired airflow path.
- H. Check for airflow blockages.
- I. Check condensate drains for proper connections and functioning.
- J. Check for proper sealing of air-handling unit components.
- K. Check for proper sealing of air duct system.

### 3.5 PROCEDURES FOR MOTORS

- A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:
  - 1. Manufacturer, model, and serial numbers.
  - 2. Motor horsepower rating.
  - 3. Motor rpm.
  - 4. Efficiency rating.
  - 5. Nameplate and measured voltage, each phase.
  - 6. Nameplate and measured amperage, each phase.
  - 7. Starter thermal-protection-element rating.

### 3.6 PROCEDURES FOR TEMPERATURE MEASUREMENTS

- A. During TAB, report the need for adjustment in temperature regulation within the automatic temperature-control system.
- B. Measure indoor wet- and dry-bulb temperatures every other hour for a period of two successive eight-hour days, in each separately controlled zone, to prove correctness of final temperature settings. Measure when the building or zone is occupied.

- C. Measure outside-air, wet- and dry-bulb temperatures.

### 3.7 TOLERANCES

- A. Set HVAC system airflow and water flow rates within the following tolerances:
  - 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus 5 to plus 10 percent.
  - 2. Air Outlets and Inlets: 0 to minus 10 percent.
  - 3. Heating-Water Flow Rate: 0 to minus 10 percent.
  - 4. Cooling-Water Flow Rate: 0 to minus 5 percent.

### 3.8 REPORTING

- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.
- B. Status Reports: As Work progresses, prepare reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

### 3.9 FINAL REPORT

- A. General: Typewritten, or computer printout in letter-quality font, on standard bond paper, in three-ring binder, tabulated and divided into sections by tested and balanced systems.
- B. Include a certification sheet in front of binder signed and sealed by the certified testing and balancing engineer.
  - 1. Include a list of instruments used for procedures, along with proof of calibration.
- C. Final Report Contents: In addition to certified field report data, include the following:
  - 1. Pump curves.
  - 2. Fan curves.
  - 3. Manufacturers' test data.
  - 4. Field test reports prepared by system and equipment installers.
  - 5. Other information relative to equipment performance, but do not include Shop Drawings and Product Data.
- D. General Report Data: In addition to form titles and entries, include the following data in the final report, as applicable:
  - 1. Title page.
  - 2. Name and address of TAB firm.
  - 3. Project name.

4. Project location.
  5. Architect's name and address.
  6. Engineer's name and address.
  7. Contractor's name and address.
  8. Report date.
  9. Signature of TAB firm who certifies the report.
  10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
  11. Summary of contents including the following:
    - a. Indicated versus final performance.
    - b. Notable characteristics of systems.
    - c. Description of system operation sequence if it varies from the Contract Documents.
  12. Nomenclature sheets for each item of equipment.
  13. Data for terminal units, including manufacturer, type size, and fittings.
  14. Notes to explain why certain final data in the body of reports varies from indicated values.
  15. Test conditions for fans and pump performance forms including the following:
    - a. Settings for outside-, return-, and exhaust-air dampers.
    - b. Conditions of filters.
    - c. Cooling coil, wet- and dry-bulb conditions.
    - d. Face and bypass damper settings at coils.
    - e. Fan drive settings including settings and percentage of maximum pitch diameter.
    - f. Inlet vane settings for variable-air-volume systems.
    - g. Settings for supply-air, static-pressure controller.
    - h. Other system operating conditions that affect performance.
- E. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of outside, supply, return, and exhaust airflows.
  2. Water and steam flow rates.
  3. Duct, outlet, and inlet sizes.
  4. Pipe and valve sizes and locations.
  5. Terminal units.
  6. Balancing stations.
  7. Position of balancing devices.
- F. Air-Handling Unit Test Reports: For air-handling units with coils, include the following:
1. Unit Data: Include the following:
    - a. Unit identification.
    - b. Location.
    - c. Make and type.
    - d. Model number and unit size.
    - e. Manufacturer's serial number.
    - f. Unit arrangement and class.
    - g. Discharge arrangement.



- h. Sheave make, size in inches, and bore.
- i. Sheave dimensions, center-to-center, and amount of adjustments in inches.
- j. Number of belts, make, and size.
- k. Number of filters, type, and size.
- 2. Motor Data:
  - a. Make and frame type and size.
  - b. Horsepower and rpm.
  - c. Volts, phase, and hertz.
  - d. Full-load amperage and service factor.
  - e. Sheave make, size in inches, and bore.
  - f. Sheave dimensions, center-to-center, and amount of adjustments in inches.
- 3. Test Data (Indicated and Actual Values):
  - a. Total airflow rate in cfm.
  - b. Total system static pressure in inches wg.
  - c. Fan rpm.
  - d. Discharge static pressure in inches wg.
  - e. Filter static-pressure differential in inches wg.
  - f. Preheat coil static-pressure differential in inches wg.
  - g. Cooling coil static-pressure differential in inches wg.
  - h. Heating coil static-pressure differential in inches wg.
  - i. Outside airflow in cfm.
  - j. Return airflow in cfm.
  - k. Outside-air damper position.
  - l. Return-air damper position.
  - m. Vortex damper position.

G. Apparatus-Coil Test Reports:

- 1. Coil Data:
  - a. System identification.
  - b. Location.
  - c. Coil type.
  - d. Number of rows.
  - e. Fin spacing in fins per inch o.c.
  - f. Make and model number.
  - g. Face area in sq. ft.
  - h. Tube size in NPS.
  - i. Tube and fin materials.
  - j. Circuiting arrangement.
- 2. Test Data (Indicated and Actual Values):
  - a. Airflow rate in cfm.
  - b. Average face velocity in fpm.
  - c. Air pressure drop in inches wg.
  - d. Outside-air, wet- and dry-bulb temperatures in deg F.
  - e. Return-air, wet- and dry-bulb temperatures in deg F.
  - f. Entering-air, wet- and dry-bulb temperatures in deg F.
  - g. Leaving-air, wet- and dry-bulb temperatures in deg F.
  - h. Water flow rate in gpm.

- i. Water pressure differential in feet of head or psig.
  - j. Entering-water temperature in deg F.
  - k. Leaving-water temperature in deg F.
  - l. Refrigerant expansion valve and refrigerant types.
  - m. Refrigerant suction pressure in psig.
  - n. Refrigerant suction temperature in deg F.
  - o. Inlet steam pressure in psig.
- H. Fan Test Reports: For supply, return, and exhaust fans, include the following:
  - 1. Fan Data:
    - a. System identification.
    - b. Location.
    - c. Make and type.
    - d. Model number and size.
    - e. Manufacturer's serial number.
    - f. Arrangement and class.
    - g. Sheave make, size in inches, and bore.
    - h. Sheave dimensions, center-to-center, and amount of adjustments in inches.
  - 2. Motor Data:
    - a. Make and frame type and size.
    - b. Horsepower and rpm.
    - c. Volts, phase, and hertz.
    - d. Full-load amperage and service factor.
    - e. Sheave make, size in inches, and bore.
    - f. Sheave dimensions, center-to-center, and amount of adjustments in inches.
    - g. Number of belts, make, and size.
  - 3. Test Data (Indicated and Actual Values):
    - a. Total airflow rate in cfm.
    - b. Total system static pressure in inches wg.
    - c. Fan rpm.
    - d. Discharge static pressure in inches wg.
    - e. Suction static pressure in inches wg.
- I. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
  - 1. Report Data:
    - a. System and air-handling unit number.
    - b. Location and zone.
    - c. Traverse air temperature in deg F.
    - d. Duct static pressure in inches wg.
    - e. Duct size in inches.
    - f. Duct area in sq. ft.
    - g. Indicated airflow rate in cfm.
    - h. Indicated velocity in fpm.
    - i. Actual airflow rate in cfm.
    - j. Actual average velocity in fpm.
    - k. Barometric pressure in psig.

J. Air-Terminal-Device Reports:

1. Unit Data:
  - a. System and air-handling unit identification.
  - b. Location and zone.
  - c. Test apparatus used.
  - d. Area served.
  - e. Air-terminal-device make.
  - f. Air-terminal-device number from system diagram.
  - g. Air-terminal-device type and model number.
  - h. Air-terminal-device size.
  - i. Air-terminal-device effective area in sq. ft.
2. Test Data (Indicated and Actual Values):
  - a. Airflow rate in cfm.
  - b. Air velocity in fpm.
  - c. Preliminary airflow rate as needed in cfm.
  - d. Preliminary velocity as needed in fpm.
  - e. Final airflow rate in cfm.
  - f. Final velocity in fpm.
  - g. Space temperature in deg F.

K. System-Coil Reports: For reheat coils and water coils of terminal units, include the following:

1. Unit Data:
  - a. System and air-handling unit identification.
  - b. Location and zone.
  - c. Room or riser served.
  - d. Coil make and size.
  - e. Flowmeter type.
2. Test Data (Indicated and Actual Values):
  - a. Airflow rate in cfm.
  - b. Entering-water temperature in deg F.
  - c. Leaving-water temperature in deg F.
  - d. Water pressure drop in feet of head or psig.
  - e. Entering-air temperature in deg F.
  - f. Leaving-air temperature in deg F.

L. Instrument Calibration Reports:

1. Report Data:
  - a. Instrument type and make.
  - b. Serial number.
  - c. Application.
  - d. Dates of use.
  - e. Dates of calibration.

### 3.10 INSPECTIONS

A. Initial Inspection:

1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the Final Report.
2. Randomly check the following for each system:
  - a. Measure airflow of at least 10 percent of air outlets.
  - b. Measure water flow of at least 5 percent of terminals.
  - c. Measure room temperature at each thermostat/temperature sensor.  
Compare the reading to the set point.
  - d. Measure sound levels at two locations.
  - e. Measure space pressure of at least 10 percent of locations.
  - f. Verify that balancing devices are marked with final balance position.
  - g. Note deviations to the Contract Documents in the Final Report.

B. Final Inspection:

1. After initial inspection is complete and evidence by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Architect.
2. TAB firm test and balance engineer shall conduct the inspection in the presence of Architect.
3. Architect shall randomly select measurements documented in the final report to be rechecked. The rechecking shall be limited to either 10 percent of the total measurements recorded, or the extent of measurements that can be accomplished in a normal 8-hour business day.
4. If the rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.
6. TAB firm shall recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes and resubmit the final report.
7. Request a second final inspection. If the second final inspection also fails, Owner shall contract the services of another TAB firm to complete the testing and balancing in accordance with the Contract Documents and deduct the cost of the services from the final payment.

### 3.11 ADDITIONAL TESTS

- A. Within ninety (90) days of completing TAB, perform additional testing and balancing to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
- B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional testing, inspecting, and adjusting during near-peak summer and winter conditions.

END OF SECTION 15950

## SECTION 26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL

### PART 1 - GENERAL

#### 1.01 SCOPE OF WORK

- A. Provide labor, materials, equipment, and services, and perform all operations required for the complete electrical system as specified herein or shown on the accompanying drawings.

#### 1.02 RELATED DOCUMENTS:

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections apply to the work of all sections of this Division 26

#### 1.03 DRAWINGS AND SPECIFICATIONS:

- A. Conform to arrangement indicated by contract documents, recognizing that portions of work are shown only in diagrammatic form.
- B. Materials, work, or equipment not mentioned, but normally necessary for the proper execution of this work, shall be provided as if specifically called for.
- C. The drawings show approximate locations of feeders, branch circuits, outlets, etc., except where specific routing or dimensions are shown. The Architect reserves the right to make reasonable changes in locations, before roughing-in, without additional cost to the Owner.
- D. Because of the small scale of the drawings, it is not possible to show all of the offsets, fittings, and accessories required. Investigate structural and finish conditions and arrange work accordingly, furnishing fittings, bends, junction boxes, pull boxes, access panels, and accessories required to meet such conditions.
- E. Where coordination requirements conflict with individual system requirements, comply with the Architect's decision on resolution of conflict.

#### 1.04 REGULATORY COMPLIANCE

- A. Applicable sections of National Fire Protection Association (NFPA) standards (latest edition) including the National Electrical Code and applicable codes or ordinances shall apply as minimum standards.

#### 1.05 MATERIALS AND EQUIPMENT

- A. Materials and equipment shall conform to the requirements set forth in these specifications and the accompanying drawings. See Division 1 sections for provisions regarding substitutions.
- B. Except as otherwise specified, materials and equipment shall be new and bear the approval label of the Underwriters' Laboratories, Incorporated.
- C. **All prior approvals shall be submitted to the architect a minimum of ten business days prior to the advertised bid date. All lighting prior approval requests shall be provided with point by point footcandle calculations for all areas, contact architect for floorplans required for calculations.**

#### 1.06 SUBMITTALS

- A. Refer to Division 1 for Submittal Requirements.
- B. Submittals Required: Refer to Division 16 Sections for submittals required. Provide complete submittals where required. Required submittals include but are not limited to the following  
  
Lighting Fixtures - Manufacturer's Product Data, Lighting Calculations  
  
Wiring Devices – Manufacturer's Product Data  
  
Panelboards – Manufacturer's Product Data and Shop Drawings
- C. Corrections or comments made on submittals during review shall not relieve the Contractor from compliance with requirements of the contract documents. Submittals will be checked for general conformance with the design concept of the project and general compliance with information given in the contract documents. Review of Shop Drawings or other submittals shall not relieve the Contractor from responsibility for confirming and correlating all quantities and dimensions, coordinating work with that of all other trades, and performing work in a safe and satisfactory manner. Review of shop Drawings or other submittals shall not permit any deviation from Drawings and Specifications.

#### 1.07 PROTECTION OF APPARATUS:

- A. Take precautions necessary to protect electrical equipment from damage. Failure to comply shall be sufficient cause for the rejection of the equipment.

#### 1.08 PHASED CONSTRUCTION; SCHEDULING:

- A. Refer to Division 1 for determination of how construction phasing and sequencing may affect performance of electrical work.
- B. Perform work in accordance with sequences shown on drawings and/or as necessary to maintain continuity of electrical service to adjacent areas within the building.

- C. Provide temporary power and data as required to accommodate all phasing requirements. Coordinate on site with engineer.

#### 1.09 ALTERNATES

- A. There may be certain alternates involved in the construction. Be aware of and provide appropriate adjustments for all alternates described in the specifications or on the drawings. See architectural drawings for detail.

#### 1.10 EQUIPMENT MANUALS

- A. Provide digital equipment manuals for review prior to final inspection
- B. Subdivide the contents, logically organized per specification section. Provide a directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.
- C. Provide operation and maintenance instructions arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers.
- D. Include project documents and certificates, including the following:
  - 1. Shop drawings and product data for all equipment.
  - 2. Test Data.
  - 3. Certificates.
  - 4. Photocopies of warranties and bonds.

#### 1.11 RECORD DRAWINGS:

- A. Except where otherwise indicated, electrical drawings (contract drawings) are diagrammatic in nature and may not show locations accurately for various components of electrical systems. Submittals prepared by Contractor show certain portions of work more accurately to scale and location, and in greater detail. It is recognized that actual layout of installed work may vary from both contract drawings and submittals.
- B. Maintain white-print set (blue-line or black-line) of electrical contract drawings and shop drawings in clean, undamaged condition for mark-up of actual installations which vary substantially from work as shown. Mark-up whatever drawings are most capable of showing installed conditions accurately; however, where shop drawings are marked, record reference note on appropriate contract drawing. Mark with erasable pencil, and use multiple colors to aid in distinguishing between separate electrical systems. In general, record every substantive installation of electrical work which previously is either not shown or shown inaccurately, but in any case record the following:



1. Work concealed behind or within other work, in a non-accessible arrangement.
  2. Mains and branches of wiring systems, with switchboards, panelboards, and control equipment and devices located and numbered.
  3. Scope of each change order, denoting C.O. number.
  4. Grounding systems.
  5. Sensor and signal locations of control systems.
  6. Updated panelboard schedules in Excel format.
- C. Transmit mark-up drawings as submittal to Architect for Owner's use and record.

#### 1.12 WARRANTY/GUARANTEE:

- A. Guarantee all labor and materials for a period of twelve (12) months from the date of final notice of final acceptance of the work or as required by Division 1, whichever is longer. 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.

#### 1.13 TESTS AND BALANCING:

- A. Conduct operating tests to demonstrate that 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 Architect's representative. Furnish instruments and personnel required for such tests.
- B. Replace any work or materials tested and found varying from the requirements of the Drawings and Specifications without additional cost to the Owner.

### PART 2 - PRODUCTS (Not Applicable)

### PART 3 - EXECUTION

#### 3.01 INSPECTION AND PREPARATION

- A. Examine condition of substrate to receive work, and conditions under which work will be performed, and make notification of conditions detrimental to completion of work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.
- B. Layout electrical work in conformity with contract drawings, coordination drawings and other shop drawings, product data and similar requirements, so that entire electrical system will perform as an integrated system, properly interfaced with other work.

#### 3.02 COORDINATION OF ELECTRICAL INSTALLATION

- A. Sequence, coordinate, and integrate various elements of electrical work so that electrical system will perform as indicated. Architect/Engineer will not supervise coordination, which is exclusive responsibility of Contractor. Where drawings call for the contractor to facilitate meetings on site, coordinate dates/times with architect and engineer. Provide a minimum of 1 week notice.
- B. Arrange work to facilitate maintenance and repair or replacement of equipment. Locate services requiring maintenance on wiring devices and similar units in front of services requiring less maintenance. Connect equipment for ease of disconnecting, with minimum of interference with other work. Locate operating and control equipment and devices for easy access.
- C. Install access panels where electrical work requiring access is concealed by finishes and similar work.
- D. Integrate electrical work in ceiling plenums, including lighting fixtures, with ceiling finish, suspension, ductwork, air diffusers and other work, so that required performances of each will be achieved.
- E. Give right-of-way in confined-service spaces to piping which must slope for drainage and to larger HVAC ductwork and similar services which are less conformable than electrical services.

### 3.03 UTILITY CONNECTIONS

- A. Electrical service will be obtained from Utility Company.
- B. Coordinate electrical work with the utility company. If required, due to existing service size, rearrange or replace existing service equipment as required for new work. Comply with requirements of the Utility regarding provision of Electrical service. Provide all equipment as required by Utility's installation standards in bid. Electrical contractor shall be responsible for all coordination with electrical utility company and shall provide all equipment as required for a complete installation. All electrical contractors bidding project shall coordinate with Utility prior to bid and include all required costs in bid. Owner shall not incur any costs due to non coordination with Utility company.
- C. Electric service shall be installed, connected, and available for full use prior to completion or acceptance of the work.

### 3.04 CUTTING AND PATCHING

- A. Do not cut structural framing, walls, floors, decks and other members intended to withstand stress except with Architect's written authorization. Authorization will be granted only where there is no other reasonable method for completing electrical work, and where proposed cutting clearly does not materially weaken the structure.

- B. All penetrations made in walls, floors, or other building partitions for raceways, cables, equipment, etc., including penetrations in concealed areas (above ceilings, in chases, etc.) shall be either bore drilled or core drilled as required by the installation. Bust/poke through penetrations with hand tools are not acceptable. All penetration work shall be neat and debris shall be removed and the area cleaned after completion. Penetrations through walls or ceilings in visible finished areas shall be patched and painted as required to restore the finish around the penetration to its original condition.
- C. Do not endanger or damage other work through procedures and processes of cutting to accommodate electrical work. Review proposed cutting with Installers of the work to be cut, and comply with their recommendations to minimize damage. Where necessary, engage original Installer or other specialists to execute cutting in recommended manner.
- D. Where patching is required to restore other work, because of cutting or other damage occurring during installation of electrical work, execute patching in manner recommended by original Installer.

### 3.05 WIRING METHODS - GENERAL

- A. All wiring shall be run in conduit or other type raceways unless specifically noted or allowed otherwise by the Owner.
- B. Wiring run without raceways shall be bundled together with reusable Velcro wraps (not nylon tie wraps) at least once between each 4'-0" support. Wiring shall be routed on the supports as high as possible, free and clear of mechanical equipment, lighting fixtures, piping, conduits, ductwork, building structural members and any other building equipment or items.
- C. Cables shall not rest on the ceiling support grid system or other building items. Do not support from ceiling system supports, HVAC ductwork, conduit, piping, etc. Any cables found to be installed improperly will be noted and the contractor will be required to properly support the cables at no cost to the owner. Prior to the start of construction, the contractor shall make note of existing cables to remain that are improperly installed and inform the owner of such conditions. Coordinate correctional work with owner.
- D. Where wiring run without raceways penetrates walls or ceilings, a metal conduit sleeve with bushings at each end shall be provided for the penetration. Cables shall not be run through holes in walls or ceilings.
- E. Each cable shall be continuous, without splices or connections from the source to the connected device. Routing shall be parallel or perpendicular to building walls. Support arrangement and tension on cables shall be minimized to prevent exceeding the maximum cable bending radius. Where cables transition from

sections run without a raceway into sections run with a raceway, a bushing shall be installed on the entrance to the raceway (conduit, Wiremold, etc.).

### 3.07. FIREPROOFING:

- A. Where conduit and/or cables penetrate fire-resistant/rated walls, partitions, ceilings, or floors, adequate fire seals using approved methods to maintain the fire-resistance rating shall be provided and installed. Fire caulk shall be installed by a certified fire caulk installer. All fireproofing shall comply with specification Division 07 – Firestopping.
- B. Penetrations shall be sealed using the design and materials of an Underwriters Laboratory (UL) listed method to maintain the fire resistance rating of the system. Provide documentation that the product is acceptable within the UL assembly being penetrated. This information shall be made available at the time of Fire Marshal inspection. All existing walls and ceilings shall be considered to have a minimum 2-hour assembly rating.
- C. Plastic sleeves/pipe shall not be used within the building when penetrating a fire-resistant-rated wall, ceiling, partition, or floor.

### 3.08 MOUNTING HEIGHTS

- A. Unless otherwise noted on the drawings or required by the Architect, the following mounting heights shall apply. Heights are to center of device unless noted otherwise:

Toggle Switches	4'-0"
Receptacles	1'-6"
Panelboards	6'-6" to top
Communication Outlets	1'-6"
Motor Control Equipment	5'-0"
- B. Coordinate wiring device mounting height with wall protection. If wall protection mounting heights interfere with wiring device mounting heights, wall protection takes precedence. Coordinate with architect on site if required.
- C. All devices shall be mounted to meet ADA requirements. Owner shall not incur any costs associated with relocation of installed devices to meet ADA requirements.

### 3.09 ELECTRICAL PRODUCT COORDINATION

- A. Power Characteristics: Refer to sections of Division 2 through 23 to confirm and verify project's power requirements, including voltages, ratings and characteristics, and ensure power availability for operation of each power consuming item of equipment. Coordinate purchases to ensure uniform interface with each installed item requiring electrical power.

- B. Coordination of Options and Substitutions: Where contract documents permit selection from several product options, do not proceed with purchasing until coordination of interface requirements has been checked and satisfactorily established.
- C. Wiring for Equipment by Others: Electrical service required for all equipment furnished under Division 23 (Mechanical), 26 (Electrical), or other Divisions of this Specification shall be furnished and connected as part of this work. It is part of the work of this Division to obtain correct roughing-in dimensions and requirements for this equipment. Review electrical requirements of equipment actually furnished as shown in material submittals provided for review and as shown on equipment nameplates prior to rough in of electrical work. Notify Architect of discrepancies prior to rough-in of electrical work.

### 3.10 MECHANICAL WORK

- A. Coordinate electrical work with mechanical work (Division 23) for proper service to each item of equipment requiring electrical connection. Determine, with each mechanical equipment installer, the proper sequencing and location for disconnect switches and similar points of interface between mechanical and electrical work. **Prior to procuring associated electrical equipment, verify all mechanical equipment electrical characteristics with mechanical contractor. Adjust wire, breaker, conduit, disconnect, fuses, etc. sizes to meet the requirements of mechanical equipment approved via submittal.**
- B. Except as otherwise indicated, final power connections are electrical work.
- C. Motor controllers will be furnished as part of the mechanical work. This contractor for the electrical work shall install and connect all motor controllers not furnished as an integral part of another item of equipment.
- D. Unless otherwise indicated, control and interlocking wiring for automatic temperature and ventilation controls is not part of this Division-26 work.

### 3.11 CLOSEOUT PROCEDURES

- A. General: Refer to Division 1 sections for coordination of closeout work for electrical systems. Sequence closeout procedures properly, so that work will not be endangered or damaged, and so that required performance will be fully tested and demonstrated.
- B. Cleaning: After final performance test run of each electrical system, clean system both externally and internally. Touch-up minor damage to factory-painted finishes; refinish work where damage is extensive.
- C. General Operating Instructions: Provide general operating instructions for each operational system and equipment item of electrical work.

- D. Provide a minimum of 8 hours of owner training for electrical systems installed as part of this project.

END OF SECTION 260500

## SECTION 26 05 19 - LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

### PART 1 - GENERAL

#### 1.01 DESCRIPTION OF WORK:

- A. Extent of wire and cable work is indicated by Drawings and schedules.

#### 1.02 RELATED DOCUMENTS:

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

#### 1.03 QUALITY ASSURANCE

- A. Comply with National Electrical Code requirements applicable to construction, installation and color-coding of wires and cables. Provide products that are UL listed and labeled.

### PART 2 - PRODUCTS

#### 2.01 WIRE AND CABLE:

- A. Provide wire, cable and connectors of manufacturer's standard materials, designed and constructed as recommended by manufacturer for a complete installation and for the application indicated. Except as noted in Paragraph B below, the conductors shall be in accordance with the following schedule:

600 volt Building Cable and Wire: Copper – Conductors shall be soft or annealed copper. THHN/THWN insulated and rated for up to 600 volts for conductors # 1 AWG and smaller. Provide solid conductors for # 12 and # 10, stranded for # 8 AWG and larger.

#### 2.02 COLOR CODING:

- A. Branch circuit conductors shall have colored insulation. Except for ground and grounding conductors, larger conductors shall be taped with the appropriate color tape for a minimum 10" starting from the termination.
- B. Except as noted in Paragraph C below, color coding for conductors shall be as in the following table:

Conductor	240Y/120 V	480Y/277V
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	Gray
Ground	Green	Green

- C. Ground and grounding conductors shall have green colored insulation throughout, regardless of size.

## PART 3 - EXECUTION

### 3.1 INSTALLATION:

- A. Install electrical cables and wires as indicated, in compliance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in accordance with recognized industry practices.
- B. Install all wiring in conduit.
- C. Coordinate cable and wire installation work with electrical raceway and equipment installation work, as necessary for proper interface. Do not pull conductors into raceways until raceway system is complete
- D. Pull conductors together where more than one is being installed in a raceway.
- E. Use pulling means including fish tape, cable or rope that will not damage raceway. Use pulling compound or lubricant, where necessary. Compound must not deteriorate conductor or insulation.
- F. Do not splice feeder conductors, unless specified to do so.
- G. Use splice and tap connectors that are compatible with conductor material.
- H. In general, conductors shall be of the same size from the last protective device to the load. Branch circuit conductors shall not be smaller than #12 AWG. Conductors for 20 amp branch circuits of 120 volts, more than 65 ft. long (to the first fixture or other current-consuming outlet), and of 277 volt, more than 150 ft. long (to the first fixture of other current consuming outlet) shall be No. 10 AWG. See voltage drop schedule on drawings for detail.

### 3.2 FIELD QUALITY CONTROL:

- A. Prior to energization, test cable and wire for continuity of circuitry, and for short circuits. Correct malfunctions when detected.

END OF SECTION



## SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.01 DESCRIPTION OF WORK

- A. Provide grounding as indicated on the drawings or required by this section.

#### 1.02 QUALITY ASSURANCE

- A. Comply with National Electrical Code requirements applicable to materials and installation of electrical grounding systems, associated equipment and wiring.
- B. Comply with applicable requirements of UL Standards Nos. 467 and 869 pertaining to grounding and bonding. Provide products that are UL listed and labeled.
- C. Comply with applicable requirements of IEEE Standard 142 and 241 pertaining to electrical grounding.

### PART 2 - PRODUCTS

#### 2.01 GROUNDING SYSTEMS

- A. Materials and Components, General: Provide electrical grounding materials and accessories needed for complete installation. Provide products complying with NEC, UL, IEEE, and established industry standards for applications indicated.
- B. Unless otherwise indicated, provide electrical grounding conductors for grounding connections matching power supply wiring materials and sized according to NEC.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION OF ELECTRICAL GROUNDING

- A. General: Install electrical grounding systems in accordance with applicable portions of NEC, with NECA's "Standard of Installation", and in accordance with recognized industry practices to ensure that products comply with requirements and serve intended functions.
- B. Coordinate with other electrical work as necessary to interface installation of electrical grounding system with other work.
- C. Provide service grounding as required by NEC Chapter 250.
- D. For all patient care areas, provide redundant grounding meeting the requirements of NEC sections 517.12 and 517.13.

#### 3.02 EQUIPMENT GROUNDING CONDUCTORS

- A. Install a separate grounding conductor, sized in accordance with NEC Table 250.122, run in the conduit with the circuit conductors for all circuits.

END OF SECTION

## SECTION 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.01 RELATED DOCUMENTS

- A. Provisions of CONCRETE Section apply to the work of this section.

#### 1.02 DESCRIPTION OF WORK

- A. Extent of electrical related work required by this section is indicated on drawings and schedules, specified in this or other Division-16 sections or as required by applicable codes or project field conditions.
- B. Types of electrical related work specified in this section include the following:
  - 1. Access to Electrical Work:
    - Access doors in walls and ceilings.
    - Removable cover plates in walls and ceilings.
  - 2. Excavating for Electrical Work:
    - Underground electrical wiring.
  - 3. Concrete for Electrical Work:
    - Encasement of electrical work.
    - Equipment foundations and mounting pads.
    - Rough grouting in and around electrical work.
    - Patching concrete cut for electrical work.
  - 4. Painting of Electrical Work:
    - Except as specified for individual items of equipment, painting of electrical work is not part of this work.
  - 5. Hangers and Supports for Electrical Work
  - 6. Sleeves for Electrical Penetrations

#### 1.03 QUALITY ASSURANCE

- A. Access Units Fire-Resistance Ratings:
  - 1. Where fire-resistance ratings are indicated for construction penetrated by access units, provide UL listed and labeled units.
- B. Hangers and Supports
  - 1. Performance Requirements

Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

## 2. Coordination

Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."

## PART 2 - PRODUCTS

### 2.01 ACCESS TO ELECTRICAL WORK

- A. Access Doors, General: Where surfaces must be penetrated for access to electrical work, provide access doors required by project conditions. Furnish sizes adequate for necessary access. Furnish manufacturer's complete units, of type recommended for application complete with anchorages and hardware.
- B. Access Door Construction: Fabricate wall/ceiling door units of welded steel construction with welds ground smooth; 16-gage frames and 14-gage flush panel doors, 175 degree swing with concealed spring hinges; flush screw-driver-operated cam locks; factory-applied rust-inhibitive prime-coat paint finish.
- C. Removable Access Plates: Provide manufacturer's complete units with anchorages, fasteners, and standard factory-applied finishes.
- D. Wall/Ceiling Unit Construction: Provide manufacturer's standard frameless round formed stainless steel or chrome-plated brass low-profile plate cover, with single exposed flush screw anchor, with bright polished finish.
- E. Units Set at Grade: Provide manufacturer's standard round or square cast-iron units, with cast-iron pipe extension to protect electrical element being accessed; designed to be set slightly above finish grade, and to be encased in concrete; secure plate to body with bronze screws; natural mill finish on plate and body.

### 2.02 HANGERS AND SUPPORTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

Cooper B-Line, Inc.  
ERICO International Corporation.  
GS Metals Corp.  
Thomas & Betts Corporation.  
Unistrut; Tyco International, Ltd.

2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
  3. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened Portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
  2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened Portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
  3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
  4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
  5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
  6. Toggle Bolts: All-steel springhead type.

7. Hanger Rods: Threaded steel.

## 2.04 SLEEVES FOR ELECTRICAL PENETRATIONS

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends

## PART 3 - EXECUTION

### 3.01 ACCESS TO ELECTRICAL WORK

- A. Install access units in accordance with manufacturer's written instructions, in compliance with NEC, and with recognized industry practices.
- B. Coordinate with other work, including substrate construction work, as necessary to interface installation of access units with other work.
- C. Locate removable access unit accurately in relation to work requiring access. Where switches, control devices, pull boxes, and similar elements of electrical work are located within or behind wall or ceiling finishes, or below grade, and are not (cannot be) provided with integral removable access plates, provide removable access plates of types and sizes needed for access requirements.
- D. Provide adequate temporary support or attachment to framing or formwork so that units will not be dislocated during construction of substrates.
- E. Set frames accurately in position and securely attach to supports with face panels plumb or level in relation to adjacent finish surfaces.
- F. Adjust hardware and panels after installation for proper operation.
- G. Remove and replace panels or frames, which are warped, bowed, or damaged.

### 3.02 EQUIPMENT FOUNDATIONS AND MOUNTING PADS

- A. Provide concrete pedestals, bases, pads, curbs, anchor blocks, anchor bolts, slab inserts, hangers channels, cradles, saddles, etc. for installation of floor mounted electrical equipment such as switchgear, switchboards, transformers.
- B. Concrete pads for floor mounted electrical equipment shall be 3.5 inches high. Concrete pads shall be 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. Finish tops of housekeeping pads smooth and level within 1 percent of span. Pads shall be extended at least 4 inches beyond the equipment outline on each side.

### 3.06 HANGERS AND SUPPORTS

A. Application

1. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
2. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
3. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted **or** other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
4. Secure raceways and cables to these supports with two-bolt conduit clamps.
5. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.
6. All electrical equipment including conduit and cabling shall be supported properly above ceiling. No electrical equipment shall be supported by other systems including but not limited to sprinkler piping, HVAC ductwork, plumbing piping, ceiling grid, etc.

B. Installation

1. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
2. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
3. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
  - To Wood: Fasten with lag screws or through bolts.
  - To New Concrete: Bolt to concrete inserts.
  - To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
  - To Existing Concrete: Expansion anchor fasteners.  
Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.

To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.

To Light Steel: Sheet metal screws.

4. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.
5. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

### 3.07 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Cut sleeves to length for mounting flush with both surfaces of walls.
- F. Extend sleeves installed in floors 4 inches above finished floor level.
- G. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable, unless indicated otherwise.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry
- I. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
- J. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."
- K. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."
- L. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- M. Aboveground, Exterior-Wall Penetrations: Seal penetrations using **steel** pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- N. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.
- O. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between



raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

END OF SECTION

## SECTION 26 05 33 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.01 DESCRIPTION OF WORK

- A. Extent of conduit work is indicated by drawings and schedules.
- B. Types of conduit in this section include the following:
  - 1. Rigid metal conduit and fittings.
  - 2. Electrical metallic tubing and fittings.
  - 3. Flexible metal conduit and fittings.
  - 4. Liquid-tight flexible metal conduit and fittings.
  - 5. Non-metallic conduit and fittings.
- C. Extent of box and associated fitting work is indicated by drawings.
- B. Types of boxes and fittings in this section include the following:
  - 1. Outlet boxes.
  - 2. Junction boxes.
  - 3. Pull boxes.
  - 4. Bushings.
  - 5. Locknuts.
  - 6. Knockout closures.

#### 1.02 QUALITY ASSURANCE

- A. NEMA Compliance: Comply with applicable requirements of NEMA standards pertaining to conduit.
- B. UL Compliance and Labeling: Comply with provisions of UL safety standards pertaining to electrical raceway systems. Provide products and components that are UL listed and labeled.
- C. National Electrical Code Compliance: Comply with requirements applicable to construction and installation of raceway systems.
- D. Comply with National Electrical Code requirements applicable to construction and installation of electrical wiring boxes and fittings.
- E. Provide electrical boxes and fittings that are Underwriters Laboratories listed and labeled.
- F. Comply with applicable requirements of NEMA standards pertaining to outlet and device boxes, covers and box supports.

### PART 2 - PRODUCTS

#### 2.01 METAL CONDUIT AND TUBING

- A. General: Provide metal conduit, tubing and fittings of types, grades, sizes and weights (wall thickness) required for each service indicated.
- B. Rigid Steel Conduit: Galvanized heavy wall, non-intermediate.
- C. Rigid Metal Conduit Fittings: Threaded type.
- D. Electrical Metallic Tubing (EMT): Galvanized steel.
- E. EMT Fittings: Steel or malleable iron.
- F. Flexible Metal Conduit: Zinc-coated steel, listed as an assembly for grounding as per NEC 250-91B.
- G. Flexible Metal Conduit Fittings: Listed assembly for grounding per NEC 250-91B.
- H. Liquid-Tight Flexible Metal Conduit: Provide liquid-tight flexible metal conduit; constructed of single strip, flexible, continuous, interlocked, and double-wrapped steel; galvanized inside and outside; coated with liquid-tight jacket of flexible polyvinyl chloride (PVC).
- I. Liquid-Tight Flexible Metal Conduit Fittings: ANSI/NEMA FB1.

## 2.02 NONMETALLIC CONDUIT AND FITTINGS

- A. General: Provide nonmetallic conduit, ducts and fittings of types, sizes and weights (wall thickness) required for each service indicated.
- B. Non-Metallic Conduit: NEMA TC2, schedule 40 PVC.
- C. Non-Metallic Conduit Fittings & Conduit Bodies: ANSI/NEMA TC 3, solvent welded match to conduit type and material.
- D. Underground Plastic Utilities Duct: ANSI/NEMA TC 6, Type 1 for encased burial in concrete.

## 2.03 FABRICATED MATERIALS

- A. Outlet Boxes (concealed conduit): Provide galvanized coated flat rolled sheet-steel outlet wiring boxes, of shapes, cubic inch capacities, and sizes, including box depths as required by particular application, suitable for installation at respective locations. Construct outlet boxes with mounting holes, and with conduit size knockout openings in bottom and sides. Provide boxes with threaded screw holes, with corrosion-resistant cover and grounding screws for fastening surface and device type box covers, and for equipment type grounding.

Outlet and device boxes shall be mounted securely to structure by means of brackets. Brackets shall provide "far-side" support to each side of box.

- B. Outlet Box Accessories: Provide outlet box accessories as required for each installation, including box supports, mounting ears and brackets, wallboard

hangers, box extension rings, fixture studs and metal straps for supporting outlet boxes, which are compatible with outlet boxes being used to fulfill installation requirements for individual wiring situations.

- C. Device Boxes (concealed conduit): Provide galvanized coated flat rolled sheet-steel non-gangable device boxes, of shapes, cubic inch capacities, and sizes suitable for installation at respective locations. Device boxes for receptacles, telephone, and communications shall be not less than 4" square and 1 1/2" deep with box extension ring as required by number of devices served. Construct device boxes for flush mounting with mounting holes, and with conduit size knockout openings in bottom and ends, and with threaded screw holes in end plates for fastening devices. Provide corrosion resistant screws for grounding.
- D. Device Box Accessories: Provide device box accessories as required for each installation, including mounting brackets, device box extensions, switch box supports, plaster ears, and plaster board expandable grip fasteners, which are compatible with device boxes being utilized to fulfill installation requirements for individual wiring situations.
- E. Outlet and Device Boxes (exposed conduit): Provide corrosion resistant cast metal raintight outlet and wiring device boxes, of types, shapes and sizes required for each application, including depth of boxes, with threaded conduit holes for fastening electrical conduit, and cast metal face plates. Where weatherproof devices are indicated, provide spring hinged watertight caps suitably configured for each application, including faceplate gaskets and corrosion resistant plugs and fasteners.
- F. Bushings, Knockout Closures, and Locknuts: Provide corrosion resistant box knockout closures, conduit locknuts and malleable iron conduit bushings, offset connectors, of types and sizes, to suit respective installation requirements and applications.

## 2.04 JUNCTION AND PULL BOXES

- A. Provide galvanized code-gage sheet steel junction and pull boxes, with screw-on covers, of types, shapes and sizes, to suit each respective location and installation, with welded seams and equipped with stainless steel nuts, bolts, screws and washers.

## PART 3 - EXECUTION

### 3.01 INSTALLATION OF ELECTRICAL CONDUIT

- A. Install conduit as indicated, according to manufacturer's written instructions.
- B. Conceal conduit and EMT, unless otherwise indicated, within finished walls, ceilings, and floors.
- C. Keep raceways at least 6 inches away from parallel runs of hot water pipes. Install horizontal raceway runs above water piping.

- D. Install raceways level and square and at proper elevations. Provide adequate headroom.
- E. Complete raceway installation before starting conductor installation.
- F. Use temporary closures to prevent foreign matter from entering raceway.
- G. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portion of bends is not visible above the finished slab. Provide bushings for ends of all conduit stub-ups.
- H. Make bends and offsets so the inside diameter is not reduced. Keep the legs of a bend in the same plane and the straight legs of offsets parallel.
- I. Raceways Embedded in Slabs: Install in middle third of the slab thickness where practical, and leave at least 1-inch concrete cover.
  - 1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
  - 2. Space raceways laterally to prevent voids in the concrete.
  - 3. Run conduit larger than 1-inch trade size under concrete slab.
- J. Install raceways parallel to or at right angles to nearby surfaces or structural members, and follow the surface contours as much as practical.
  - 1. Run parallel or banked raceways together, on common supports.
  - 2. Make bends in parallel or banked runs from same centerline to make bends parallel. Use factory elbows only where they can be installed parallel; otherwise, provide field bends for parallel raceways.
- K. Join raceways with fittings designed and approved for purpose, make joints tight.
  - 1. Make raceway terminations tight. Use bonding bushings or wedges at connections subject to vibration. Use bonding jumpers where joints cannot be made tight.
  - 2. Use insulating bushings to protect conductors.
- L. Terminations: Where raceways are terminated with locknuts and bushings, align the raceway to enter squarely, and install the locknuts with dished part against the box. Where terminations cannot be made secure with one locknut, use two locknuts, one inside and one outside the box.
- M. Where terminating in threaded hubs, screw the raceway or fitting tight into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align the raceway so the coupling is square to the box, and tighten the chase nipple so no threads are exposed.
- N. Install pull wires in empty raceways. Use No. 14 AWG zinc-coated steel or monofilament plastic line having not less than 200-lb tensile strength. Leave not less than 12 inches of slack at each end of the pull wire.

- O. Flexible Connections: Use maximum of 6 feet of flexible conduit for recessed and semi recessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use liquid tight flexible conduit in wet or damp locations. Install separate ground conductor across flexible connections.
- P. Install expansion joints where conduit crosses building expansion joints.
- Q. Furnish and install pull boxes as required for installation of wiring. Boxes shall be code gauge galvanized steel with screw attached access panels.

### 3.02 CONDUIT INSTALLATION SCHEDULE

- A. Underground Installations: Use PVC or rigid steel conduit. Conduit rising from horizontal underground or in slab runs shall have rigid steel conduit, risers, ells and bends. Conduits installed under building slab on grade elevation shall be buried under the vapor barrier out of the concrete pour and a minimum of 12" below the top of slab. All other underground conduit runs shall be buried minimum 24" below grade and covered with red concrete 3" all around.
- B. In Slab Above Grade: PVC or Rigid steel conduit, 3/4" maximum size.
- C. Outdoor Locations, Above Grade: Galvanized rigid steel (GRS).
- D. Dry Interior Locations: Electrical metallic tubing.
- E. Use flexible metal conduit for final connections to motors and for other electrical equipment subject to movement or vibration - 24" maximum length each connection.
- F. Install liquid-tight flexible conduit for connection of motors and for other electrical equipment (24" maximum length) where subject to movement and vibration and also where subject to one or more of the following conditions:
  - 1. Exterior location.
  - 2. Moist or humid atmosphere where condensate can be expected to accumulate.
  - 3. Subjected to water spray.
  - 4. Subjected to dripping oil, grease, or water.

### 3.03 INSTALLATION OF ELECTRICAL BOXES AND FITTINGS

- A. General: Install electrical boxes and fittings in accordance with manufacturer's written instructions, applicable requirements of the NEC and NECA's "Standard of Installation", and in compliance with recognized industry practices.
- B. Coordinate installation of electrical boxes and fittings with wire/cable, wiring devices, and raceway installation work.
- C. Provide weathertight outlet boxes for interior and exterior locations exposed to weather.

- D. Provide knockout closures to cap unused knockout holes where blanks have been removed.
- E. Install boxes to ensure ready accessibility to enclosed electrical wiring.
- F. Avoid installing boxes back-to-back in walls. Provide not less than 6" separation.
- G. Position recessed boxes accurately to allow for surface finish thickness.
- H. Round boxes are not acceptable where conduit must enter box through side of box, which would result in difficult and insecure connections when fastened with locknut or bushing on rounded surface.
- I. Fasten boxes rigidly to substrates or structural surfaces to which attached, or solidly embed boxes in concrete or masonry.

END OF SECTION 260533

## SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.01 Summary

- A Section Includes identification of electrical products.

#### 1.04 Scope of Work

- A. Provide manufacturer's standard equipment nameplates, permanently affixed, indicating manufacturer's product data information, including model and serial number information, electrical ratings and information required by the various independent testing organizations, such as Underwriters Laboratories Inc., and industry standards organizations, such as the National Electrical Manufacturers Association.
- B. In addition to the manufacturer's nameplates, provide identification of electrical system equipment as specified and indicated on the drawings including, but not limited to, each transformer, switchboard, branch circuit and distribution panelboard, transformer, lighting contactor, equipment cabinet, fire alarm panel or battery cabinet, fire alarm detection and notification devices, access control cabinet, disconnect switch, and wiring device faceplates. See drawings for exact labeling requirements for panelboards, disconnect switches, and transformers.

### PART 2 - PRODUCTS

#### 2.01 Identification Materials

- A. Engraved Plastic-Laminate Signs
  - 1. Provide engraving stock, melamine plastic laminate face color and white core plies (letter color).
  - 2. Provide minimum 1/16-inch thickness for signs up to 20 square inches or 8 inches length and 1/8-inch thickness for larger units.
  - 3. Provide 1/4-inch high lettering with lines of information as specified.
  - 4. Provide 1/4-inch black border around outside edge of sign.
  - 5. Punch label for mechanical fastening and provide self-tapping stainless steel screws, except where screws cannot or should not penetrate substrate.
- B. Cable/Conductor Identification Bands: Provide vinyl-cloth, self-adhesive marker band of wrap-around type, either pre-numbered plastic coated type, or type-on type with clear plastic self-adhesive cover flap.



- C. Plastic Signs: Provide self-adhesive or pressure-sensitive, pre-printed, flexible vinyl signs for operational instruction or warnings, of sizes suitable for application areas and adequate for visibility.
- D. Labeling For Receptacle And Switch Cover Plates: Laminated, scratch resistant, 1/2" wide polyester adhesive backed tape, Panduit LS4M, Brother P-Touch labeling system, or equal system approved by the Owner. Tape shall be clear and lettering shall be black. Confirm font size with owner. Label each faceplate with the circuit serving that device.

## PART 3 - EXECUTION

### 3.01 Installation

- A. Refer to equipment and system specification sections for specific identification installation requirements. See drawing details.
- B. Thoroughly clean surface to which identification material will be affixed.
- C. Plastic-Laminate Sign Installation
  - 1. Securely fasten to equipment utilizing screws or contact-type adhesive for equipment conditions, which should not or cannot penetrate the equipment.
  - 2. Mount signs on equipment front exteriors to be easily viewed. Mount signs for different but adjacent equipment and for common equipment lineups, such as substation, at the same height above finished floor.

END OF SECTION

## SECTION 26 24 16 - PANELBOARDS

### PART 1 - GENERAL

#### 1.01 DESCRIPTION OF WORK

- A. Extent of panelboard and enclosure work is indicated by drawings and schedules.

#### 1.02 QUALITY ASSURANCE

- A. Comply with National Electrical Code requirements applicable to installation of panelboards, cabinets, and cutout boxes.
- B. Comply with UL requirements pertaining to panelboards, accessories and enclosures. Provide panelboards that are UL listed and labeled.
- C. Comply with applicable NEMA Standards for panelboards.

#### 1.03 SUBMITTALS

- A. Provide manufacturer's data on panelboards to verify compliance with requirements of the drawings and this specification.

### PART 2 - PRODUCTS

#### 2.01 PANELBOARDS

- A. Provide panelboards, enclosures and ancillary components of types, sizes, and ratings indicated which comply with manufacturer's standard materials, design and construction in accordance with published product information. Equip with proper number of unit panelboard devices as required for complete installation. Where types, sizes or ratings are not indicated, comply with NEC, UL and established industry standards for those applications indicated.
- B. Distribution, Lighting and Appliance Panelboards: Provide dead-front safety constructed factory assembled circuit breaker type panelboards in sizes and ratings as indicated. Construct with plated rectangular shaped copper bus bars that are securely mounted and braced. Provide anti-turn solderless pressure type lug connectors approved for copper conductors for connecting feeders. Equip with full-sized neutral bus bar with suitable lugs for circuits requiring neutral connection. Provide circuit breakers in accordance with schedules shown on drawings. Breakers shall be molded case bolt-in type, heavy-duty, quick-make, quick-break, with toggle handles that indicate when tripped. Where multipole breakers are indicated, provide with common trip so that overload on one pole will trip all poles simultaneously. Provide GFCI, AFCI or combination GFCI/AFCI circuit breakers where called for. Provide lugs on neutral bus for each outgoing circuit or feeder required. Provide bare uninsulated grounding bars suitable for bolting to enclosures with suitable lugs for incoming and outgoing equipment grounding conductors. Load center type panelboards are not acceptable.

- C. Panelboard Enclosures: Provide galvanized sheet steel cabinet type enclosures, in sizes and NEMA types indicated, code-gage, minimum 16-gage thickness, minimum 20" wide. Construct with multiple knockouts and wiring gutters. Provide fronts with adjustable trim clamps, and doors with flush locks and keys, all panelboard enclosures keyed alike, with concealed piano door hinges. Equip with interior circuit-directory frame, and card with clear plastic covering. Provide baked gray enamel finish over a rust inhibitor coating. Design enclosures for recessed or surface mounting as noted on the drawings.
- D. Panelboard Accessories: Provide panelboard accessories and devices including, but not necessarily limited to circuit breakers as recommended by panelboard manufacturer for ratings and applications indicated.
- E. Panelboards shall be as shown in the following schedule and shall be completely factory assembled. Do not purchase panelboards or cabinets until submittals have been approved.

Branch Circuit Panelboards (120/240 Volt Operation)

Square D NQ or equal by GE, Eaton, or Siemens

Distribution Panelboards (600 Amp Mains & Larger)

Square D I-Line HC Series GE, Eaton, or Siemens

- F. Where a specific interrupting rating is shown on the drawings, panelboards and associated circuit breakers shall be rated for that value as a minimum. Circuit breakers with non-UL listed ratings are not acceptable. Maintaining required interrupting rating through series rating of devices is not acceptable.
- G. All panelboards shall be in a single enclosure. **Double section panelboards are not to be used. If double section panels are sent to jobsite, they shall be returned and replaced at the expense of the electrical contractor.**
- H. Panelboard doors shall have a locking latch and shall be keyed alike for the entire project.
- J. Where surge protective devices are shown on the drawings, provide a SurgeLogic or approved equal surge protection device mounted internal to the panelboard per manufacturers recommendations. All panelboards connected to the essential branch system (life safety, critical, equipment) shall have panel mounted surge protective devices.
- L. Provide labeling per electrical drawings details and applicable specification sections.

## PART 3 - EXECUTION

### 3.01 INSTALLATION OF PANELBOARDS

- A. General: Install panelboards and enclosures in accordance with manufacturer's written instructions, applicable requirements of NEC standards and NECA's "Standard of Installation", and in compliance with recognized industry practices.
- B. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque-tightening values for equipment connectors. Where manufacturer's torque requirements are not indicated, tighten connectors and terminals to comply with tightening torque specified in UL Std. 486A.
- C. Anchor enclosures firmly to walls and structural surfaces, ensuring that they are permanently and mechanically secure.
- D. Provide properly wired electrical connections within enclosures.
- E. Fill out panelboard circuit directory cards upon completion of installation work. Type text, handwriting is not acceptable.
- F. Provide engraved laminated plastic nameplate for each panel – match building standard finishes.

### 3.02 GROUNDING

- A. Provide grounding connections. Tighten connections to comply with tightening torque specified in UL Std. 486A to assure permanent and effective grounds.

### 3.03 FIELD QUALITY CONTROL

- A. Prior to energization of circuitry, check all accessible connections to manufacturer's tightening torque specifications.
- B. Prior to energization check with ground resistance tester phase-to-phase and phase-to-ground insulation resistance levels to ensure requirements are fulfilled.
- C. Prior to energization, check for electrical continuity of circuits, and for short circuits.
- D. After wire and cable hook-ups, energize panelboards and demonstrate functioning in accordance with requirements. Where necessary, correct malfunctioning units, and then retest to demonstrate compliance.

END OF SECTION

## SECTION 26 27 26 - WIRING DEVICES

### PART 1 - GENERAL

#### 1.01 DESCRIPTION OF WORK:

- A. The work of this section consists of providing labor, materials, tools, appliances and miscellaneous accessories for wiring device work indicated by Drawings and schedules.
- B. Types of electrical wiring devices in this section include the following:
  - 1. Receptacles.
  - 2. Ground-fault circuit interrupters.
  - 3. Switches.
  - 4. Wallbox dimmer switches
  - 5. Wallplates.

#### 1.02 SUBMITTALS

- A. Provide submittals for review by Architect. Provide manufacturer's data for wiring devices and cover plates. Clearly indicate model number proposed.

### PART 2 - PRODUCTS

#### 2.01 FABRICATED WIRING DEVICES:

- A. Provide factory-fabricated wiring devices in types, colors, and electrical ratings for applications indicated, complying with NEMA Std. Pub. No. WD 1. Where types and grades are not indicated, provide proper selection as determined by Installer to fulfill wiring requirements. Notwithstanding colors indicated in catalog numbers shown below, devices and cover plates shall be provided in colors selected by architect at time of material submittal.
- B. Receptacles:
  - 1. Duplex: Provide duplex "specification grade" receptacles, 2-pole, 3-wire grounding, with green hexagonal equipment ground screw, ground terminals and poles internally connected to mounting yoke and mounting yoke provided with automatic grounding feature between mounting screws and yoke, 20-amperes, 125-volts, with metal plaster ears, back and side wiring, NEMA configuration 5-20R unless otherwise indicated. Hubbell #5362 , Leviton 5362, or approved equal.
  - 2. Duplex, Ground-Fault Interrupter: Provide "specification grade" duplex receptacles, ground-fault circuit interrupters (GFCI), feed-through type, capable of protecting connected downstream receptacles on single-circuit, grounding type UL-rated Class A, 20-amperes rating, 120-volts, 60 Hz, with solid-state ground-fault sensing and signaling, with 5 milliamperes ground-fault trip level; equip with 20-ampere plug configuration, NEMA 5-20R and with local test/reset buttons.

Receptacles shall be by same manufacturer as duplex receptacles, Hubbell GFRST20 , Leviton GFTR1 or approved equal.

3. Duplex – Safety Type: Leviton TCR20-I or equal by Hubbell.
4. Deadfront GFCI – 20 amp, ivory self test deadront (blank face) GFCI Outlet: Legrand 2087I, Eaton SGFD20V, or equal by Hubbell)

C. Switches:

1. Single Pole Toggle: Provide "specification grade" flush, quiet, AC-type, Decora Style, single-pole toggle switches, 20-amperes, 277/125 volts AC, with mounting yoke insulated from mechanism; equip with plaster ears, switch handle, side-wired screw terminals (and backwiring with clamp type terminals). Lutron, Hubbell, Leviton, or equal.
2. Three-Way Toggle: Provide "specification grade" flush, quiet, AC-type, Decora style, three-way toggle switches, 20-amperes, 277/125 volts AC, with mounting yoke insulated from mechanism, with plaster ears, switch handle, side-wired screw terminals (and backwiring with clamp type terminals). Manufacturer shall be same as for single pole switches, Hubbell 1223, Leviton 1223, or approved equal.
3. Pilot Light Switches: Provide "specification grade" flush, quiet, AC-type, single-pole toggle switches, 20-amperes, 277/125 volts AC, with pilot light (light on when load is on): Hubbell 1221PL, Leviton 1221PL, or approved equal.
4. Wallbox Dimmer Switches: Provide extra heavy use, specification grade Wallbox dimmer switches, Lutron DVSTV or equal by Greengate. All dimmers shall be compatible for the type of lamp technology it is serving and sized for the load served.
5. Wallbox Dimmer Switch with integrated occupancy sensor: Lutron Maestro Dimmer Sensor Switch or equal by Greengate.. All dimmers shall be compatible for the type of lamp technology it is serving and sized for the load served.
6. Toggle switch with integrated occupancy sensor: : Lutron Maestro Dual Tech Sensor Switch or equal by Greengate.
7. Ceiling Mounted Occupancy Sensor: Lutron Dual Tech Ceiling Sensor or equal by Greengate.

2.02 WIRING DEVICE ACCESSORIES:

- A. Wall Plates: Provide wall plates for wiring devices, of types, sizes, and with ganging and cutouts as indicated on drawings (or schedules). Construct with metal screws with countersunk heads for securing plates to devices, screw heads colored to match finish of plates.
  - 1. Material and Finish: Verify with architect (assume stainless steel for bidding purposes).
- B. Weatherproof Device Covers: Provide heavy duty, while-in-use covers with weatherproof gasket.

## PART 3 - EXECUTION

### 3.01 INSTALLATION OF WIRING DEVICES/PLATES:

- A. Install wiring devices in compliance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in accordance with recognized industry practices.
- B. Coordinate with other work, including painting, box and wiring work, as necessary to interface installation of wiring devices with other work, furniture locations, and door swings.
- C. Verify location of all devices with Architect before rough-in. See architectural elevations for detail.
- D. Install wiring devices only in electrical boxes, which are clean, free from, excess building materials, dirt, and debris.
- E. Install weatherproof, heavy duty while in use covers at all damp or exposed locations, as indicated on drawings.
- F. Install wiring devices after wiring work is completed.
- G. Install wall plates after painting work is completed.
- H. Protect wiring devices during painting. Wiring devices shall remain free of paint.
- I. Plates shall be installed with all four edges in continuous contact with finished wall surfaces without the use of mats or similar devices. Plaster fillings will not be permitted. Plates shall be installed with an alignment tolerance of 1/16" from the vertical or horizontal.
- J. For receptacle and switches that are not the end of the line, the equipment-grounding conductor shall not route through the device per NEC 250-114. Splice from the incoming conductor in the box with one conductor going to the device and one continuing to the next device on the run such that the device can be removed without losing the ground connection to the downstream devices.

### 3.02 INSTALLATION OF OCCUPANCY SENSORS

- A. Install occupancy sensors in accordance with manufacturer's instructions.
  - B. Test and verify proper operation of each sensor. Perform necessary adjustments in sensitivity.
  - C. After installation, adjust occupancy sensors to sensitivity required to eliminate operation in rooms located next to corridors as a result of foot traffic in corridors.
  - D. Low voltage splices for occupancy sensors shall be installed in junction boxes adjacent to power supplies.
  - E. Do not support low voltage occupancy wiring from ceiling tiles. Utilize j-hooks for support.
- 3.03 PROTECTION OF WALL PLATES AND RECEPTACLES: Upon installation of wall plates and receptacles, advise Contractor regarding proper and cautious use of convenience outlets. At time of Substantial Completion, replace those items, which have been damaged, including those burned and scored by faulty plugs and those having paint or carpet adhesive.
- 3.04 GROUNDING: Provide electrically continuous, tight grounding connections for wiring devices, unless otherwise indicated.
- 3.05 TESTING: 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.

END OF SECTION



## SECTION 26 28 16 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

### PART 1 - GENERAL

#### 1.01 DESCRIPTION OF WORK

- A. Extent of circuit and motor disconnect switch work is indicated on drawings.

#### 1.02 QUALITY ASSURANCE

- A. Comply with National Electrical Code requirements pertaining to construction and installation of electrical circuit and motor disconnect devices.
- B. Comply with requirements of UL 98, "Enclosed and Dead-Front Switches". Provide circuit and motor disconnect switches that are UL listed and labeled.

### PART 2 - PRODUCTS

#### 2.01 FABRICATED SWITCHES

- A. Disconnect Switches: Provide heavy-duty surface mounted, sheet-steel enclosed switches, of types, sizes and with fusing and other electrical characteristics indicated or required. Switches shall be rated 240 volts for use on 240/120 volt systems and 600 volts for use on 480Y/277 volt systems, 60 Hz, with blades, and poles as required for their application. Units shall incorporate spring assisted, quick-make, quick-break switches, which are constructed so that switch blades are visible in OFF position with door open. Equip each unit with an operating handle that is an integral part of enclosure base, whose operating position is easily recognizable, and which is capable of being padlocked in OFF position. Construct current carrying parts of high-conductivity plated copper. Unless noted otherwise, provide NEMA Type 1 enclosures for interior use and NEMA Type 3R enclosures for exterior use. Switches shall be Square D Class 3110, Cutler Hammer Type DH, Siemens VBII, General Electric Type TH, or approved equal.

#### 2.02 FUSES FOR FUSIBLE SWITCHES

- A. Fuses for circuits 601 amps and larger shall be UL listed Class L with time delay feature, with an interrupting rating of 300,000 amperes.
- B. Fuses for circuits 600 amps and less shall be UL Listed Class R time delay fuses with an interrupting rating of 300,000 amperes. Class R fuses shall be true dual element, time delay fuses, full sized with end caps that can be tested to determine if the fuse is blown. Fuses shall be indicating type where noted below.
- C. Fuses for safety switches protecting panelboards shall be UL listed Type Class RK-1, indicating type, with time delay feature.
- D. Fuses for 480-volt motor circuits shall be 600 volt, Class RK1, indicating type.
- E. All other fuses shall be dual element time delay type UL listed Type Class RK-5.

- F. Fuses for switches used as disconnecting means for motors and other equipment shall be sized in accordance with the nameplate requirements of the equipment actually installed.

## 2.03 ENCLOSED CIRCUIT BREAKERS

- A. Circuit Breakers: Provide surface mounted, sheet-steel enclosed circuit breakers, of types, sizes and with other electrical characteristics indicated or required. Breakers shall be rated 240 volts for use on 208/120 volt systems and 600 volts for use on 480Y/277 volt systems, 60 Hz, with poles as required for their application. Provide shunt trip devices where shown. Unless noted otherwise, provide NEMA Type 1 enclosures for interior use and NEMA Type 3R enclosures for exterior use. Breakers shall be Square D, Cutler Hammer, Siemens, or approved equal.
- B. Imaging Equipment: Where circuit breakers serve Imaging Equipment, electrical contractor shall coordinate all requirements with most up to date, site specific Imaging Equipment drawings. Coordinate all requirements with manufacturer and provide all equipment, components, and accessories as required.

## PART 3 - EXECUTION

### 3.01 INSTALLATION OF CIRCUIT AND MOTOR DISCONNECT SWITCHES

- A. Install circuit and motor disconnect switches in compliance with manufacturer's written instructions, applicable requirements of NEC, NEMA, and NECA's "Standard of Installation", and recognized industry practices.
- B. Install disconnect switches for use with motor-driven appliances, and motors and controllers within sight of controller position.
- C. Provide etched laminated label on each disconnect switch. Label shall identify equipment served by the switch.

### 3.02 GROUNDING

- A. Provide equipment-grounding lugs in all switches with connections, sufficiently tight to assure a permanent and effective ground.

### 3.03 FIELD QUALITY CONTROL

- A. Subsequent to completion of installation of electrical disconnect switches or circuit breakers, energize circuitry and demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at project site, then retest to demonstrate compliance; otherwise remove and replace with new units and retest.

END OF SECTION