

**PROJECT MANUAL FOR:**

**UNIVERSITY OF MISSOURI TEACHING  
HOSPITAL –  
FIT OUT SPACE 2W**

**PROJECT NO.: CP210701**

**AT:**  
**UNIVERSITY OF MISSOURI - COLUMBIA  
COLUMBIA, MISSOURI**

**FOR:**  
**THE CURATORS OF THE  
UNIVERSITY OF MISSOURI**

**PREPARED BY:**

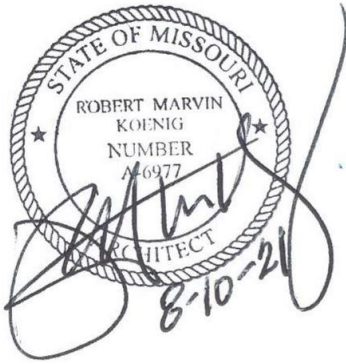


***PLANNING  
DESIGN &  
CONSTRUCTION***

**CAMPUS FACILITIES  
UNIVERSITY OF MISSOURI**

**Date August 10, 2021**

I hereby certify that these Drawings and/or Specifications have been prepared by me, or under my supervision. I further certify that to the best of my knowledge these Drawings and/or Specifications are as required by and in compliance with Building Codes of the University of Missouri.



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

Robert Koenig, Architect  
Specifications Division 1-14  
Except Section 020800  
CP210731 – CCA Renovate C3016  
Drawings: G000 – A751

I hereby certify that these Drawings and/or Specifications have been prepared by me, or under my supervision. I further certify that to the best of my knowledge these Drawings and/or Specifications are as required by and in compliance with Building Codes of the University of Missouri.



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

Austin P. Strieker, PE,  
Electrical Engineer  
Specifications Division  
26, 27 and 28.

CP210701 – University of Missouri Teaching Hospital – Fitout Space 2W  
Drawings: E000-E203, ED201

I hereby certify that these Drawings and/or Specifications have been prepared by me, or undermy supervision. I further certify that to the best of my knowledge these Drawings and/or Specifications are as required by and in compliance with Building Codes of the University of Missouri.



Signature:

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Eric A. Reuther, PE, Engineer  
Specifications Division 20, 21, 22, 23 and 24  
CP210701 – University of Missouri Teaching Hospital – Fitout Space 2W  
Drawings: M001 – M601, MD302

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PROJECT MANUAL FOR: **UNIVERSITY OF MISSOURI TEACHING HOSPITAL – FITOUT SPACE 2W**

PROJECT NUMBER: **CP210701**

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**END OF SECTION**

CAMPUS FACILITIES

General Services Bldg.  
Columbia, Missouri 65211  
Telephone: (573) 882-3091

ADVERTISEMENT FOR BIDS

Sealed bids for:

UNIVERSITY OF MISSOURI TEACHING HOSPITAL –  
FITOUT SPACE 2W  
UNIVERSITY OF MISSOURI  
COLUMBIA, MISSOURI  
PROJECT NUMBER: CP210701

CONSTRUCTION ESTIMATE \$1,265,808 - \$1,406,064

will be received by the Curators of the University of Missouri, Owner, at Campus Facilities, Planning, Design & Construction, Room L100 (Front Reception Desk), General Services Building, University of Missouri, Columbia, Missouri 65211, until 1:30 p.m., C.T., August 31, 2021 and then immediately opened and publicly read aloud.

Bids will be accepted from Prequalified Health Care General Contractors **only**. A list of Prequalified Health Care General Contractors may be obtained at <http://operations-webapps.missouri.edu/pdc/adsite/ad.html>.

Drawings, specifications, and other related contract information may be obtained at <http://operations-webapps.missouri.edu/pdc/adsite/ad.html>. Electronic bid sets are available at no cost and may be printed as desired by the plan holders. No paper copies will be issued. If paper copies are desired, it is the responsibility of the user to print the files or have them printed.

Questions regarding the scope of work should be directed to TJ Barry with TreanorHL at (816) 854-0397 or [tbarry@treanorhl.com](mailto:tbarry@treanorhl.com). Questions regarding commercial conditions should be directed to Jeff Fleenor at (573) 882-7356 or [fleenorj@missouri.edu](mailto:fleenorj@missouri.edu).

Information regarding bid results will be available the day following the bid opening by calling (573) 882-1133

A Diversity Participation goal of 10% MBE / 10% Combined WBE, DBE, Veteran Owned Business and 3% SDVE has been established for this contract.

The Owner reserves the right to waive informalities in bids and to reject any and all bids.

Individuals with special needs as addressed by the Americans with Disabilities Act may contact (573) 882-1133.

Advertisement Date: August 10, 2021

Gary L. Ward  
Vice Chancellor for Operations and Chief Operating Officer  
University of Missouri

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SECTION 1.A

BID FOR LUMP SUM CONTRACT

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

BID OF \_\_\_\_\_  
(hereinafter called "Bidder") a corporation\* organized and existing under laws of the State of \_\_\_\_\_,  
a partnership\* consisting of \_\_\_\_\_,  
an individual\* trading as \_\_\_\_\_,  
\_\_\_\_\_,  
a joint venture\* consisting of \_\_\_\_\_  
\_\_\_\_\_.

\*Insert Corporation(s), partnership or individual, as applicable.

TO: Curators of the University of Missouri  
c/o Associate Vice Chancellor – Facilities  
Room L100, General Services Building  
University of Missouri  
Columbia, Missouri 65211

1. Bidder, in compliance with invitation for bids for construction work in accordance with Drawings and Specifications prepared by TreanorHL, Inc., entitled "University of Missouri Teaching Hospital – Fitout Space 2W", project number CP210701, dated **August 10, 2021** having examined Contract Documents and site of proposed work, and being familiar with all conditions pertaining to construction of proposed project, including availability of materials and labor, hereby proposes to furnish all labor, materials and supplies to construct project in accordance with Contract Documents, within time set forth herein at prices stated below. Prices shall cover all expenses, including taxes not covered by the University of Missouri's tax exemption status, incurred in performing work required under Contract documents, of which this Bid is a part.

Bidder acknowledges receipt of following addenda:

Addendum No. _____	Dated _____
Addendum No. _____	Dated _____
Addendum No. _____	Dated _____
Addendum No. _____	Dated _____

2. In following Bid(s), amount(s) shall be written in both words and figures. In case of discrepancy between words and figures, words shall govern.

3. **BID PRICING**

- a. Base Bid:

The Bidder agrees to furnish all labor, materials, tools, and equipment required to complete project which consists of Renovation of the Materials Management and Physicians Work Room, approximately 4500 sq ft located on the second floor of the University of Missouri Teaching Hospital located at 1 Hospital Drive in Columbia, MO.

This Work includes Physicians Workrooms consisting of three conference/study rooms, one large conference room and a break room. Also included in the Work is the connecting Corridor, Restrooms and Support spaces. NOTE this Work has been reduced from previous release by removal of Materials Management and associated areas. All as indicated on the Drawings and described in these Specifications for sum of: \_\_\_\_\_

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

Unit Prices:

- (1) For changing specified quantities of work from those indicated by Contract Drawings and Specifications, upon written instructions of Owner, the following Unit Prices shall prevail in accordance with General Conditions.
- (2) The following Unit Prices include all labor, overhead and profit, materials, equipment, appliances, bailing, shoring, shoring removal, etc., to cover all work.
- (3) The following Unit Prices are required where applicable to particular Base Bid and/or Alternate being submitted.
- (4) Only a single Unit Price shall be given and it shall apply for either MORE or LESS work than that indicated on Drawings and called for in Specifications as indicated to be included in Base Bid and/or Alternates. In the event that more or less units than so indicated is actually furnished, Change Orders will be issued for increased or decreased amounts as approved by the Owner.
- (5) Bidder understands that the Owner will not be liable for any Unit Price or any amount in excess of Base Bid and any Alternate(s) accepted at time of award of Contract, except as expressed in written Change Orders duly executed and delivered by Owner's Representative.

FILL IN ONLY ONE PRICE PER LINE

- (6) Floor leveling for resilient sheet and tile flooring.
  - (a) Floor Leveling Work,  
Base Bid quantity = 1500 sq. ft. \$ \_\_\_\_\_ / sq. ft.

c. Allowance:

Bidder shall include in the base bid sum an allowance of ten thousand dollars (\$10,000) for fire/smoke stopping. This allowance amount shall not include contractor's overhead and profit. The Contractor shall include overhead and profit on the allowance amount in his bid.

4. PROJECT COMPLETION

- a. Contract Period - Contract period begins on the day the Contractor receives unsigned Contract, Performance Bond, Payment Bond, and "Instructions for Execution of Contract, Bonds, and Insurance Certificates." Bidder agrees to Substantial Completion within (100) One Hundred Consecutive Calendar days. Fifteen (15) calendar days have been allocated

in construction schedule for receiving aforementioned documents from Bidder.

- b. Commencement - Contractor agrees to commence work on this project after the "Notice to Proceed" is issued by the Owner. "Notice to Proceed" will be issued within seven (7) calendar days after Owner receives properly prepared and executed Contract documents listed in paragraph 4.a. above.

5. SUBCONTRACTOR LIST:

Bidder hereby certifies that the following subcontractors will be used in performance of Work:

NOTE: Failure to list subcontractors for each category of work identified on this form or listing more than one subcontractor for any category of work without designating the portion of work performed by each shall be grounds for rejection of bid. List name, city, and state of designated subcontractor, for each category of work listed in Bid For Lump Sum Contract. If work within a category will be performed by more than one subcontractor, Bidder shall provide name, city, and state of each subcontractor and specify exact portion of work to be performed by each. If acceptance/non-acceptance of Alternates will affect designation of a subcontractor, Bidder shall provide information, for each affected category, with this bid form. If Bidder intends to perform any designated subcontract work by using Bidder's own employees, then Bidder shall list their own name, city, and state. The bidder may petition the Owner to change a listed subcontractor only within 48 hours of the bid opening. See Information For Bidders Section 16 List of Subcontractors for requirements.

\_\_\_\_\_

Work to be performed Subcontractor Name, City, and State

\_\_\_\_\_

Certified Fire Protection Contractor \_\_\_\_\_

Mechanical Contractor \_\_\_\_\_

Electrical Contractor \_\_\_\_\_

6. SUPPLIER DIVERSITY PARTICIPATION GOALS

- a. The Contractor shall have as a goal, subcontracting with Minority Business Enterprise (MBE) of ten percent (10%), with Women Business Enterprise (WBE), Disadvantage Business Enterprise (DBE), and/or Veteran Owned Business of ten percent (10%) and with Service-Disabled Veteran Owned Business (SDVE) of three percent (3%) of awarded contract price for work to be performed.
- b. Requests for waiver of this goal shall be submitted on the attached Application For Waiver form. A determination by the Director of Facilities Planning & Development, UM, that a good faith effort has not been made by Contractor to achieve above stated goal may result in rejection of bid.
- c. The Undersigned proposes to perform work with following Supplier Diversity participation level:

MBE PERCENTAGE PARTICIPATION:

\_\_\_\_\_ percent ( \_\_\_\_\_ %)

WBE, DBE, and/or VETERAN PERCENTAGE PARTICIPATION

\_\_\_\_\_ percent ( \_\_\_\_\_ %)

SDVE PERCENTAGE PARTICIPATION:

\_\_\_\_\_ percent ( \_\_\_\_\_ %)

- d. A Supplier Diversity Compliance Evaluation form shall be submitted with this bid for each diverse subcontractor to be used on this project.

7. BIDDER'S ACKNOWLEDGMENTS

- a. Bidder declares that he has had an opportunity to examine the site of the work and he has examined Contract Documents therefore; that he has carefully prepared his bid upon the basis thereof; that he has carefully examined and checked bid, materials, equipment and labor required thereunder, cost thereof, and his figures therefore. Bidder hereby states that amount, or amounts, set forth in bid is, or are, correct and that no mistake or error has occurred in bid or in Bidder's computations upon which this bid is based. Bidder agrees that he will make no claim for reformation, modifications, revisions or correction of bid after scheduled closing time for receipt of bids.
- b. Bidder agrees that bid shall not be withdrawn for a period of ninety (90) days after scheduled closing time for receipt of bids.
- c. Bidder understands that Owner reserves right to reject any or all bids and to waive any informalities in bidding.
- d. Accompanying the bid is a bid bond, or a certified check, or an irrevocable letter of credit, or a cashier's check payable without condition to "The Curators of the University of Missouri" which is an amount at least equal to five percent (5%) of amount of largest possible total bid herein submitted, including consideration of Alternates.
- e. Accompanying the bid is a Bidder's Statement of Qualifications. Failure of Bidder to submit the Bidder's Statement of Qualifications with the bid may cause the bid to be rejected. Owner does not maintain Bidder's Statements of Qualifications on file.
- f. It is understood and agreed that bid security of two (2) lowest and responsive Bidders will be retained until Contract has been executed and an acceptable Performance Bond and Payment Bond has been furnished. It is understood and agreed that if the bid is accepted and the undersigned fails to execute the Contract and furnish acceptable Performance/Payment Bond as required by Contract Documents, accompanying bid security will be realized upon or retained by Owner. Otherwise, the bid security will be returned to the undersigned.

8. BIDDER'S CERTIFICATE

Bidder hereby certifies:

- a. His bid is genuine and is not made in interest of or on behalf of any undisclosed person, firm or corporation, and is not submitted in conformity with any agreement or rules of any

group, association or corporation.

- b. He has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid.
- c. He has not solicited or induced any person, firm or corporation to refrain from bidding.
- d. He has not sought by collusion or otherwise to obtain for himself any advantage over any other Bidder or over Owner.
- e. He will not discriminate against any employee or applicant for employment because of race, color, religion, sex or national origin in connection with performance of work.
- f. By virtue of policy of the Board of Curators, and by virtue of statutory authority, a preference will be given to materials, products, supplies, provisions and all other articles produced, manufactured, mined or grown within the State of Missouri. By virtue of policy of the Board of Curators, preference will also be given to all Missouri firms, corporations, or individuals, all as more fully set forth in "Information For Bidders."

**END OF BIDDER'S CERTIFICATE**

9. BIDDER'S SIGNATURE

Note: All signatures shall be original; not copies, photocopies, stamped, etc.

Authorized Signature	Date
Printed Name	Title
Company Name	
Mailing Address	
City, State, Zip	
Phone No.	Federal Employer ID No.
Fax No.	E-Mail Address
Circle one:    Individual       Partnership       Corporation       Joint Venture	
If a corporation, incorporated under the laws of the State of _____	
Licensed to do business in the State of Missouri?    ___yes    ___no	

(Each Bidder shall complete bid form by manually signing on the proper signature line above and supplying required information called for in connection with the signature. Information is necessary for proper preparation of the Contract, Performance Bond and Payment Bond. Each Bidder shall supply information called for in accompanying "Bidder's Statement of Qualifications.")

**END OF SECTION**



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**UNIVERSITY OF MISSOURI  
BIDDER'S STATEMENT OF QUALIFICATIONS**

Submit with Bid for Lump Sum Contract in separate envelope appropriately labeled. Attach additional sheet if necessary.

1. Company Name \_\_\_\_\_

Phone# \_\_\_\_\_ Fax #: \_\_\_\_\_

Address \_\_\_\_\_

2. Number of years in business \_\_\_\_\_. If not under present firm name, list previous firm names and types of organization.

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

3. List contracts on hand (complete the following schedule, include telephone number).

Project & Address	Owner/Owner's Representative	Phone Number	Architect	Amount of your Contract	Percent Completed
-------------------	------------------------------	--------------	-----------	-------------------------	-------------------

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

4. General character of work performed by your company personnel.

\_\_\_\_\_

5. List important projects completed in the last five (5) years on a type similar to the work now bid for, including approximate cost and telephone number.

Project & Address	Owner/Owner's Representative	Phone Number	Architect	Amount of your Contract	Percent Completed
-------------------	------------------------------	--------------	-----------	-------------------------	-------------------

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

6. Other experience qualifying you for the work now bid.

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

7. No default has been made in any contract complete or incomplete except as noted below:

(a) Number of contracts on which default was made \_\_\_\_\_

(b) Description of defaulted contracts and reason therefor

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

8. (a) Have you or your company participated in any contract subject to an equal opportunity clause similar to that described in the General Conditions?

Yes \_\_\_\_\_ No \_\_\_\_\_

(b) Have you filed all required compliance reports?

Yes \_\_\_\_\_ No \_\_\_\_\_

- (c) Is fifty percent or more of your company owned by a minority?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- (d) Is fifty percent or more of your company owned by a woman?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- (e) Is fifty percent or more of your company owned by a service disabled veteran?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- (f) Is fifty percent or more of your company owned by a veteran?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- (g) Is your company a Disadvantaged Business Enterprise?  
Yes \_\_\_\_\_ No \_\_\_\_\_

9. Have you or your company been suspended or debarred from working at any University of Missouri campus?  
Yes \_\_\_\_\_ No \_\_\_\_\_ (If the answer is "yes", give details.)

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10. Have any administrative or legal proceedings been started against you or your company alleging violation of any wage and hour regulations or laws?  
Yes \_\_\_\_\_ No \_\_\_\_\_ (If the answer is "yes", give details.)

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11. Workers Compensation Experience Modification Rates (last 3 yrs): \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_  
Incidence Rates (last 3 years): \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

12. List banking references.

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- 13. (a) Do you have a current confidential financial statement on file with Owner?  
Yes \_\_\_\_\_ No \_\_\_\_\_ (If not, and if desired, Bidder may submit such statement with bid, in a separate sealed and labeled envelope.)
- (b) If not, upon request will you file a detailed confidential financial statement within three (3) days?  
Yes \_\_\_\_\_ No \_\_\_\_\_

Dated at \_\_\_\_\_ this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_

---

Name of Organization

---

Signature

---

Printed Name

---

Title of Person Signing

END OF SECTION

**UNIVERSITY OF MISSOURI  
BIDDER'S STATEMENT OF QUALIFICATIONS FOR ASBESTOS ABATEMENT**

Submit with Bid for Lump Sum Contract in separate envelope appropriately labeled. Attach additional sheet if necessary.

1. Company Name \_\_\_\_\_ Phone# \_\_\_\_\_  
Address \_\_\_\_\_

2. State of Missouri Registration number \_\_\_\_\_

3. Number of years in business \_\_\_\_\_. If not under present firm name, list previous firm names and types of organization.

\_\_\_\_\_

4. List contracts on hand (complete the following schedule, include telephone number).

Project & Address	Owner/Owner's Representative	Phone Number	Architect	Amount of your Contract	Percent Completed

5. General character of work performed by your company personnel.

\_\_\_\_\_

6. List important projects completed in the last five (5) years on a type similar to the work now bid for, including approximate cost and telephone number.

Project & Address	Owner/Owner's Representative	Phone Number	Architect	Amount of your Contract	Percent Completed

7. Other experience qualifying you for the work now bid.

\_\_\_\_\_

8. No default has been made in any contract complete or incomplete except as noted below:

(a) Number of contracts on which default was made \_\_\_\_\_

(b) Description of defaulted contracts and reason therefor \_\_\_\_\_

9. (a) Have you or your company participated in any contract subject to an equal opportunity clause similar to that described in the General Conditions?

Yes \_\_\_\_\_ No \_\_\_\_\_

(b) Have you filed all required compliance reports?

Yes \_\_\_\_\_ No \_\_\_\_\_

- (c) Is fifty percent or more of your company owned by a minority?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- (d) Is fifty percent or more of your company owned by a woman?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- (e) Is fifty percent or more of your company owned by a service disabled veteran?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- (f) Is fifty percent or more of your company owned by a veteran?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- (g) Is your company a Disadvantaged Business Enterprise? Yes \_\_\_\_\_ No \_\_\_\_\_

10. Have you or your company been suspended or debarred from working at any University of Missouri campus?  
Yes \_\_\_\_\_ No \_\_\_\_\_ (If the answer is "yes", give details.)

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11. Have any administrative or legal proceedings been started against you or your company alleging violation of any wage and hour regulations or laws?  
Yes \_\_\_\_\_ No \_\_\_\_\_ (If the answer is "yes", give details.)

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12. Workers Compensation Experience Modification Rates (last 3 yrs): \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_  
Incidence Rates (last 3 years): \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

13. List banking references.

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14. (a) Do you have a current confidential financial statement on file with Owner?  
Yes \_\_\_\_\_ No \_\_\_\_\_ (If not, and if desired, Bidder may submit such statement with bid, in a separate sealed and labeled envelope.)

(b) If not, upon request will you file a detailed confidential financial statement within three (3) days? Yes \_\_\_ No \_\_\_\_\_

Dated at \_\_\_\_\_ this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_\_

\_\_\_\_\_  
Name of Organization

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Title of Person Signing  
END OF SECTION

**SUPPLIER DIVERSITY COMPLIANCE EVALUATION FORM**

This form shall be completed by Bidders and submitted with the Bidder's Statement of Qualifications form for each diverse firm who will function as a subcontractor on the contract.

The undersigned submits the following data with respect to this firm's assurance to meet the goal for Supplier Diversity participation.

I. Project: \_\_\_\_\_

II. Name of General Contractor: \_\_\_\_\_

III. Name of Diverse Firm: \_\_\_\_\_  
Address: \_\_\_\_\_

Phone No.: \_\_\_\_\_ Fax No.: \_\_\_\_\_

Status (check one) MBE \_\_\_\_\_ WBE \_\_\_\_\_ Veteran \_\_\_\_\_ Service Disabled Veteran \_\_\_\_\_ DBE \_\_\_\_\_

IV. Describe the subcontract work to be performed. (List Base Bid work and any Alternate work separately):

Base Bid: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

V. Dollar amount of contract to be subcontracted to the Diverse firm:

Base Bid: \_\_\_\_\_

Alternate(s), (Identify separately): \_\_\_\_\_

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

VI. Is the proposed subcontractor listed in the Directory of M/W/DBE Vendors, Directory of Serviced Disabled Veterans and/or the Directory of Veterans maintained by the State of Missouri?

Yes \_\_\_\_\_ No \_\_\_\_\_

Is the proposed subcontractor certified as a diverse supplier by any of the following: federal government agencies, state agencies, State of Missouri city or county government agencies, Minority and/or WBE certifying agencies?

Yes \_\_\_\_\_

No \_\_\_\_\_

If yes, please provide details and attach a copy of the certification.

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Does the proposed subcontractor have a signed document from their attorney certifying the Supplier as a Diverse and meeting the 51% owned and committed requirement?

Yes \_\_\_\_\_

No \_\_\_\_\_

If yes, please attach letter.

Signature:

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Name:

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Title:

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Date:

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**APPLICATION FOR WAIVER**

This form shall be completed and submitted with the Bidder's Statement of Qualifications. Firms wishing to be considered for award are required to demonstrate that a good faith effort has been made to include diverse suppliers. This form will be used to evaluate the extent to which a good faith effort has been made. The undersigned submits the following data with respect to the firm's efforts to meet the goal for Supplier Diversity Participation.

1. List pre-bid conferences your firm attended where Supplier Diversity requirements were discussed.

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2. Identify advertising efforts undertaken by your firm which were intended to recruit potential diverse subcontractors for various aspects of this project. Provide names of newspapers, dates of advertisements and copies of ads that were run.

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3. Note specific efforts to contact in writing those diverse suppliers capable of and likely to participate as subcontractors for this project.

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4. Describe steps taken by your firm to divide work into areas in which diverse suppliers/contractors would be capable of performing.

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5. What efforts were taken to negotiate with prospective diverse suppliers/contractors for specific sub-bids? Include the names, addresses, and telephone numbers of diverse suppliers/contractors contacted, a description of the information given to diverse suppliers/contractors regarding plans and specifications for the assigned work, and a statement as to why additional agreements were not made with diverse suppliers/contractors.

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6. List reasons for rejecting a diverse supplier/contractor which has been contacted.

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8. Describe the follow-up contacts with diverse suppliers/contractors made by your firm after the initial solicitation.

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9. Describe the efforts made by your firm to provide interested diverse suppliers/contractors with sufficiently detailed information about the plans, specifications and requirements of the contract.

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10. Describe your firm's efforts to locate diverse suppliers/contractors.

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Based on the above stated good faith efforts made to include supplier diversity, the bidder hereby requests that the original supplier diversity percentage goal be waived and that the percentage goal for this project be set at \_\_\_\_\_ percent.

The undersigned hereby certifies, having read the answers contained in the foregoing Application for Waiver, that they are true and correct to the best of his/her knowledge, information and belief.

Signature \_\_\_\_\_

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Date \_\_\_\_\_

**AFFIDAVIT**

"The undersigned swears that the foregoing statements are true and correct and include all material information necessary to identify and explain the operation of \_\_\_\_\_ (name of firm) as well as the ownership thereof. Further, the undersigned agrees to provide through the prime contractor or directly to the Contracting Officer current, complete and accurate information regarding actual work performed on the project, the payment therefore and any proposed changes, if any, of the project, the foregoing arrangements and to permit the audit and examination of books, records and files of the named firm. Any material misrepresentation will be grounds for terminating any contract which may be awarded and for initiating action under federal or state laws concerning false statements."

Note - If, after filing this information and before the work of this firm is completed on the contract covered by this regulation, there is any significant change in the information submitted, you must inform the Director of Facilities Planning and Development of the change either through the prime contractor or directly.

Signature \_\_\_\_\_

Name \_\_\_\_\_

Title \_\_\_\_\_

Date \_\_\_\_\_

Corporate Seal (where appropriate)

Date \_\_\_\_\_

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

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

On this \_\_\_\_\_ day of \_\_\_\_\_, 19\_,  
before me appeared (name) \_\_\_\_\_ to me personally known, who, being  
duly sworn, did execute the foregoing affidavit, and did state that he or she was properly authorized by (name of firm)

\_\_\_\_\_  
\_\_\_\_\_ to execute the affidavit and did so as his or her own free act and deed.

(Seal)

Notary Public \_\_\_\_\_

Commission expires \_\_\_\_\_

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**AFFIDAVIT FOR AFFIRMATIVE ACTION**

State of Missouri                    )  
  )  
County of                                )                    ss.

\_\_\_\_\_ first being duly sworn on his/her oath states: that he/she is the (sole proprietor, partner, or officer) of \_\_\_\_\_ a (sole proprietorship, partnership, corporation), and as such (sole proprietor, partner, or officer) is duly authorized to make this affidavit on behalf of said (sole proprietorship, partnership, corporation); that under the contract known as " \_\_\_\_\_ " Project No. \_\_\_\_\_ less than 50 persons in the aggregate will be employed and therefore, the applicable Affirmative Action requirements as set forth in the "Nondiscrimination in Employment Equal Opportunity," Supplemental Special Conditions, and Article 13 in the General Conditions do not apply.

\_\_\_\_\_

Subscribed and sworn before me this \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_\_.

My commission expires \_\_\_\_\_, 19\_\_\_\_\_.

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## CERTIFYING SUPPLIER DIVERSITY AGENCIES

Diverse firms are defined in General Conditions Articles 1.1.7 and those businesses must be certified as disadvantaged by an approved agency. The Bidder is responsible for obtaining information regarding the certification status of a firm. A list of certified firms may be obtained by contacting the agencies listed below. Any firm listed as disadvantaged by any of the following agencies will be classified as a diverse firm by the Owner.

St. Louis Development Corporation  
1520 Market St., Ste. 2000  
St. Louis, MO 63103  
P: 314.982.1400  
W: [www.stlouis-mo.gov/slcdc/](http://www.stlouis-mo.gov/slcdc/)

Bi-State Development  
211 N. Broadway, Ste. 700  
St. Louis, MO 63102  
P: 314.982.1400  
W: [www.metrostlouis.dbesystem.com](http://www.metrostlouis.dbesystem.com)

St. Louis Minority Business Council  
211 N. Broadway, Ste. 1300  
St. Louis, MO 63102  
P: 314.231.5555  
W: [www.slmbc.org](http://www.slmbc.org)

U.S. Small Business Administration - St. Louis, MO  
8(a) Contractors, Minority Small Business  
1222 Spruce Street, Suite 10.103  
St. Louis, MO 63101  
P: 314.539.6600  
W: [www.sba.gov](http://www.sba.gov)

Lambert St. Louis International Airport  
Business Diversity Development Office  
11495 Navaid  
Bridgeton, MO 63044  
P: 314-426-8111  
W: [www.flystl.com/business/business-diversity-development-1/directories](http://www.flystl.com/business/business-diversity-development-1/directories)

City of Kansas City, Missouri  
Human Relations Department, MBE/WBE Division  
4th Floor, City Hall  
414 E. 12<sup>th</sup> Street  
Kansas City, MO 64106  
P: 816.513.1836  
W: [kcmohrd.mwdbe.com/?TN=kcmohrd](http://kcmohrd.mwdbe.com/?TN=kcmohrd)

Mid-States Minority Supplier Development Council  
505 N. 7<sup>th</sup> Street, Ste. 1820  
St. Louis, MO 63101  
P: 314.278.5616  
W: [midstatesdc.org](http://midstatesdc.org)

U.S. Small Business Administration - Kansas City, MO  
8(a) Contractors, Minority Small Business  
1000 Walnut, Suite 500  
Kansas City, MO 64106  
P: 816.426.4900  
W: [kcmohrd.mwdbe.com/?TN=kcmohrd](http://kcmohrd.mwdbe.com/?TN=kcmohrd)

Missouri Department of Transportation  
Division of Construction  
1617 Missouri Blvd.  
P.O. Box 270  
Jefferson City, MO 65102  
P: 573.526.2978  
W: [www.modot.org/mrcc-directory](http://www.modot.org/mrcc-directory)

Illinois Department of Transportation  
MBE/WBE Certification Section  
2300 Dirksen Parkway  
Springfield, IL 62764  
217/782-5490; 217/785-1524 (Fax)  
W: [webapps.dot.illinois.gov/UCP/ExternalSearch](http://webapps.dot.illinois.gov/UCP/ExternalSearch)

State of Missouri OA  
Office of Equal Opportunity  
301 W. High St. HSC Rm 870-B  
Jefferson City, MO 65101  
P: 877.259.2963  
W: [oa.mo.gov/sites/default/files/sdvelisting.pdf](http://oa.mo.gov/sites/default/files/sdvelisting.pdf)  
[oeo.mo.gov/](http://oeo.mo.gov/)

## Minority Newspapers

Dos Mundos Bilingual Newspaper  
902A Southwest Blvd.  
Kansas City, MO 64108  
816-221-4747  
[www.dosmundos.com](http://www.dosmundos.com)

Kansas City Hispanic News  
2918 Southwest Blvd.  
Kansas City, MO 64108  
816/472-5246  
[www.kchispanicnews.com](http://www.kchispanicnews.com)

The Kansas City Globe  
615 E. 29th Street  
Kansas City, MO 64109  
816-531-5253  
[www.thekcglobe.com/about\\_us.php](http://www.thekcglobe.com/about_us.php)

St. Louis American  
4144 Lindell  
St. Louis, MO 63108  
314-533-8000  
[www.stlamerican.com](http://www.stlamerican.com)

St. Louis Chinese American News  
1766 Burns Ave, Suite 201  
St. Louis, MO 63132  
314-432-3858  
[www.scanews.com](http://www.scanews.com)

St. Louis Business Journal  
815 Olive St., Suite 100  
St. Louis, MO 63101  
314-421-6200  
[www.bizjournal.com/stlouis](http://www.bizjournal.com/stlouis)

Kansas City Business Journal  
1100 Main Street, Suite 210  
Kansas City, MO 64105  
816-421-5900  
[www.bizjournals.com/kansascity](http://www.bizjournals.com/kansascity)

## **AFFIDAVIT OF SUPPLIER DIVERSITY PARTICIPATION**

The apparent low Bidder shall complete and submit this form within 48 hours of bid opening for each Diverse firm that will participate on the contract.

1. Diverse Firm: \_\_\_\_\_  
 Contact Name: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 Phone No.: \_\_\_\_\_ E-Mail: \_\_\_\_\_

Status (check one) MBE  WBE  Veteran  Service Disabled Veteran  DBE   
 If MBE, Certified as (circle one): 1) Black American 2) Hispanic American 3) Native American 4) Asian American

2. Is the proposed diverse firm certified by an approved agency [see IFB article 15]? Yes  No

Agency: \_\_\_\_\_ [attach copy of certification authorization from agency]

Certification Number: \_\_\_\_\_

3. Diverse firm scope work and bid/contract dollar amount of participation (List Base Bid and Alternate work separately). The final Dollar amount will be determined at substantial completion:

	Scope of Work	Bid/Contract Amount	Final Dollar Amount
Base Bid			
Alternate #1			
Alternate #2			
Alternate #3			
Alternate #4			
Alternate #5			
Alternate #6			

The undersigned certifies that the information contained herein (i.e. Scope of Work and Bid/Contract Amount) is true and correct to the best of their knowledge, information and belief.

General Contractor: \_\_\_\_\_ Diverse Firm: \_\_\_\_\_

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

Name: \_\_\_\_\_ Name: \_\_\_\_\_

Title: \_\_\_\_\_ Title: \_\_\_\_\_

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

The undersigned certifies that the information contained herein (i.e. Scope of Work and Final Dollar Amount) is true and correct to the best of their knowledge, information and belief. If the Final Dollar Amount is different than the Bid/Contract Amount, then attach justification for the difference.

Contractor: \_\_\_\_\_ Diverse Firm: \_\_\_\_\_

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

Name: \_\_\_\_\_ Name: \_\_\_\_\_

Title: \_\_\_\_\_ Title: \_\_\_\_\_

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



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University of Missouri

INFORMATION FOR BIDDERS

Page No.

1. Contract Documents..... IFB/1  
2. Bidder's Obligation ..... IFB/1  
3. Interpretation of Documents ..... IFB/1  
4. Bids..... IFB/1  
5. Modification and Withdrawal of Bids..... IFB/2  
6. Signing of Bids ..... IFB/2  
7. Bid Security ..... IFB/2  
8. Bidder's Statement of Qualifications ..... IFB/2  
9. Award of Contract..... IFB/2  
10. Contract Execution..... IFB/2  
11. Contract Security ..... IFB/3  
12. Time of Completion ..... IFB/3  
13. Number of Contract Documents ..... IFB/3  
14. Missouri Products and Missouri Firms ..... IFB/3  
15. Supplier Diversity ..... IFB/3  
16. List of Subcontractors ..... IFB/5

**1. Contract Documents**

**1.1** Drawings, specifications, and other contract documents, pursuant to work which is to be done, may be obtained shown in the Advertisement for Bids and Special Conditions.

**2. Bidder Obligations**

**2.1** Before submitting bids each bidder shall carefully examine the drawings and specifications and related contract documents, visit site of work and fully inform themselves as to all existing conditions, facilities, restrictions and other matters which can affect the work or the cost thereof.

**2.2** Each bidder shall include in their bid the cost of all work and materials required to complete the contract in a first-class manner as hereinafter specified.

**2.3** Failure or omission of any bidder to receive or examine any form, instrument, addendum, or other document, or to visit the site and acquaint themselves with existing conditions, shall in no way relieve them from any obligation with respect to their bid or contract, and no extra compensation will be allowed by reason of any thing or matter concerning which bidder should have fully informed themselves prior to bidding.

**2.4** Submission of bids shall be deemed acceptance of the above obligations and each and every obligation required to be performed by all of the contract documents in the event the bid is accepted.

**3. Interpretation of Documents**

**3.1** If any prospective bidder is in doubt as to the true meaning of any part of the drawings and specifications or contract documents, they shall submit a written request to the Architect for an interpretation.

**3.2** Requests for such interpretations shall be delivered to the Architect at least one (1) week prior to time for receipt of bids.

**3.3** Bids shall be based only on interpretations issued in the form of addenda mailed to each person who is on the

Architect's record as having received a set of the contract documents.

**4. Bids**

**4.1** Bids shall be received separately or in combination as shown in and required by the Bid for Lump Sum contract. Bids will be completed so as to include insertion of amounts for alternate bids, unit prices and cost accounting data.

**4.2** Bidders shall apportion each base bid between various phases of the work, as stipulated in the Bid for Lump Sum contract. All work shall be done as defined in the specifications and as indicated on the drawings.

**4.3** Bids shall be presented in sealed envelopes which shall be plainly marked "Bids for (indicate name of project from cover sheet)", and mailed or delivered to the building and room number specified in the Advertisement for Bids. Bidders shall be responsible for actual delivery of bids during business hours, and it shall not be sufficient to show that a bid was mailed in time to be received before scheduled closing time for receipt of bids, nor shall it be sufficient to show that a bid was somewhere in a university facility.

**4.4** The bidder's price shall include all federal sales, excise, and similar taxes, which may be lawfully assessed in connection with their performance of work and purchase of materials to be incorporated in the work. City & State taxes shall not be included as defined within Article 3.16 of the General Conditions for Construction Contract included in the contract documents.

**4.5** Bids shall be submitted on a single bid form, furnished by the Owner or Architect. Do not remove the bid form from the specifications.

**4.6** No bidder shall stipulate in their bid any conditions not contained in the bid form.

**4.7** The Owner reserves the right to waive informalities in bids and to reject any or all bids.

## **5. Modification and Withdrawal of Bids**

**5.1** The bidder may withdraw their bid at any time before the scheduled closing time for receipt of bids, but no bidder may withdraw their bid after the scheduled closing time for receipt of bids.

**5.2** Only telegrams, letters and other written requests for modifications or correction of previously submitted bids, contained in a sealed envelope which is plainly marked "Modification of Bid on (name of project on cover sheet)," which are addressed in the same manner as bids, and are received by Owner before the scheduled closing time for receipt of bids will be accepted and bids corrected in accordance with such written requests.

## **6. Signing of Bids**

**6.1** Bids which are signed for a partnership shall be **manually** signed in the firm name by at least one partner, or in the firm name by Attorney-in-Fact. If signed by Attorney-in-Fact there should be attached to the bid, a Power of Attorney evidencing authority to sign the bid dated the same date as the bid and executed by all partners of the firm.

**6.2** Bids that are signed for a corporation shall have the correct corporate name thereon and the signature of an authorized officer of the corporation manually written below corporate name. Title of office held by the person signing for the corporation shall appear below the signature of the officer.

**6.3** Bids that are signed by an individual doing business under a firm name, shall be manually signed in the name of the individual doing business under the proper firm name and style.

**6.4** Bids that are signed under joint venture shall be manually signed by officers of the firms having authority to sign for their firm.

## **7. Bid Security**

**7.1** Each bid shall be accompanied by a bid bond, certified check, or cashier's check, acceptable to and payable without condition to The Curators of the University of Missouri, in an amount at least equal to five percent (5%) of bidder's bid including additive alternates.

**7.2** Bid security is required as a guarantee that bidder will enter into a written contract and furnish a performance bond within the time and in form as specified in these specifications; and if successful bidder fails to do so, the bid security will be realized upon or retained by the Owner. The apparent low bidder shall notify the Owner in writing within 48 hours (2 work days) of the bid opening of any circumstance that may affect the bid security including, but not limited to, a bidding error. This notification will not guarantee release of the bidder's security and/or the bidder from the Bidder's Obligations.

**7.3** If a bid bond is given as a bid security, the amount of the bond may be stated as an amount equal to at least five percent (5%) of the bid, including additive alternates, described in the bid. The bid bond shall be executed by the bidder and a responsible surety licensed in the State of Missouri with a Best's rating of no less than A-/XI.

**7.4** It is specifically understood that the bid security is a guarantee and shall not be considered as liquidated damages for failure of bidder to execute and deliver their contract and performance bond, nor limit or fix bidder's liability to Owner for any damages sustained because of failure to execute and deliver the required contract and performance bond.

**7.5** Bid security of the two (2) lowest and responsive Bidders will be retained by the Owner until a contract has been executed and an acceptable bond has been furnished, as required hereby, when such bid security will be returned. Surety bid bonds of all other bidders will be destroyed and all other alternative forms of bid bonds will be returned to them within ten (10) days after Owner has determined the two (2) lowest and responsive bids.

## **8. Bidder's Statement of Qualifications**

**8.1** Each bidder submitting a bid shall present evidence of their experience, qualifications, financial responsibility and ability to carry out the terms of the contract by completing and submitting with their bid the schedule of information set forth in the form furnished in the bid form.

**8.2** Such information, a single copy required in a separate sealed envelope, will be treated as confidential information by the Owner, within the meaning of Missouri Statue 610.010.

**8.3** Bids not accompanied with current Bidder's Statement of Qualifications may be rejected.

## **9. Award of Contract**

**9.1** The Owner reserves the right to let other contracts in connection with the work, including, but not by way of limitation, contracts for furnishing and installation of furniture, equipment, machines, appliances, and other apparatus.

**9.2** In awarding the contract, the Owner may take into consideration the bidder's, and their subcontractor's, ability to handle promptly the additional work, skill, facilities, capacity, experience, ability, responsibility, previous work, financial standing of bidder, and the bidder's ability to provide the required bonds and insurance; quality, efficiency and construction of equipment proposed to be furnished; period of time within which equipment is proposed to be furnished and delivered; success in achieving the specified Supplier Diversity goal, or demonstrating a good faith effort as described in Article 15; necessity of prompt and efficient completion of work herein described, and the bidder's status as suspended or debarred. Inability of any bidder to meet the requirements mentioned above may be cause for rejection of their bid.

## **10. Contract Execution**

**10.1** The Contractor shall submit within fifteen (15) days from receipt of notice, the documents required in Article 9 of the General Conditions for Construction Contract included in the contract documents.

**10.2** No bids will be considered binding upon the Owner until the documents listed above have been furnished. Failure of Contractor to execute and submit these documents within the time period specified will be treated, at the option of the

Owner, as a breach of the bidder's bid security under Article 7 and the Owner shall be under no further obligation to Bidder.

## **11. Contract Security**

**11.1** When the Contract sum exceeds \$50,000, the Contractor shall procure and furnish a Performance bond and a Payment bond in the form prepared by Owner. Each bond shall be in the amount equal to one hundred percent (100%) of the contract sum, as well as adjustments to the Contract Sum. The Performance Bond shall secure and guarantee Contractor's faithful performance of this Contract, including but not limited to Contractor's obligation to correct defects after final payment has been made as required by the Contract Documents. The Payment Bond shall secure and guarantee payment of all persons performing labor on the Project under this Contract and furnishing materials in connection with this Contract. These Bonds shall be in effect through the duration of the Contract plus the Guaranty Period as required by the Contract Documents.

**11.2** The bonds required hereunder shall be meet all requirements of Article 11 of the General Conditions for Construction Contract included in the contract documents.

**11.3** If the surety of any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to conduct business in the State of Missouri is terminated, or it ceases to meet the requirements of this Article 11, Contractor shall within ten (10) days substitute another bond and surety, both of which must be acceptable to Owner. If Contractor fails to make such substitution, Owner may procure such required bonds on behalf of Contractor at Contractor's expense.

## **12. Time of Completion**

**12.1** Contractors shall agree to commence work within five (5) days of the date "Notice to Proceed" is received from the Owner, and the entire work shall be completed by the completion date specified or within the number of consecutive calendar days stated in the Special Conditions. The duration of the construction period, when specified in consecutive calendar days, shall begin when the contractor receives notice requesting the documents required in Article 9 of the General Conditions for Construction Contract included in the contract documents.

## **13. Number of Contract Documents**

**13.1** The Owner will furnish the Contractor a copy of the executed contract and performance bond.

**13.2** The Owner will furnish the Contractor the number of copies of complete sets of drawings and specifications for the work, as well as, clarification and change order drawings pertaining to change orders required during construction as set forth in the Special Conditions.

## **14. Missouri Products and Missouri Firms**

**14.1** The Curators of the University of Missouri have adopted a policy which is binding upon all employees and departments of the University of Missouri, and which by contract, shall be binding upon independent contractors and subcontractors with the University of Missouri whereby all other things being equal, and when the same can be secured without additional cost over foreign products, or products of other states, a preference shall be granted in all construction, repair and purchase contracts, to all products, commodities,

materials, supplies and articles mined, grown, produced and manufactured in marketable quantity and quality in the State of Missouri, and to all firms, corporations or individuals doing business as Missouri firms, corporations or individuals. Each bidder submitting a bid agrees to comply with, and be bound by the foregoing policy.

## **15. SUPPLIER DIVERSITY**

### **15.1 Award of Contract**

The Supplier Diversity participation goal for this project is stated on the Bid for Lump Sum Contract Form, and the Owner will take into consideration the bidder's success in achieving the Supplier Diversity participation goal in awarding the contract. Inability of any bidder to meet this requirement may be cause for rejection of their bid.

The University will grant a three (3) point bonus preference to a Missouri based, certified Service Disabled Veteran Enterprise (SDVE) bidder as defined in Article 1 – (Supplier Diversity Definitions) of the General Conditions of the Contract for Construction included in the contract documents. The three percent (3%) goal can be met, and the bonus points obtained, by a qualified SDVE vendor and/or through the use of qualified SDVE subcontractors or suppliers that provide at least three percent (3%) of the total contract value. The submitted bid form must include a minimum of 3% SDVE participation to obtain the three (3) point bonus.

### **15.2 List of Supplier Diversity Firms**

**15.2.1** The bidder shall submit as part of their bid a list of diverse firms performing as contractor, subcontractors, and/or suppliers. The list shall specify the single designated diverse firm name and address. If acceptance or non-acceptance of alternates will affect the designation of a subcontractor, provide information for each affected category.

**15.2.2** Failure to include a complete list of diverse firms may be grounds for rejection of the bid.

**15.2.3** The list of diverse firms shall be submitted in addition to any other listing of subcontractors required in the Bid for Lump Sum Contract Form.

### **15.3 Supplier Diversity Percentage Goal**

The bidder shall have a minimum goal of subcontracting with diverse contractors, subcontractors, and suppliers, the percent of contract price stated in the Supplier Diversity goal paragraph of the Bid for Lump Sum Contract Form.

### **15.4 Supplier Diversity Percent Goal Computation**

**15.4.1** The total dollar value of the work granted to the diverse firms by the successful bidder is counted towards the applicable goal of the entire contract, unless otherwise noted below.

**15.4.2** The bidder may count toward the Supplier Diversity goal only expenditures to diverse firms that perform a commercially useful function in the work of a contract. A diverse firm is considered to perform a commercially useful function when it is responsible for executing a distinct element of the work and carrying out its responsibilities by actually performing, managing and supervising the work involved. A bidder that is a certified diverse firm may count as 100% of the contract towards the Supplier Diversity goal. For projects with separate MBE, SDVE, and WBE/Veteran

/DBE goals, a MBE firm bidding as the prime bidder is expected to obtain the required SDVE, and WBE/Veteran/DBE participation; a WBE or Veteran or DBE firm bidding as the prime bidder is expected to obtain the required MBE and SDVE participation and a SDVE firm bidding as the prime bidder is expected to obtain the required MBE, and WBE/Veteran/DBE participation.

**15.4.3** When a MBE, WBE, Veteran Business Enterprise, DBE, or SDVE performs work as a participant in a joint venture, only the portion of the total dollar value of the contract equal to the distinct, clearly defined portion of the work of the contract that the MBE, WBE, Veteran Business Enterprise, DBE, or SDVE performs with its own forces shall count toward the MBE, WBE, Veteran Business Enterprise, DBE, or SDVE individual contract percentages.

**15.4.4** The bidder may count toward its Supplier Diversity goal expenditures for materials and supplies obtained from diverse suppliers and manufacturers, provided the diverse firm assumes the actual and contractual responsibility for the provision of the materials and supplies.

**15.4.4.1** The bidder may count its entire expenditure to a diverse manufacturer. A manufacturer shall be defined as an individual or firm that produces goods from raw materials or substantially alters them before resale.

**15.4.4.2** The bidder may count its entire expenditure to diverse suppliers that are not manufacturers provided the diverse supplier performs a commercially useful function as defined above in the supply process.

**15.4.4.3** The bidder may count 25% of its entire expenditures to diverse firms that do not meet the definition of a subcontractor, a manufacturer, nor a supplier. Such diverse firms may arrange for, expedite, or procure portions of the work but are not actively engaged in the business of performing, manufacturing, or supplying that work.

**15.4.5** The bidder may count toward the Supplier Diversity goal that portion of the total dollar value of the work awarded to a certified joint venture equal to the percentage of the ownership and control of the diverse partner in the joint venture.

## **15.5 Certification by Bidder of Diverse Firms**

**15.5.1** The bidder shall submit with its bid the information requested in the "Supplier Diversity Compliance Evaluation Form" for every diverse firm the bidder intends to award work to on the contract.

**15.5.2** Diverse firms are defined in Article 1 – (Supplier Diversity Definitions) of the General Conditions of the Contract for Construction included in the contract documents, and as those businesses certified as disadvantaged by an approved agency. The bidder is responsible for obtaining information regarding the certification status of a firm. A list of certified firms may be obtained by contacting the agencies listed in the proposal form document "Supplier Diversity Certifying Agencies". Any firm listed as disadvantaged by any of the identified agencies will be classified as a diverse firm by the Owner.

**15.5.3** Bidders are urged to encourage their prospective diverse contractors, subcontractors, joint venture participants, team partners, and suppliers who are not currently certified to obtain certification from one of the approved agencies.

## **15.6 Supplier Diversity Participation Waiver**

**15.6.1** The bidder is required to make a good faith effort to locate and contract with diverse firms. If a bidder has made a good faith effort to secure the required diverse firms and has failed, the bidder shall submit with the bid, the information requested in "Application for Supplier Diversity Participation Waiver." The Contracting Officer will review the bidder's actions as set forth in the bidder's "Application for Waiver" and any other factors deemed relevant by the Contracting Officer to determine if a good faith effort has been made to meet the applicable percentage goal. If the bidder is judged not to have made a good faith effort, the bid may be rejected. Bidder's who demonstrate that they have made a good faith effort to include Supplier Diversity participation may be awarded the contract regardless of the percent of Supplier Diversity participation, provided the bid is otherwise acceptable and is determined to be the best bid.

**15.6.2** To determine good faith effort of the bidder, the Contracting Officer may evaluate factors including, but not limited to, the following:

**15.6.2.1** The bidder's attendance at pre-proposal meetings scheduled to inform bidders and diverse firms of contracting and subcontracting opportunities and responsibilities associated with Supplier Diversity participation.

**15.6.2.2** The bidder's advertisements in general circulation trade association, and diverse (minority) focused media concerning subcontracting opportunities.

**15.6.2.3** The bidder's written notice to specific diverse firms that their services were being solicited in sufficient time to allow for their effective participation.

**15.6.2.4** The bidder's follow-up attempts to the initial solicitation(s) to determine with certainty whether diverse firms were interested.

**15.6.2.5** The bidder's efforts to divide the work into packages suitable for subcontracting to diverse firms.

**15.6.2.6** The bidder's efforts to provide interested diverse firms with sufficiently detailed information about the drawings, specific actions and requirements of the contract, and clear scopes of work for the firms to bid on.

**15.6.2.7** The bidder's efforts to solicit for specific sub-bids from diverse firms in good faith. Documentation should include names, addresses, and telephone numbers of firms contacted a description of all information provided the diverse firms, and an explanation as to why agreements were not reached.

**15.6.2.8** The bidder's efforts to locate diverse firms not on the directory list and assist diverse firms in becoming certified as such.

**15.6.2.9** The bidder's initiatives to encourage and develop participation by diverse firms.

**15.6.2.10** The bidder's efforts to help diverse firms overcome legal or other barriers impeding the participation of diverse firms in the construction contract.

**15.6.2.11** The availability of diverse firms and the adequacy of the bidder's efforts to increase the participation of such business provided by the persons and organizations consulted by the bidder.

#### **15.7 Submittal of Forms**

**15.7.1** The bidder will include the Supplier Diversity Compliance Evaluation Form(s), or the Application for Waiver and other form(s) as required above in the envelope containing the "Bidder's Statement of Qualifications", see Article 8.

#### **15.8 Additional Bid/Proposer Information**

**15.8.1** The Contracting Officer reserves the right to request additional information regarding Supplier Diversity participation and supporting documentation from the apparent low bidder. The bidder shall respond in writing to the Contracting Officer within 24-hours (1 work day) of a request.

**15.8.2** The Contracting Officer reserves the right to request additional information after the bidder has responded to prior 24 hour requests. This information may include follow up and/or clarification of the information previously submitted.

**15.8.3** The Owner reserves the right to consider additional diverse subcontractor and supplier participation submitted by the bidder after bids are opened under the provisions within these contract documents that describe the Owner's right to accept or reject subcontractors including, but not limited to, Article 16 below. The Owner may elect to waive the good faith effort requirement if such additional participation achieves the Supplier Diversity goal.

**15.8.4** The Bidder shall provide the Owner information related to the Supplier Diversity participation included in the bidder's proposal, including, but is not limited to, the complete Application for Waiver, evidence of diverse certification of participating firms, dollar amount of participation of diverse firms, information supporting a good faith effort as described in Article 15.6 above, and a list of all diverse firms that submitted bids to the Bidder with the diverse firm's price and the name and the price of the firm awarded the scope of work bid by the diverse firm.

#### **16. List of Subcontractors**

**16.1** If a list of subcontractors is required on the Bid for Lump Sum Contract Form, the bidders shall list the name, city and state of the firm(s) which will accomplish that portion of the contract requested in the space provided. This list is separate from both the list of diverse firms required in Article 15.2, and the complete list of subcontractors required in Article 10.1 of this document. Should the bidder choose to perform any of the listed portions of the work with its own forces, the bidder shall enter its own name, city and state in the space provided. If acceptance or non-acceptance of alternates will affect the designation of a subcontractor, the bidder shall provide that information on the bid form.

**16.2** Failure of the bidder to supply the list of subcontractors required or the listing of more than one subcontractor for any category without designating the portion of the work to be performed by each, shall be grounds for the rejection of the bid. The bidder can petition the Owner to change a listed subcontractor within 48 hours of the bid opening. The Owner reserves the right to make the final determination on a petition to change a subcontractor. The Owner will consider factors such as clerical and mathematical bidding errors, listed subcontractor's inability to perform the work for the bid used, etc. Any request to change a listed subcontractor shall include at a minimum, contractor's bid sheet showing tabulation of the bid; all subcontractor bids with documentation of the time they were received by the contractor; and a letter from the listed subcontractor on their letterhead stating why they cannot perform the work if applicable. The Owner reserves the right to ask for additional information.

**16.3** Upon award of the contract, the requirements of Article 10 of this document and Article 5 of the General Conditions of the Contract for Construction included in the contract documents will apply.

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University of Missouri

**General Conditions**

of the

**Contract**

for

**Construction**

August 2020 Edition



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**ARTICLE 1  
GENERAL PROVISIONS**

**1.1 Basic Definitions**

As used in the Contract Documents, the following terms shall have the meanings and refer to the parties designated in these definitions.

**1.1.1 Owner**

The Curators of the University of Missouri. The Owner may act through its Board of Curators or any duly authorized committee or representative thereof.

**1.1.2 Contracting Officer**

The Contracting Officer is the duly authorized representative of the Owner with the authority to execute contracts. Communications to the Contracting Officer shall be forwarded via the Owner's Representative.

**1.1.3 Owner's Representative**

The Owner's Representative is authorized by the Owner as the administrator of the Contract and will represent the Owner during the progress of the Work. Communications from the Architect to the Contractor and from the Contractor to the Architect shall be through the Owner's Representative, unless otherwise indicated in the Contract Documents.

**1.1.4 Architect**

When the term "Architect" is used herein, it shall refer to the Architect or the Engineer specified and defined in the Contract for Construction or its duly authorized representative. Communications to the Architect shall be forwarded to the address shown in the Contract for Construction.

**1.1.5 Contractor**

The Contractor is the person or entity with whom the Owner has entered into the Contract for Construction. The term "Contractor" means the Contractor or the Contractor's authorized representative.

**1.1.6 Subcontractor and Lower-tier Subcontractor**

A Subcontractor is a person or organization who has a contract with the Contractor to perform any of the Work. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or its authorized representative. The term "Subcontractor" also is applicable to those furnishing materials to be incorporated in the Work whether work performed is at the Owner's site or off site, or both. A lower-tier Subcontractor is a person or organization who has a contract with a Subcontractor or another lower-tier Subcontractor to perform any of the Work at the site. Nothing contained in the Contract Documents shall create contractual relationships between the Owner or the Architect and any Subcontractor or lower-tier Subcontractor of any tier.

**1.1.7 Supplier Diversity Definitions**

Businesses that fall into the Supplier Diversity classification shall mean an approved certified business concern which is at least fifty-one percent (51%) owned and controlled by one (1) or more diverse suppliers as described below.

**.1 Minority Business Enterprises (MBE)**

Minority Business Enterprise [MBE] shall mean an approved certified business concern which is at least fifty-one percent (51%) owned and controlled by one (1) or more minorities as defined below or, in the case of any publicly-owned business, in which at least fifty-one percent (51%) of the stock of which is owned by one (1) or more minorities as defined below, and whose management and daily business operations are controlled by one (1) or more minorities as defined herein.

**.1.1** "African Americans", which includes persons having origins in any of the black racial groups of Africa.

**.1.2** "Hispanic Americans", which includes persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race.

**.1.3** "Native Americans", which includes persons of American Indian, Eskimo, Aleut, or Native Hawaiian origin.

**.1.4** "Asian-Pacific Americans", which includes persons whose origins are from Japan, China, Taiwan, Korea, Vietnam, Laos, Cambodia, the Philippines, Samoa, Guam, the U.S. Trust Territories of the Pacific, or the Northern Marianas.

**.1.5** "Asian-Indian Americans", which includes persons whose origins are from India, Pakistan, or Bangladesh.

**.2 Women Business Enterprise (WBE)**

Women Business Enterprise [WBE] shall mean an approved certified business concern which is at least fifty-one percent (51%) owned and controlled by one (1) or more women or, in the case of any publicly-owned business, in which at least fifty-one percent (51%) of the stock of which is owned by one (1) or more women, and whose management and daily business operations are controlled by one (1) or more women.

**.3 Veteran Owned Business**

Veteran Owned Business shall mean an approved certified business concern which is at least fifty-one percent (51%) owned and controlled by one (1) or more Veterans or, in the case of any publicly-owned business, in which at least fifty-one percent (51%) of the stock of which is owned by one (1) or more Veterans, and whose management and daily business operations are controlled by one (1) or more Veterans. Veterans must be certified by the appropriate federal agency responsible for veterans' affairs.

**.4 Service Disabled Veteran Enterprise (SDVE)**

Service Disabled Veteran Enterprise (SDVE) shall mean a business certified by the State of Missouri Office of Administration as a Service Disabled Veteran Enterprise, which is at least fifty-one percent (51%) owned and controlled by one (1) or more Served Disabled Veterans or, in the case of any publicly-owned business, in which at least

fifty-one percent (51%) of the stock of which is owned by one (1) or more Service Disabled Veterans, and whose management and daily business operations are controlled by one (1) or more Serviced Disabled Veterans.

**.5 Disadvantaged Business Enterprise (DBE)**

A Disadvantaged Business Enterprise (DBE) is a for-profit small business concern where a socially and economically disadvantaged individual owns at least 51% interest and also controls management and daily business operations. These firms can and also be referred to as Small Disadvantaged Businesses (SDB). Eligibility requirements for certification are stated in 49 CFR (Code of Federal Regulations), part 26, Subpart D.

U.S. citizens that are African-Americans, Hispanics, Native Americans, Asian-Pacific and Subcontinent Asian Americans, and women are presumed to be socially and economically disadvantaged. Also recognized as DBE's are Historically Black Colleges and Universities (HBCU) and small businesses located in Federal HUB Zones.

To be regarded as economically disadvantaged, an individual must have a personal net worth that does not exceed \$1.32 million. To be seen as a small business, a firm must meet Small Business Administration (SBA) size criteria (500 employees or less) and have average annual gross receipts not to exceed \$22.41 million. To be considered a DBE/SDB, a small business owned and controlled by socially and/or economically disadvantaged individuals must receive DBE certification from one of the recognized Missouri state agencies to be recognized in this classification.

**1.1.9 Work**

Work shall mean supervision, labor, equipment, tools, material, supplies, incidentals operations and activities required by the Contract Documents or reasonably inferable by Contractor therefrom as necessary to produce the results intended by the Contract Documents in a safe, expeditious, orderly, and workmanlike manner, and in the best manner known to each respective trade.

**1.1.10 Approved**

The terms "approved", "equal to", "directed", "required", "ordered", "designated", "acceptable", "satisfactory", and similar words or phrases will be understood to have reference to action on the part of the Architect and/or the Owner's Representative.

**1.1.11 Contract Documents**

The Contract Documents consist of (1) the executed Contract for Construction, (2) these General Conditions of the Contract for Construction, (3) any Supplemental Conditions or Special Conditions identified in the Contract for Construction, (4) the Specifications identified in the Contract for Construction, (5) the Drawings identified in the Contract for Construction, (6) Addenda issued prior to the receipt of bids, (7) Contractor's bid addressed to Owner, including Contractor's completed Qualification Statement, (8)

Contractor's Performance Bond and Contractor's Payment Bond, (9) Notice to Proceed, (10) and any other exhibits and/or post bid adjustments identified in the Contract for Construction, (11) Advertisement for Bid, (12) Information for Bidders, and (13) Change Orders issued after execution of the Contract. All other documents and technical reports and information are not Contract Documents, including without limitation, Shop Drawings, and Submittals.

**1.1.12 Contract**

The Contract Documents form the Contract and are the exclusive statement of agreement between the parties. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior representations or agreements, either written or oral. The Contract Documents shall not be construed to create a contractual relationship of any kind between the Owner and a Subcontractor or any lower-tier Subcontractor.

**1.1.13 Change Order**

The Contract may be amended or modified without invalidating the Contract, only by a Change Order, subject to the limitations in Article 7 and elsewhere in the Contract Documents. A Change Order is a written instrument signed by the Owner and the Contractor stating their agreement to a change in the Work, the amount of the adjustment to the Contract Sum, if any, and the extent of the adjustment to the Contract Time, if any. Agreement to any Change Order shall constitute a final settlement of all matters relating to the change in the work which is the subject of the Change Order, including, but not limited to, all direct and indirect costs associated with such change and any and all adjustments of the Contract sum, time and schedule.

**1.1.14 Substantial Completion**

The terms "Substantial Completion" or "substantially complete" as used herein shall be construed to mean the completion of the entire Work, including all submittals required under the Contract Documents, except minor items which in the opinion of the Architect, and/or the Owner's Representative will not interfere with the complete and satisfactory use of the facilities for the purposes intended.

**1.1.15 Final Completion**

The date when all punch list items are completed, including all closeout submittals and approval by the Architect is given to the Owner in writing.

**1.1.16 Supplemental and Special Conditions**

The terms "Supplemental Conditions" or "Special Conditions" shall mean the part of the Contract Documents which amend, supplement, delete from, or add to these General Conditions.

**1.1.17 Day**

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

**1.1.18 Knowledge.**

The terms “knowledge,” “recognize” and “discover,” their respective derivatives and similar terms in the Contract Documents, as used in reference to the Contractor, shall be interpreted to mean that which the Contractor knows or should know, recognizes or should recognize and discovers or should discover in exercising the care, skill, and diligence of a diligent and prudent contractor familiar with the work. Analogously, the expression “reasonably inferable” and similar terms in the Contract Documents shall be interpreted to mean reasonably inferable by a diligent and prudent contractor familiar with the work.

#### **1.1.19 Punch List**

“Punch List” means the list of items, prepared in connection with the inspection of the Project by the Owner’s Representative or Architect in connection with Substantial Completion of the Work or a portion of the Work, which the Owner’s Representative or Architect has designated as remaining to be performed, completed or corrected before the Work will be accepted by the Owner.

#### **1.1.20 Public Works Contracting Minimum Wage**

The public works contracting minimum wage shall be equal to one hundred twenty percent of the average hourly wage in a particular locality, as determined by the Missouri economic research and information center within the department of economic development, or any successor agency.

#### **1.1.21 Force Majeure**

An event or circumstance that could not have been reasonably anticipated and is out of the control of both the Owner and the Contractor.

### **1.2 Specifications and Drawings**

**1.2.1** The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, construction system, standards and workmanship and performance of related services for the Work identified in the Contract for Construction. Specifications are separated into titled divisions for convenience of reference only. Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade. Such separation will not operate to make the Owner or the Architect an arbiter of labor disputes or work agreements.

**1.2.2** The drawings herein referred to, consist of drawings prepared by the Architect and are enumerated in the Contract Documents.

**1.2.3** Drawings are intended to show general arrangements, design, and dimensions of work and are partly diagrammatic. Dimensions shall not be determined by scale or rule. If figured dimensions are lacking, they

shall be supplied by the Architect on the Contractor's written request to the Owner's Representative.

**1.2.4** The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complimentary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the intended results.

**1.2.5** In the event of inconsistencies within or between parts of the Contract Documents, or between the Contract Documents and applicable standards, codes and ordinances, the Contractor shall (1) provide the better quality or greater quantity of Work or (2) comply with the more stringent requirement; either or both in accordance with the Owner’s Representative’s interpretation. On the Drawings, given dimensions shall take precedence over scaled measurements and large scale drawings over small scale drawings. Before ordering any materials or doing any Work, the Contractor and each Subcontractor shall verify measurements at the Work site and shall be responsible for the correctness of such measurements. Any difference which may be found shall be submitted to the Owner’s Representative and Architect for resolution before proceeding with the Work. If a minor change in the Work is found necessary due to actual field conditions, the Contractor shall submit detailed drawings of such departure for the approval by the Owner’s Representative and Architect before making the change.

**1.2.6** Data in the Contract Documents concerning lot size, ground elevations, present obstructions on or near the site, locations and depths of sewers, conduits, pipes, wires, etc., position of sidewalks, curbs, pavements, etc., and nature of ground and subsurface conditions have been obtained from sources the Architect believes reliable, but the Architect and Owner do not represent or warrant that this information is accurate or complete. The Contractor shall verify such data to the extent possible through normal construction procedures, including but not limited to contacting utility owners and by prospecting.

**1.2.7** Only work included in the Contract Documents is authorized, and the Contractor shall do no work other than that described therein.

**1.2.8** Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents. Contractor represents that it has performed its own investigation and examination of the Work site and its surroundings and satisfied itself before entering into this Contract as to:

- .1 conditions bearing upon transportation, disposal, handling, and storage of materials;

- .2 the availability of labor, materials, equipment, water, electrical power, utilities and roads;
- .3 uncertainties of weather, river stages, flooding and similar characteristics of the site;
- .4 conditions bearing upon security and protection of material, equipment, and Work in progress;
- .5 the form and nature of the Work site, including the surface and sub-surface conditions;
- .6 the extent and nature of Work and materials necessary for the execution of the Work and the remedying of any defects therein; and
- .7 the means of access to the site and the accommodations it may require and, in general, shall be deemed to have obtained all information as to risks, contingencies and other circumstances.
- .8 the ability to complete work without disruption to normal campus activities, except as specifically allowed in the contract documents.

The Owner assumes no responsibility or liability for the physical condition or safety of the Work site or any improvements located on the Work site. The Contractor shall be solely responsible for providing a safe place for the performance of the Work. The Owner shall not be required to make any adjustment in either the Contract Sum or Contract Time concerning any failure by the Contractor or any Subcontractor to comply with the requirements of this Paragraph.

**1.2.9** Drawings, specifications, and copies thereof furnished by the Owner are and shall remain the Owner's property. They are not to be used on another project and, with the exception of one contract set for each party to the Contract, shall be returned to the Owner's Representative on request, at the completion of the Work.

**1.3 Required Provisions Deemed Inserted**

Each and every provision of law and clause required by law to be inserted in this Contract shall be deemed to be inserted herein, and the Contract shall be read and enforced as though it were included herein; and if through mistake or otherwise any such provision is not inserted, or is not correctly inserted, then upon the written application of either party the Contract shall forthwith be physically amended to make such insertion or correction.

**ARTICLE 2  
OWNER**

**2.1 Information and Services Required of the Owner**

**2.1.1** Permits and fees are the responsibility of the Contractor under the Contract Documents, unless specifically stated in the contract documents that the Owner will secure and pay for specific necessary approvals, easements, assessments, and charges required for construction, use or occupancy of permanent

structures, or for permanent changes in existing facilities.

**2.1.2** When requested in writing by the Contractor, information or services under the Owner's control, which are reasonably necessary to perform the Work, will be furnished by the Owner with reasonable promptness to avoid delay in the orderly progress of the Work.

**2.2 Owner's Right to Stop the Work**

**2.2.1** If the Contractor fails to correct Work which is not in strict accordance with the requirements of the Contract Documents or fails to carry out Work in strict accordance with the Contract Documents, the Owner's Representative may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work will not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity. Owner's lifting of Stop Work Order shall not prejudice Owner's right to enforce any provision of this Contract.

**2.3 Owner's Right to Carry Out the Work**

**2.3.1** If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents, and fails within a seven (7) day period after receipt of a written notice from the Owner to correct such default or neglect, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. In such case, an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the cost of correcting such deficiencies, including compensation for the Architect's additional services and expenses made necessary by such default or neglect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to Owner. However, such notice shall be waived in the event of an emergency with the potential for property damage or the endangerment of students, faculty, staff, the public or construction personnel, at the sole discretion of the Owner.

**2.3.2** In the event the Contractor has not satisfactorily completed all items on the Punch List within thirty (30) days of its receipt, the Owner reserves the right to complete the Punch List without further notice to the Contractor or its surety. In such case, Owner shall be entitled to deduct from payments then or thereafter due the Contractor the cost of completing the Punch List items, including compensation for the Architect's additional services. If payments then or thereafter due Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to Owner.

**2.4 Extent of Owner Rights**

**2.4.1** The rights stated in this Article 2 and elsewhere in the Contract Documents are cumulative and not in limitation of any rights of the Owner (1) granted in the Contract Documents, (2) at law or (3) in equity.

**2.4.2** In no event shall the Owner have control over, charge of, or any responsibility for construction means, methods, techniques, sequences or procedures or for safety precautions and programs in connection with the Work, notwithstanding any of the rights and authority granted the Owner in the Contract Documents.

### **ARTICLE 3 CONTRACTOR**

#### **3.1 Contractor's Warranty**

**3.1.1** The Contractor warrants all equipment and materials furnished, and work performed, under this Contract, against defective materials and workmanship for a period of twelve months after acceptance as provided in this Contract, unless a longer period is specified, regardless of whether the same were furnished or performed by the Contractor or any Subcontractors of any tier. Upon written notice from the Owner of any breach of warranty during the applicable warranty period due to defective material or workmanship, the affected part or parts thereof shall be repaired or replaced by the Contractor at no cost to the Owner. Should the Contractor fail or refuse to make the necessary repairs, replacements, and tests when requested by the Owner, the Owner may perform, or cause the necessary work and tests to be performed, at the Contractor's expense, or exercise the Owner's rights under Article 14.

**3.1.2** Should one or more defects mentioned above appear within the specified period, the Owner shall have the right to continue to use or operate the defective part or apparatus until the Contractor makes repairs or replacements or until such time as it can be taken out of service without loss or inconvenience to the Owner.

**3.1.3** The above warranties are not intended as a limitation, but are in addition to all other express warranties set forth in this Contract and such other warranties as are implied by law, custom, and usage of trade. The Contractor, and its surety or sureties, if any, shall be liable for the satisfaction and full performance of the warranties set forth herein.

**3.1.4** Neither the final payment nor any provision in the Contract Documents nor partial or entire occupancy of the premises by the Owner, nor expiration of warranty stated herein, will constitute an acceptance of Work not done in accordance with the Contract Documents or relieve the Contractor of liability in respect to any responsibility for non-conforming work. The Contractor shall immediately remedy any defects in the Work and pay for any damage to other Work resulting therefrom upon written notice from the Owner. Should the Contractor fail or refuse to remedy the non-conforming work, the Owner may perform, or cause to be performed the work necessary to bring the work into conformance with the Contract Documents at the Contractor's expense.

**3.1.5** The Contractor agrees to defend, indemnify, and save harmless The Curators of the University of Missouri, their Officers, Agents, Employees and Volunteers, from and against all loss or expense from any injury or damages to property of others suffered or incurred on account of any breach of the aforesaid obligations and covenants. The Contractor agrees to investigate, handle, respond to and provide defense for and defend against any such liability, claims, and demands at the sole expense of the Contractor, or at the option of the University, agrees to pay to or reimburse the University for the defense costs incurred by the University in connection with any such liability claims, or demands. The parties hereto understand and agree that the University is relying on, and does not waive or intend to waive by any provision of this Contract, any monetary limitations or any other rights, immunities, and protections provided by the State of Missouri, as from time to time amended, or otherwise available to the University, or its officers, employees, agents or volunteers.

#### **3.2 Compliance with Laws, Permits, Regulations and Inspections**

**3.2.1** The Contractor shall, without additional expense to the Owner, comply with all applicable laws, ordinances, rules, statutes, and regulations (collectively referred to as "Laws").

**3.2.2** Since the Owner is an instrumentality of the State of Missouri, municipal, or political subdivision, ordinances, zoning ordinances, and other like ordinances are not applicable to construction on the Owner's property, and the Contractor will not be required to submit plans and specifications to any municipal or political subdivision authority to obtain construction permits or any other licenses or permits from or submit to, inspection by any municipality or political subdivision relating to the construction on the Owner's property, unless required by the Owner in these Contract Documents or otherwise in writing.

**3.2.3** All fees, permits, inspections, or licenses required by municipality or political subdivision for operation on property not belonging to the Owner, shall be obtained by and paid for by the Contractor. The Contractor, of its own expense, is responsible to ensure that all inspections required by said permits or licenses on property, easements, or utilities not belonging to the Owner are conducted as required therein. All connection charges, assessments or transportation fees as may be imposed by any utility company or others are included in the Contract Sum and shall be the Contractor's responsibility, as stated in 2.1.1 above.

**3.2.4** If the Contractor has knowledge that any Contract Documents are at variance with any Laws, including Americans with Disabilities Act – Standards for Accessible Design, ordinances, rules, regulations or codes applying to the Work, Contractor shall promptly notify the Architect and the Owner's Representative, in writing, and any necessary changes will be adjusted as provided in Contract Documents.



However, it is not the Contractor's primary responsibility to ascertain that the Contract Documents are in accordance with applicable Laws, unless such Laws bear upon performance of the Work.

### **3.3 Anti-Kickback**

**3.3.1** No member or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this Contract or to any benefit that may arise therefrom, but this provision shall not be construed to extend to this Contract if made with a corporation for its general benefit.

**3.3.2** No official of the Owner who is authorized in such capacity and on behalf of the Owner to negotiate, make, accept or approve, or to take part in negotiating, making, accepting, or approving any architectural, engineering, inspection, construction, or material supply contract or any Subcontract of any tier in connection with the construction of the Work shall have a financial interest in this Contract or in any part thereof, any material supply contract, Subcontract of any tier, insurance contract, or any other contract pertaining to the Work.

### **3.4 Supervision and Construction Procedures**

**3.4.1** The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences, and procedures and for coordinating all portions of the Work under the Contract. The Contractor shall supply sufficient and competent supervision and personnel, and sufficient material, plant, and equipment to prosecute the Work with diligence to ensure completion thereof within the time specified in the Contract Documents, and shall pay when due any laborer, Subcontractor of any tier, or supplier.

**3.4.2** The Contractor, if an individual, shall give the Work an adequate amount of personal supervision, and if a partnership or corporation or joint venture the Work shall be given an adequate amount of personal supervision by a partner or executive officer, as determined by the Owner's Representative.

**3.4.3** The Contractor and each of its Subcontractors of any tier shall submit to the Owner such schedules of quantities and costs, progress schedules in accordance with 3.17.2 of this document, payrolls, reports, estimates, records, and other data as the Owner may request concerning Work performed or to be performed under the Contract.

**3.4.4** The Contractor shall be represented at the site by a competent superintendent from the beginning of the Work until its final acceptance, whenever contract work is being performed, unless otherwise permitted in writing by the Owner's Representative. The superintendent for the Contractor shall exercise general supervision over the

Work and such superintendent shall have decision making authority of the Contractor. Communications given to the superintendent shall be binding as if given to the Contractor. The superintendent shall not be changed by the contractor without approval from the Owner's Representative.

**3.4.5** The Contractor shall establish and maintain a permanent bench mark to which access may be had during progress of the Work, and Contractor shall establish all lines and levels, and shall be responsible for the correctness of such. Contractor shall be fully responsible for all layout work for the proper location of Work in strict accordance with the Contract Documents.

**3.4.6** The Contractor shall establish and be responsible for wall and partition locations. If applicable, separate contractors shall be entitled to rely upon these locations and for setting their sleeves, openings, or chases.

**3.4.7** The Contractor's scheduled outage/tie-in plan, time, and date for any utilities is subject to approval by the Owner's Representative. Communication with the appropriate entity and planning for any scheduled outage/tie-in of utilities shall be the responsibility of the Contractor. Failure of Contractor to comply with the provisions of this Paragraph shall cause Contractor to forfeit any right to an adjustment of the Contract Sum or Contract Time for any postponement, rescheduling or other delays ordered by Owner in connection with such Work. The Contractor shall follow the following procedures for all utility outages/tie-ins or disruption of any building system:

- .1** All shutting of valves, switches, etc., shall be by the Owner's personnel.
- .2** Contractor shall submit its preliminary outage/tie-in schedule with its baseline schedule.
- .3** The Contractor shall request an outage/tie-in meeting at least two weeks before the outage/tie-in is required.
- .4** The Owner's Representative will schedule an outage/tie-in meeting at least one week prior to the outage/tie-in.

**3.4.8** The Contractor shall coordinate all Work so there shall be no prolonged interruption of existing utilities, systems and equipment of Owner. Any existing plumbing, heating, ventilating, air conditioning, or electrical disconnection necessary, which affect portions of this construction or building or any other building, must be scheduled with the Owner's Representative to avoid any disruption of operation within the building under construction or other buildings or utilities. In no case shall utilities be left disconnected at the end of a work day or over a weekend. Any interruption of utilities, either intentionally or accidentally, shall not relieve the Contractor from repairing and restoring the utility to normal service. Repairs and restoration shall be made before the workers responsible for the repair and restoration leave the job.

**3.4.9** The Contractor shall be responsible for repair of damage to property on or off the project occurring during construction of project, and all such repairs shall be made to meet code requirements or to the satisfaction of the Owner's Representative if code is not applicable.

**3.4.10** The Contractor shall be responsible for all shoring required to protect its work or adjacent property and shall pay for any damage caused by failure to shore or by improper shoring or by failure to give proper notice. Shoring shall be removed only after completion of permanent supports.

**3.4.11** The Contractor shall maintain at his own cost and expense, adequate, safe and sufficient walkways, platforms, scaffolds, ladders, hoists and all necessary, proper, and adequate equipment, apparatus, and appliances useful in carrying on the Work and which are necessary to make the place of Work safe and free from avoidable danger for students, faculty, staff, the public and construction personnel, and as may be required by safety provisions of applicable laws, ordinances, rules regulations and building and construction codes.

**3.4.12** During the performance of the Work, the Contractor shall be responsible for providing and maintaining warning signs, lights, signal devices, barricades, guard rails, fences, and other devices appropriately located on site which shall give proper and understandable warning to all persons of danger of entry onto land, structure, or equipment, within the limits of the Contractor's work area.

**3.4.13** The Contractor shall pump, bail, or otherwise keep any general excavations free of water. The Contractor shall keep all areas free of water before, during and after concrete placement. The Contractor shall be responsible for protection, including weather protection, and proper maintenance of all equipment and materials installed, or to be installed by him.

**3.4.14** The Contractor shall be responsible for care of the Work and must protect same from damage of defacement until acceptance by the Owner. All damaged or defaced Work shall be repaired or replaced to the Owner's satisfaction, without cost to the Owner.

**3.4.15** When requested by the Owner's Representative, the Contractor, at no extra charge, shall provide scaffolds or ladders in place as may be required by the Architect or the Owner for examination of Work in progress or completed.

**3.4.16** The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors of any tier and their agents and employees, and any entity or other persons performing portions of the Work.

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

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

### **3.5 Use of Site**

**3.5.1** The Contractor shall limit operations and storage of material to the area within the Work limit lines shown on Drawings, except as necessary to connect to exiting utilities, shall not encroach on neighboring property, and shall exercise caution to prevent damage to existing structures.

**3.5.2** Only materials and equipment, which are to be used directly in the Work, shall be brought to and stored on the Work site by the Contractor. After equipment is no longer required for the Work, it shall be promptly removed from the Work site. Protection of construction materials and equipment stored at the Work site from weather, theft, damage and all other adversity is solely the responsibility of the Contractor.

**3.5.3** No project signs shall be erected without the written approval of the Owner's Representative.

**3.5.4** The Contractor shall ensure that the Work is at all times performed in a manner that affords reasonable access, both vehicular and pedestrian, to the site of the Work and all adjacent areas. Particular attention shall be paid to access for emergency vehicles, including fire trucks. Wherever there is the possibility of interfering with normal emergency vehicle operations, Contractor shall obtain permission from both campus and municipal emergency response entities prior to limiting any access. The Work shall be performed, to the fullest extent reasonably possible, in such a manner that public areas adjacent to the site of the Work shall be free from all debris, building materials and equipment likely to cause hazardous conditions. Without limitation of any other provision of the Contract Documents, Contractor shall not interfere with the occupancy or beneficial use of (1) any areas and buildings adjacent to the site of the Work or (2) the Work in the event of partial occupancy. Contractor shall assume full responsibility for any damage to the property comprising the Work or to the owner or occupant of any adjacent land or areas resulting from the performance of the Work.

**3.5.5** The Contractor shall not permit any workers to use any existing facilities at the Work site, including, without limitation, lavatories, toilets, entrances, and parking areas other than those designated by Owner. The Contractor, Subcontractors of any tier, suppliers and employees shall comply with instructions or regulations of the Owner's

Representative governing access to, operation of, and conduct while in or on the premises and shall perform all Work required under the Contract Documents in such a manner as not to unreasonably interrupt or interfere with the conduct of Owner's operations. Any request for Work, a suspension of Work or any other request or directive received by the Contractor from occupants of existing buildings shall be referred to the Owner's Representative for determination.

**3.5.6** The Contractor and the Subcontractor of any tier shall have its' name, acceptable abbreviation or recognizable logo and the name of the city and state of the mailing address of the principal office of the company, on each motor vehicle and motorized self-propelled piece of equipment which is used in connection with the project. The signs are required on such vehicles during the time the Contractor is working on the project.

### **3.6 Review of Contract Documents and Field Conditions by Contractor**

**3.6.1** The Contractor shall carefully study and compare the Contract Documents with each other and with information furnished by the Architect and Owner and shall at once report in writing to the Architect and Owner's Representative any errors, inconsistencies or omissions discovered. If the Contractor performs any construction activity which it knows or should have known involves a recognized error, inconsistency or omission in the Contract Documents without such written notice to the Architect and Owner's Representative, the Contractor shall assume appropriate responsibility for such performance and shall bear an appropriate amount of the attributable costs for correction.

**3.6.2** The Contractor shall take field measurements and verify field conditions and shall carefully compare such field measurements and conditions and other information known to the Contractor with the Contract Documents before commencing activities. Errors, inconsistencies or omissions discovered shall be reported in writing to the Architect and Owner's Representative within twenty-four (24) hours. During the progress of work, Contractor shall verify all field measurements prior to fabrication of building components or equipment, and proceed with the fabrication to meet field conditions. Contractor shall consult all Contract Documents to determine the exact location of all work and verify spatial relationships of all work. Any question concerning said location or spatial relationships shall be submitted to the Owner's Representative. Specific locations for equipment, pipelines, ductwork and other such items of work, where not dimensioned on plans, shall be determined in consultation with Owner's Representative and Architect. Contractor shall be responsible for the proper fitting of the Work in place.

**3.6.3** The Contractor shall provide, at the proper time, such material as required for support of the Work. If

openings or chases are required, whether shown on Drawings or not, the Contractor shall see they are properly constructed. If required openings or chases are omitted, the Contractor shall cut them at the Contractors own expense, but only as directed by the Architect, through the Owner Representative.

**3.6.4** Should the Contract Documents fail to particularly describe materials or goods to be used, it shall be the duty of the Contractor to inquire of the Architect and the Owner's Representative what is to be used and to supply it at the Contractor's expense, or else thereafter replace it to the Owner's Representative's satisfaction. At a minimum, the Contractor shall provide the quality of materials as generally specified throughout the Contract Documents.

### **3.7 Cleaning and Removal**

**3.7.1** The Contractor shall keep the Work site and surrounding areas free from accumulation of waste materials, rubbish, debris, and dirt resulting from the Work and shall clean the Work site and surrounding areas as requested by the Architect and the Owner's Representative, including mowing of grass greater than 6 inches high. The Contractor shall be responsible for the cost of clean up and removal of debris from premises. The building and premises shall be kept clean, safe, in a workmanlike manner, and in compliance with OSHA standards at all times. At completion of the Work, the Contractor shall remove from and about the Work site tools, construction equipment, machinery, fencing, and surplus materials. Further, at the completion of the work, all dirt, stains, and smudges shall be removed from every part of the building, all glass in doors and windows shall be washed, and entire Work shall be left broom clean in a finished state ready for occupancy. The Contractor shall advise his Subcontractors of any tier of this provision, and the Contractor shall be fully responsible for leaving the premises in a finished state ready for use to the satisfaction of the Owner's Representative. If the Contractor fails to comply with the provisions of this paragraph, the Owner may do so and the cost thereof shall be charged to the Contractor.

### **3.8 Cutting and Patching**

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

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

**3.8.3** If the Work involves renovation and/or alteration of existing improvements, Contractor acknowledges that cutting

and patching of the Work is essential for the Work to be successfully completed. Contractor shall perform any cutting, altering, patching, and/or fitting of the Work necessary for the Work and the existing improvements to be fully integrated and to present the visual appearance of an entire, completed, and unified project. In performing any Work which requires cutting or patching, Contractor shall use its best efforts to protect and preserve the visual appearance and aesthetics of the Work to the reasonable satisfaction of both the Owner's Representative and Architect.

### **3.9 Indemnification**

**3.9.1** To the fullest extent permitted by law, the Contractor shall defend, indemnify, and hold harmless the Owner, the Architect, Architect's consultants, and the agents, employees, representatives, insurers and re-insurers of any of the foregoing (hereafter collectively referred to as the "Indemnitees") from and against claims, damages (including loss of use of the Work itself), punitive damages, penalties and civil fines unless expressly prohibited by law, losses and expenses, including, but not limited to, attorneys' fees, arising out of or resulting from performance of the Work to the extent caused in whole or in part by negligent acts or omissions or other fault of Contractor, a Subcontractor of any tier, or anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by the negligent acts or omissions or other fault of a party indemnified hereunder. The Contractor's obligations hereunder are in addition to and shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that the Owner may possess. If one or more of the Indemnitees demand performance by the Contractor of obligations under this paragraph or other provisions of the Contract Documents and if Contractor refuses to assume or perform, or delays in assuming or performing Contractor's obligations, Contractor shall pay each Indemnitee who has made such demand its respective attorneys' fees, costs, and other expenses incurred in enforcing this provision. The defense and indemnity required herein shall be a binding obligation upon Contractor whether or not an Indemnitee has made such demand. Even if a defense is successful to a claim or demand for which Contractor is obligated to indemnify the Indemnitees from under this Paragraph, Contractor shall remain liable for all costs of defense.

**3.9.2** The indemnity obligations of Contractor under this Section 3.9 shall survive termination of this Contract or final payment thereunder. In the event of any claim or demand made against any party which is entitled to be indemnified hereunder, the Owner may in its sole discretion reserve, return or apply any monies due or to become due the Contractor under the Contract for the purpose of resolving such claims; provided, however, that the Owner may release such funds if the Contractor provides the Owner with reasonable assurance of

protection of the Owner's interests. The Owner shall in its sole discretion determine if such assurances are reasonable. Owner reserves the right to control the defense and settlement of any claim, action or proceeding which Contractor has an obligation to indemnify the Indemnitees against under Paragraph 3.9.1.

**3.9.3** In claims against any person or entity indemnified under this Section 3.9 by an employee of the Contractor, a Subcontractor of any tier, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under this Section 3.9 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor of any tier under workers' or workmen's compensation acts, disability benefit acts or other employee benefit acts.

**3.9.4** The obligations of the Contractor under Paragraph 3.9.1 shall not extend to the liability of the Architect, his agents or employees, arising out of the preparation and approval of maps, drawings, opinions, reports, surveys, Change Orders, designs, or Specifications.

### **3.10 Patents**

**3.10.1** The Contractor shall hold and save harmless the Owner and its officers, agents, servants, and employees from liability of any nature or kind, including cost and expense, for, or on account of, any patented or otherwise protected invention, process, article, or appliance manufactured or used in the performance of the Contract, including its use by the Owner, unless otherwise specifically stipulated in the Contract Documents.

**3.10.2** If the Contractor uses any design, device, or material covered by letters patent or copyright, he shall provide for such use by suitable agreement with the Owner of such patented or copyrighted design, device, or material. It is mutually agreed and understood, without exception, that the Contract Sum includes and the Contractor shall pay all royalties, license fees or costs arising from the use of such design, device, or material in any way involved in the Work. The Contractor and/or sureties shall indemnify and save harmless the Owner from any and all claims for infringement by reason of the use of such patented or copyrighted design, device, or material or any trademark or copyright in connection with Work agreed to be performed under this Contract and shall indemnify the Owner for any cost, expense, or damage it may be obligated to pay by reason of such infringement at any time during the prosecution of the Work or after completion of the Work.

### **3.11 Materials, Labor, and Workmanship**

**3.11.1** Materials and equipment incorporated into the Work shall strictly conform to the Contract Documents and representations and approved Samples provided by Contractor and shall be of the most suitable grade of their respective kinds for their respective uses, and shall be fit and sufficient for the purpose intended, merchantable, of good

new material and workmanship, and free from defect. Workmanship shall be in accordance with the highest standard in the industry and free from defect in strict accordance with the Contract Documents.

**3.11.2** Materials and fixtures shall be new and of latest design unless otherwise specified, and shall provide the most efficient operating and maintenance costs to the Owner. All Work shall be performed by competent workers and shall be of best quality.

**3.11.3** The Contractor shall carefully examine the Contract Documents and shall be responsible for the proper fitting of his material, equipment, and apparatus into the building.

**3.11.4** The Contractor shall base his bid only on the Contract Documents.

**3.11.5** Materials and workmanship shall be subject to inspection, examination, and test by the Architect and the Owner's Representative at any and all times during manufacture, installation, and construction of any of them, at places where such manufacture, installation, or construction is performed.

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

**3.11.7** Unless otherwise specifically noted, the Contractor shall provide and pay for supervision, labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for the proper execution and completion of the Work.

### **3.11.8 Substitutions**

**3.11.8.1** A substitution is a Contractor proposal of an alternate product or method in lieu of has been specified or shown in the Contract Documents, which is not an "or equal" as set forth in Section 3.12.1.

**3.11.8.2** Contractor may make a proposal to the Architect and the Owner's Representative to use substitute products or methods as set forth herein, but the Architect's and the Owner's Representative's decision concerning acceptance of a substitute shall be final. The Contractor must do so in writing and setting forth the following:

- .1** Full explanation of the proposed substitution and submittal of all supporting data including technical information, catalog cuts, warranties, test results, installation instructions, operating procedures, and other like information necessary for a complete evaluation of the substitution.
- .2** Reasons the substitution is advantageous and necessary, including the benefits to the Owner

and the Work in the event the substitution is acceptable.

- .3** The adjustment, if any, in the Contract Sum, in the event the substitution is acceptable.
- .4** The adjustment, if any, in the time of completion of the Contract and the construction schedule in the event the substitution is acceptable.
- .5** An affidavit stating that (a) the proposed substitution conforms to and meets all of the Contract Documents, except as specifically disclosed and set forth in the affidavit and (b) the Contractor accepts the warranty and correction obligations in connection with the proposed substitution as if originally specified by the Architect. Proposals for substitutions shall be submitted to the Architect and Owner's Representative in sufficient time to allow the Architect and Owner's Representative no less than ten (10) working days for review. No substitution will be considered or allowed without the Contractor's submittal of complete substantiating data and information as stated herein.

**3.11.8.3** Substitutions may be rejected without explanation in Owner's sole discretion and will be considered only under one or more of the following conditions:

- .1** Required for compliance with interpretation of code requirements or insurance regulations then existing;
- .2** Unavailability of specified products, through no fault of the Contractor;
- .3** Material delivered fails to comply with the Contract Documents;
- .4** Subsequent information discloses inability of specified products to perform properly or to fit in designated space;
- .5** Manufacturer/fabricator refuses to certify or guarantee performance of specified product as required; or
- .6** When in the judgment of the Owner or the Architect, a substitution would be substantially to the Owner's best interests, in terms of cost, time, or other considerations.

**3.11.8.4** Whether or not any proposed substitution is accepted by the Owner or the Architect, the Contractor shall reimburse the Owner for any fees charged by the Architect or other consultants for evaluating each proposed substitute.

### **3.12 Approved Equal**

**3.12.1** Whenever in the Contract Documents any article, appliance, device, or material is designated by the name of a manufacturer, vendor, or by any proprietary or trade name, the words "or approved equal," shall automatically follow and shall be implied unless specifically indicated otherwise. The standard products of manufacturers other than those specified will be accepted when, prior to the ordering or use thereof, it is proven to the satisfaction of the Owner's Representative and the Architect they are equal in design, appearance, spare parts availability, strength, durability,

usefulness, serviceability, operation cost, maintenance cost, and convenience for the purpose intended. Any general listings of approved manufacturers in any Contract Document shall be for informational purposes only and it shall be the Contractor's sole responsibility to ensure that any proposed "or equal" complies with the requirements of the Contract Documents.

**3.12.2** The Contractor shall submit to Architect and Owner's Representative a written and full description of the proposed "or equal" including all supporting data, including technical information, catalog cuts, warranties, test results, installation instructions, operating procedures, and similar information demonstrating that the proposed "or equal" strictly complies with the Contract Documents. The Architect or Owner's Representative shall take appropriate action with respect to the submission of a proposed "or equal" item. If Contractor fails to submit proposed "or equals" as set forth herein, it shall waive any right to supply such items. The Contract Sum and Contract Time shall not be adjusted as a result of any failure by Contractor to submit proposed "or equals" as provided for herein. All documents submitted in connection with preparing an "or equal" shall be clearly and obviously marked as a proposed "or equal" submission.

**3.12.3** No approvals or action taken by the Architect or Owner's Representative shall relieve Contractor from its obligation to ensure that an "or equal" article, appliance, devise or material strictly complies with the requirements of the Contract Documents. Contractor shall not propose "or equal" items in connection with Shop Drawings or other Submittals, and Contractor acknowledges and agrees that no approvals or action taken by the Architect or Owner's Representative with respect to Shop Drawings or other Submittals shall constitute approval of any "or equal" item or relieve Contractor from its sole and exclusive responsibility. Any changes required in the details and dimensions indicated in the Contract Documents for the incorporation or installation of any "or equal" item supplied by the Contractor shall be properly made and approved by the Architect at the expense of the Contractor. No 'or equal' items will be permitted for components of or extensions to existing systems when, in the opinion of the Architect, the named manufacturer must be provided in order to ensure compatibility with the existing systems, including, but not limited to, mechanical systems, electrical systems, fire alarms, smoke detectors, etc. No action will be taken by the Architect with respect to proposed "or equal" items prior to receipt of bids, unless otherwise noted in the Special Conditions.

### **3.13 Shop Drawings, Product Data, Samples, and Coordination Drawings/BIM Models**

**3.13.1** Shop Drawings are drawings, diagrams, schedules and other data specifically prepared for the Work by the Contractor or a Subcontractor, sub-subcontractor,

manufacturer, supplier or distributor to illustrate some portion of the Work.

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

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

**3.13.4** Coordination Drawings are drawings for the integration of the Work, including work first shown in detail on shop drawings or product data. Coordination drawings show sequencing and relationship of separate units of work which must interface in a restricted manner to fit in the space provided, or function as indicated. Coordination Drawings are the responsibility of the contractor and are submitted for informational purposes. The Special Conditions will state whether coordination drawings are required. BIM models may be used for coordination in lieu of coordination drawings at the contractor's discretion, unless required in the Special Conditions. The final coordination drawings/BIM Model will not change the contract documents, unless approved by a fully executed change order describing the specific modifications that are being made to the contract documents.

**3.13.5** Shop Drawings, Coordination Drawings/BIM Models, Product Data, Samples and similar submittals (collectively referred to as "Submittals") are not Contract Documents. The purpose of their submittal is to demonstrate for those portions of the Work for which submittals are required the way the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents.

**3.13.6** The Contractor shall schedule submittal of Shop Drawings and Product Data to the Architect so that no delays will result in delivery of materials and equipment, advising the Architect of priority for checking of Shop Drawings and Product Data, but a minimum of two weeks shall be provided for this purpose. Because time is of the essence in this contract, unless noted otherwise in the Special Conditions or Technical Specifications, all submittals, shop drawings and samples must be submitted as required to maintain the contractor's plan for proceeding, but must be submitted within 90 days of the Notice To Proceed. If Contractor believes that this milestone is unreasonable for any submittal, Contractor shall request an extension of this milestone, within 60 days of Notice To Proceed, for each submittal that cannot meet the milestone. The request shall contain a reasonable explanation as to why the 90 day milestone is unrealistic, and shall specify a date on which the submittal will be transmitted, for approval by the Owner's Representative. Failure of the Contractor to comply with this section may result in delays in the submittal approval process and/or charges for expediting approval, both of which will be the responsibility of the Contractor.

**3.13.7** The Contractor, at its own expense, shall submit Samples required by the Contract Documents with reasonable promptness as to cause no delay in the Work or the activities of separate contractors and no later than twenty (20) days before materials are required to be ordered for scheduled delivery to the Work site. Samples shall be labeled to designate material or products represented, grade, place of origin, name of producer, name of Contractor and the name and number of the Owner's project. Quantities of Samples shall be twice the number required for testing so that Architect can return one set of the Samples. Materials delivered before receipt of Architect's approval may be rejected by Architect and in such event, Contractor shall immediately remove all such materials from the Work site. When requested by Architect or Owner's Representative, samples of finished masonry and field applied paints and finishes shall be located as directed and shall include sample panels built at the site of approximately twenty (20) square feet each.

**3.13.8** The Contractor shall perform no portion of the Work requiring submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect. Such Work shall be in accordance with approved submittals.

**3.13.9** By approving and submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents such Submittals strictly comply with the requirements of the Contract Documents and that the Contractor has determined and verified field measurements and field construction criteria related thereto, that materials are fit for their intended use and that the fabrication, shipping, handling, storage, assembly and installation of all materials, systems and equipment are in accordance with best practices in the industry and are in strict compliance with any applicable requirements of the Contract Documents. Contractor shall also coordinate each Submittal with other Submittals.

**3.13.10** Contractor shall be responsible for the correctness and accuracy of the dimensions, measurements and other information contained in the Submittals.

**3.13.11** Each Submittal will bear a stamp or specific indication that the Submittal complies with the Contract Documents and Contractor has satisfied its obligations under the Contract Documents with respect to Contractor's review and approval of that Submittal. Each Submittal shall bear the signature of the representative of Contractor who approved the Submittal, together with the Contractor's name, Owner's name, number of the Project, and the item name and specification section number.

**3.13.12** The Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals.

The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof. Specifically, but not by way of limitation, Contractor acknowledges that Architect's approval of Shop Drawings shall not relieve Contractor for responsibility for errors and omissions in the Shop Drawings since Contractor is responsible for the correctness of dimensions, details and the design of adequate connections and details contained in the Shop Drawings.

**3.13.13** The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous Submittals.

**3.13.14** The Contractor represents and warrants that all Shop Drawings shall be prepared by persons and entities possessing expertise and experience in the trade for which the Shop Drawing is prepared and, if required by the Architect or applicable Laws, by a licensed engineer or other design professional.

### **3.14 Record Drawings**

**3.14.1** The Contractor shall maintain a set of Record Drawings on site in good condition and shall use colored pencils to mark up said set with "record information" in a legible manner to show: (1) bidding addendums, (2) executed change orders, (3) deviations from the Drawings made during construction; (4) details in the Work not previously shown; (5) changes to existing conditions or existing conditions found to differ from those shown on any existing drawings; (6) the actual installed position of equipment, piping, conduits, light switches, electric fixtures, circuiting, ducts, dampers, access panels, control valves, drains, openings, and stub-outs; and (7) such other information as either Owner or Architect may reasonably request. The prints for Record Drawing use will be a set of "blue line" prints provided by Architect to Contractor at the start of construction. Upon Substantial Completion of the Work, Contractor shall deliver all Record Drawings to Owner and Architect for approval. If not approved, Contractor shall make the revisions requested by Architect or Owner's Representative. Final payment and any retainage shall not be due and owing to Contractor until the final Record Drawings marked by Contractor as required above are delivered to Owner.

### **3.15 Operating Instructions and Service Manuals**

**3.15.1** The Contractor shall submit four (4) volumes of operating instructions and service manuals to the Architect before completing 50% of the adjusted contract amount. Payments beyond 50% of the adjusted contract amount may be withheld until all operating instructions and service manuals are received. The operating instructions and service manuals shall contain:

- .1** Start-up and Shutdown Procedures: Provide a step-by-step write up of all major equipment. When manufacturer's printed start-up, trouble shooting and shut-down procedures are available, they may be

incorporated into the operating manual for reference.

- .2 Operating Instructions: Written operating instructions shall be included for the efficient and safe operation of all equipment.
- .3 Equipment List: List of all major equipment as installed shall include model number, capacities, flow rate, and name-plate data.
- .4 Service Instructions: The Contractor shall be required to provide the following information for all pieces of equipment.
  - (a) Recommended spare parts including catalog number and name of local suppliers or factory representative.
  - (b) Belt sizes, types, and lengths.
  - (c) Wiring diagrams.
- .5 Manufacturer's Certificate of Warranty: Manufacturer's certificates of warranty shall be obtained for all major equipment. Warranty shall be obtained for at least one year from the date of Substantial Completion. Where longer period is required by the Contract Documents, the longer period shall govern.
- .6 Parts catalogs: For each piece of equipment furnished, a parts catalog or similar document shall be provided which identifies the components by number for replacement ordering.

### 3.15.2 Submission

- .1 Manuals shall be bound into volumes of standard 8 1/2" x 11" hard binders. Large drawings too bulky to be folded into 8 1/2" x 11" shall be separately bound or folded and in brown envelopes, cross-referenced and indexed with the manuals.
- .2 The manuals shall identify the Owner's project name, project number, and include the name and address of the Contractor and major Subcontractors of any tier who were involved with the activity described in that particular manual.

### 3.16 Taxes

**3.16.1** The Contractor shall pay all applicable sales, consumer, use, and similar taxes for the Work which are legally enacted when the bids are received, whether or not yet effective or scheduled to go into effect. However, certain purchases by the Contractor of materials incorporated in or consumed in the Work are exempt from certain sales tax pursuant to RSMo § 144.062. The Contractor shall be issued a Project Tax Exemption Certificate for this Work to obtain the benefits of RSMo § 144.062.

**3.16.2** The Contractor shall furnish this certificate to all subcontractors, and any person or entity purchasing materials for the Work shall present such certificate to all material suppliers as authorization to purchase, on behalf

of the Owner, all tangible personal property and materials to be incorporated into or consumed in the Work and no other on a tax-exempt basis. Such suppliers shall provide to the purchasing party invoices bearing the name of the exempt entity and the project identification number. Nothing in this section shall be deemed to exempt from any sales or similar tax the purchase of any construction machinery, equipment or tools used in construction, repairing or remodeling facilities for the Owner. All invoices for all personal property and materials purchased under a Project Tax Exemption Certificate shall be retained by the Contractor for a period of five years and shall be subject to audit by the Director of Revenue.

**3.16.3** Any excess resalable tangible personal property or materials which were purchased for the project under this Project Tax Exemption Certificate but which were not incorporated into or consumed in the Work shall either be returned to the supplier for credit or the appropriate sales or use tax on such excess property or materials shall be reported on a return and paid by such purchasing party not later than the due date of the purchasing party's Missouri sales or use tax return following the month in which it was determined that the materials were not used in the Work.

**3.16.4** If it is determined that sales tax is owed by the Contractor on property and materials due to the failure of the Owner to revise the certificate expiration date to cover the applicable date of purchase, Owner shall be liable for the tax owed.

**3.16.5** The Owner shall not be responsible for any tax liability due to Contractor's neglect to make timely orders, payments, etc. or Contractor's misuse of the Project Tax Exemption Certificate. Contractor represents that the Project Tax Exemption Certificate shall be used in accordance with RSMo § 144.062 and the terms of the Project Tax Exemption Certificate. Contractor shall indemnify the Owner for any loss or expense, including but not limited to, reasonable attorneys' fees, arising out of Contractor's use of the Project Tax Exemption Certificate.

### 3.17 Contractor's Construction Schedules

**3.17.1** The Contractor, within fifteen (15) days after the issuance of the Notice to Proceed, shall prepare and submit for the Owner's and Architect's information Contractor's construction schedule for the Work and shall set forth interim dates for completion of various components of the Work and Work Milestone Dates as defined herein. The schedule shall not exceed time limits current under the Contract Documents, shall be revised on a monthly basis or as requested by the Owner's Representative as required by the conditions of the Work, and shall provide for expeditious and practicable execution of the Work. The Contractor shall conform to the most recent schedule.

**3.17.2** The construction schedule shall be in a detailed format satisfactory to the Owner's Representative and the Architect and in accordance with the detailed schedule



requirements set forth in this document and the Special Conditions. If the Owner's Representative or Architect has a reasonable objection to the schedule submitted by Contractor, the construction schedule shall be promptly revised by the Contractor. The Contractor shall monitor the progress of the Work for conformance with the requirements of the construction schedule and shall promptly advise the Owner of any delays or potential delays.

**3.17.3** As time is of the essence to this contract, the University expects that the Contractor will take all necessary steps to insure that the project construction schedule shall be prepared in accordance with the specific requirements of the Special Conditions to this contract. At a minimum, contractor shall comply with the following:

- .1 The schedule shall be prepared using Primavera P3, Oracle P6, Microsoft Project or other software acceptable to the Owner's Representative.
- .2 The schedule shall be prepared and maintained in CPM format, in accordance with Construction CPM Scheduling, published by the Associated General Contractors of American (AGC).
- .3 Prior to submittal to the Owner's Representative for review, Contractor shall obtain full buy-in to the schedule from all major subcontractors, in writing if so requested by Owner's Representative.
- .4 Schedule shall be updated, in accordance with Construction CPM Scheduling, published by the AGC, on a monthly basis at minimum, prior to, and submitted with, the monthly pay application or as requested by the Owner's Representative.
- .5 Along with the update the Contractor shall submit a narrative report addressing all changes, delays and impacts, including weather to the schedule during the last month, and explain how the end date has been impacted by same.
- .6 The submission of the updated certifies that all delays and impacts that have occurred on or to the project during the previous month have been factored into the update and are fully integrated into the schedule and the projected completion date.

Failure to comply with any of these requirements will be considered a material breach of this contract. See Special Conditions for detailed scheduling requirements.

**3.17.4** In the event the Owner's Representative or Architect determines that the performance of the Work, as of a Milestone Date, has not progressed or reached the level of completion required by the Contract Documents, the Owner shall have the right to order the Contractor to take corrective measures necessary to expedite the progress of construction, including, without limitation, (1) working additional shifts or overtime, (2) supplying additional manpower, equipment, facilities, (3) expediting delivery of

materials, and (4) other similar measures (hereinafter referred to collectively as Extraordinary Measures). Such Extraordinary Measures shall continue until the progress of the Work complies with the stage of completion required by the Contract Documents. The Owner's right to require Extraordinary Measures is solely for the purpose of ensuring the Contractor's compliance with the construction schedule. The Contractor shall not be entitled to an adjustment in the Contract Sum concerning Extraordinary Measures required by the Owner under or pursuant to this Paragraph 3.17.3. The Owner may exercise the rights furnished the Owner under or pursuant to this Paragraph 3.17.3 as frequently as the Owner deems necessary to ensure that the Contractor's performance of the Work will comply with any Milestone Date or completion date set forth in the Contract Documents.

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

### **4.1 Rights of the Owner**

**4.1.1** The Owner's Representative will administer the Construction Contract. The Architect will assist the Owner's Representative with the administration of the Contract as indicated in these Contract Documents.

**4.1.2** If, in the judgment of the Owner's Representative, it becomes necessary to accelerate the work, the Contractor, when directed by the Owner's Representative in writing, shall cease work at any point and transfer its workers to such point or points and execute such portions of the work as may be required to enable others to hasten and properly engage and carry out the work, all as directed by the Owner's Representative. The additional cost of accelerating the work, if any, will be borne by the Owner, unless the Contractor's work progress is behind schedule as shown on the most recent progress schedule.

**4.1.3** If the Contractor refuses, for any reason, to proceed with what the Owner believes to be contract work, the Owner may issue a Construction Directive, directing the Contractor to proceed. Contractor shall be obligated to promptly proceed with this work. If Contractor feels that it is entitled to additional compensation for this work, it may file a claim for additional compensation and/or time, in accordance with 4.4 of this document.

**4.1.4** The Owner's Representative, may, by written notice, require a Contractor to remove from involvement with the Work, any of Contractor's personnel or the personnel of its Subcontractors of any tier whom the Owner's Representative may deem abusive, incompetent, careless, or a hindrance to proper and timely execution of the Work. The Contractor shall comply with such notice promptly, but without detriment to the Work or its progress.

**4.1.5** The Owner's Representative will schedule Work status meetings that shall be attended by representatives of the Contractor and appropriate Subcontractors of any tier.

Material suppliers shall attend status meetings if required by the Owner's Representative. These meetings shall include preconstruction meetings.

**4.1.6** The Owner does not allow smoking on University property.

## **4.2 Rights of the Architect**

**4.2.1** The Architect will interpret requirements of the Contract Documents with respect to the quality, quantity and other technical requirements of the Work itself within a reasonable time after written request of the Contractor. Contractor shall provide Owner's Representative a copy of such written request.

## **4.3 Review of the Work**

**4.3.1** The Architect and the Owner's Representative shall, at all times, have access to the Work; and the Contractor shall provide proper and safe facilities for such access.

**4.3.2** The Owner's Representative shall have authority to reject Work that does not strictly comply with the requirements of the Contract Documents. Whenever the Owner's Representative considers it necessary or advisable for implementation of the intent of the Contract Documents, Owner's Representative shall have the authority to require additional inspection or testing of the Work, whether or not such Work is fabricated, installed or completed.

**4.3.3** The fact that the Architect or the Owner's Representative observed, or failed to observe, faulty Work, or Work done which is not in accordance with the Contract Documents, regardless of whether or not the Owner has released final payment, shall not relieve the Contractor from responsibility for all damages and additional costs of the Owner as a result of defective or faulty Work.

## **4.4 Claims**

**4.4.1** A Claim is a demand or assertion by Contractor seeking, as a matter of right, adjustment or interpretation of Contract terms, payment of money, extension of time or any other relief with respect to the terms of the Contract. The term "Claim(s)" also includes demands and assertions of Contractor arising out of or relating to the Contract Documents, including Claims based upon breach of contract, mistake, misrepresentation, or other cause for Contract Modification or rescission. Claims must be made by written notice. Contractor shall have the responsibility to substantiate Claims.

**4.4.2** Claims by Contractor must be made promptly, and no later than within fourteen (14) days after occurrence of the event giving rise to such Claim. Claims must be made by written notice. Such notice shall include a detailed statement setting forth all reasons for the Claim and the amount of additional money and additional time

claimed by Contractor. The notice of Claims shall also strictly comply with all other provisions of the Contract Documents. Contractor shall not be entitled to rely upon any grounds or basis for additional money on additional time not specifically set forth in the notice of Claim. All Claims not made in the manner provided herein shall be deemed waived and of no effect. Contractor shall furnish the Owner and Architect such timely written notice of any Claim provided for herein, including, without limitation, those in connection with alleged concealed or unknown conditions, and shall cooperate with the Owner and Architect in any effort to mitigate the alleged or potential damages, delay or other adverse consequences arising out of the condition which is the cause of such a Claim.

**4.4.3** Pending final resolution of a Claim, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments that are not in dispute in accordance with the Contract Documents.

## **4.5 Claims for Concealed or Unknown Conditions**

**4.5.1** If conditions are encountered at the site which are (1) subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents, or (2) unknown physical conditions of an unusual nature, which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, then notice by the Contractor shall be given to the Owner's Representative promptly before conditions are disturbed, and in no event later than three (3) days after first observance of the conditions. The Owner's Representative will promptly investigate such conditions. If such conditions differ materially, as provided for above and cause an increase or decrease in the Contractor's cost, or time, required for performance of the Work, an equitable adjustment in the Contract sum or Contract Time, or both, shall be made, subject to the provisions and restrictions set for herein. If the Owner's Representative determines that the conditions at the site are not materially different from those indicated in the Contract Documents, and that no change in the terms of the Contract is justified, the Owner's Representative will so notify the Contractor in writing. If the Contractor disputes the finding of the Owner's Representative that no change in the terms of the Contract terms is justified, Contractor shall proceed with the Work, taking whatever steps are necessary to overcome or correct such conditions so that Contractor can proceed in a timely manner. The Contractor may have the right to file a Claim in accordance with the Contract Documents.

**4.5.2** It is expressly agreed that no adjustment in the Contract Time or Contract Sum shall be permitted, however, in connection with a concealed or unknown condition which does not differ materially from those conditions disclosed or which reasonably should have been disclosed by the Contractor's (1) prior inspections, tests, reviews and preconstruction investigations for the Project, or (2) inspections, tests, reviews and preconstruction inspections

which the Contractor had the opportunity to make or should have performed in connection with the Project.

#### **4.6 Claim for Additional Cost**

**4.6.1** If the Contractor makes a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. In addition to all other requirements for notice of a Claim, said notice shall detail and itemize the amount of all Claims and shall contain sufficient data to permit evaluation of same by Owner.

#### **4.7 Claims for Additional Time**

**4.7.1** If the Contractor makes a Claim for an increase in the Contract Time, written notice as provided herein shall be given. In addition to other requirements for notice of a Claim, Contractor shall include an estimate of the probable effect of delay upon the progress of the Work, utilizing a CPM Time Impact Schedule Analysis, (TIA) as defined in the AGC Scheduling Manual. In the case of a continuing delay, only one Claim is necessary.

**.1** Time extensions will be considered for excusable delays only. That is, delays that are beyond the control and/or contractual responsibility of the contractor.

**4.7.2** If weather days are the basis for a Claim for additional time, such Claim shall be documented by the Contractor by data acceptable to the Owner's Representative substantiating that weather conditions for the period of time in question, had an adverse effect on the critical path of the scheduled construction. Weather days shall be defined as days on which critical path work cannot proceed due to weather conditions (including but not limited to rain, snow, etc.), in excess of the number of days shown on the Anticipated Weather Day schedule in the Special Conditions. To be considered a weather day, at least four hours must be lost due to the weather conditions on a critical path scope item for that day. Weather days and Anticipated weather days listed in the Special Conditions shall only apply to Monday through Friday. A weather day claim cannot be made for Saturdays, Sundays, New Year's Day, Martin Luther King Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the day after Thanksgiving Day and Christmas Day, unless that specific day was approved in writing for work by the Owner's Representative.

**.1** The Contractor must have fulfilled its contract obligations with respect to temporary facilities and protection of its work; and worker protection for hot and cold weather per OSHA guidelines.

**.2** If the contract obligations have been satisfied, the Owner will review requests for non-compensable time extensions for critical path activities as follows:

**.2.1** If the Contractor cannot work on a critical path activity due to adverse weather, after implementing all reasonable temporary weather

protection, the Contractor will so notify the Owner's Representative. Each week, the Contractor will notify the Owner's Representative of the number of adverse weather days that it believes it has experienced in the previous week. As provided in the contract, until such time as the weather days acknowledged by the Owner's Representative exceed the number of days of adverse weather contemplated in the Special Conditions, no request for extension of the contract completion time will be considered.

**.2.2** If the Contractor has accumulated in excess of the number of adverse weather days contemplated in the Special Conditions due to the stoppage of work on critical path activities due to adverse weather, the Owner will consider a time extension request from the Contractor that is submitted in accordance with the contract requirements. The Owner will provide a change order extending the time for contract completion or direct an acceleration of the work in accordance with the contract terms and conditions to recover the time lost due to adverse weather in excess of the number of adverse weather working days contemplated in the Special Conditions.

**4.7.3** A Force Majeure event or circumstance shall not be the basis of a claim by the Contractor seeking an adjustment in the Contract amount for costs or expenses of any type. With the exception of weather delays which are administered under this Article 4, and notwithstanding other requirements of the Contract, all Force Majeure events resulting in a delay to the critical path of the project shall be administered as provided in Article 8.

**4.7.4** The Owner will consider and evaluate requests for time extensions due to changes or other events beyond the control of the Contractor on a monthly basis only, with the submission of the Contractor's updated schedule, in conjunction with the monthly application for payment.

#### **4.8 Resolution of Claims and Disputes**

**4.8.1** The Owner's Representative will review Claims and take one or more of the following preliminary actions within ten days of receipt of a Claim: (1) request additional supporting data from the Contractor, (2) reject the Claim in whole or in part, (3) approve the Claim, or (4) suggest a compromise.

**4.8.2** If a Claim has not been resolved, the Contractor shall, within ten days after the Owner's Representative's preliminary response, take one or more of the following actions: (1) submit additional supporting data requested, (2)

modify the initial Claim, or (3) notify the Owner's Representative that the initial Claim stands.

**4.8.3** If a Claim has not been resolved after consideration of the foregoing and of further information presented by the Contractor, the Contractor has the right to seek administrative review as set forth in Section 4.9. However, Owner's Representative's decisions on matters relating to aesthetics will be final.

#### **4.9 Administrative Review**

**4.9.1** Claims not resolved pursuant to the procedures set forth in the Contract Documents except with respect to Owner's Representative's decision on matters relating to aesthetic effect, and except for claims which have been waived by the making or acceptance of final payment, or the Contractor's acceptance of payments in full for changes in work may be submitted to administrative review as provided in this section. All requests for administrative review shall be made in writing.

**4.9.2** Upon written request from the Contractor, the Owner's Review Administrator authorized by the Campus Contracting Officer will convene a review meeting between the Contractor and Owner's Representative's within fifteen (15) days of receipt of such written request. The Contractor and Owner's Representative will be allowed to present written documentation with respect to the claim(s) before or during the meeting. The Contractor and Owner's Representative will be allowed to present the testimony of any knowledgeable person regarding the claim at the review meeting. The Owner's Review Administrator will issue a written summary of the review meeting and decision to resolve the Claim within fifteen (15) days. If the Contractor is in agreement with the decision the Contractor shall notify the Owner's Review Administrator in writing within five (5) days, and appropriate documentation will be signed by the parties to resolve the Claim.

**4.9.3** If the Contractor is not in agreement with the proposal of the Owner's Review Administrator as to the resolution of the claim, the Contractor may file a written appeal with the UM System Contracting Officer, [in care of the Director of Facilities Planning and Development, University of Missouri, 109 Old Alumni Centers, University of Missouri, Columbia, Missouri 65211] within fifteen (15) days after receipt of the Owner's Review Administrator's proposal. The UM System Contracting Officer will call a meeting of the Contractor, the Owner's Representative, and the Owner's Review Administrator by written notice, within thirty (30) days after receipt of the Contractor's written appeal. The Owner's Review Administrator shall provide the UM System Contracting Officer with a copy of the written decision and summary of the review meeting, the Contractor's corrections or comments regarding the summary of the review meeting, and any written documentation presented by the Contractor and the

Owner's Representative at the initial review meeting. The parties may present further documentation and/or present the testimony of any knowledgeable person regarding the claim at the meeting called by the UM System Contracting Officer.

**4.9.4** The UM System Contracting Officer will issue a written decision to resolve the claim within fifteen (15) days after the meeting. If the Contractor is in agreement with the UM System Contracting Officer's proposal, the Contractor shall notify the UM System Contracting Officer in writing within five (5) days, and the Contractor and the Owner shall sign appropriate documents. The issuance of the UM System Contracting Officer's written proposal shall conclude the administrative review process even if the Contractor is not in agreement. However, proposals and any opinions expressed in such proposals issued under this section will not be binding on the Contractor nor will the decisions or any opinions expressed be admissible in any legal actions arising from the Claim and will not be deemed to remove any right or remedy of the Contractor as may otherwise exist by virtue of Contract Documents or law. Contractor and Owner agree that the Missouri Circuit Court for the County where the Work is located shall have exclusive jurisdiction to determine all issues between them. Contractor agrees not to file any complaint, petition, lawsuit or legal proceeding against Owner except with such Missouri Circuit Court.

## **ARTICLE 5 SUBCONTRACTORS**

### **5.1 Award of Subcontracts**

**5.1.1** Pursuant to Article 9, the Contractor shall furnish the Owner and the Architect, in writing, with the name, and trade for each Subcontractor and the names of all persons or entities proposed as manufacturers of products, materials and equipment identified in the Contract Documents and where applicable, the name of the installing contractor. The Owner's Representative will reply to the Contractor in writing if the Owner has reasonable objection to any such proposed person or entity. The Contractor shall not contract with a proposed person or entity to whom the Owner has made reasonable and timely objection.

**5.1.2** The Contractor may request to change a subcontractor. Any such request shall be made in writing to the Owner's Representative. The Contractor shall not change a Subcontractor, person, or entity previously disclosed if the Owner makes reasonable objection to such change.

**5.1.3** The Contractor shall be responsible to the Owner for acts, defaults, and omissions of its Subcontractors of any tier.

### **5.2 Subcontractual Relations**

**5.2.1** By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor of any tier, to the extent of the Work to be performed by the Subcontractor of any tier, to be bound to

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

**5.2.2** All agreements between the Contractor and a Subcontractor or supplier shall contain provisions whereby Subcontractor or supplier waives all rights against the Owner, contractor, Owner's representative, Architect and all other additional insureds for all losses and damages caused by, arising out of, or resulting from any of the perils covered by property or builders risk insurance coverage required of the Contractor in the Contract Documents. If Contractor fails to include said provisions in all subcontracts, Contractor shall indemnify, defend and hold all the above entities harmless in the event of any legal action by Subcontractor or supplier. If insureds on any such policies require separate waiver forms to be signed by any Subcontractors of any tier or suppliers, Contractor shall obtain the same.

### **5.3 Contingent Assignment of Subcontract**

**5.3.1** No assignment by the Contractor of any amount or any part of the Contract or of the funds to be received thereunder will be recognized unless such assignment has had the written approval of the Owner, and the surety has been given due notice of such assignment and has furnished written consent hereto. In addition to the usual recitals in assignment Contracts, the following language must be set forth: "it is agreed that the funds to be paid to the assignee under this assignment are subject to performance by the Contractor of the contract and to claims and to liens for services rendered or materials supplied for the performance of the Work called for in said contract in favor of all persons, firms or corporations rendering such services or supplying such materials.

## **ARTICLE 6 SEPARATE CONTRACTS AND COOPERATION**

**6.1** The Owner reserves the right to let other contracts in connection with the Work.

**6.2** It shall be the duty of each Contractor to whom Work may be awarded, as well as all Subcontractors of any tier employed by them, to communicate immediately with each other in order to schedule Work, locate storage facilities, etc., in a manner that will permit all Contractors to work in harmony in order that Work may be completed in the manner and within the time specified in the Contract Documents.

**6.3** No Contractor shall delay another Contractor by neglecting to perform his work at the proper time. Each Contractor shall be required to coordinate his work with other Contractors to afford others reasonable opportunity for execution of their work. Any costs caused by defective or ill-timed work, including actual damages and liquidated damages for delay, if applicable, shall be borne by the Contractor responsible therefor.

**6.4** Each Contractor shall be responsible for damage to Owner's or other Contractor's property done by him or persons in his employ, through his or their fault or negligence. If any Contractor shall cause damage to any other Contractor, the Contractor causing such damage shall upon notice of any claim, settle with such Contractor.

**6.5** The Contractor shall not claim from the Owner money damages or extra compensation under this Contract when delayed in initiating or completing his performance hereunder, when the delay is caused by labor disputes, acts of God, or the failure of any other Contractor to complete his performance under any Contract with the Owner, where any such cause is beyond the Owner's reasonable control.

**6.6** Progress schedule of the Contractor for the Work shall be submitted to other Contractors as necessary to permit coordinating their progress schedules.

**6.7** If Contractors or Subcontractors of any tier refuse to cooperate with the instructions and reasonable requests of other contractors performing work for the Owner under separate contract, in the overall coordinating of the Work, the Owner's Representative may take such appropriate action and issue such instructions as in his judgement may be required to avoid unnecessary and unwarranted delay.

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

### **7.1 CHANGE ORDERS**

**7.1.1** A change order is a written instrument prepared by the Owner and signed by the Owner and Contractor formalizing their agreement on the following:

- .1** a change in the Work
- .2** the amount of an adjustment, if any, in the Contract amount

.3 an adjustment, if any, in the Contract time

**7.1.2** The Owner may at any time, order additions, deletions, or revisions in the Work by a Change Order or a Construction Change Directive. Such Change Order or Construction Change Directive shall not invalidate the Contract and requires no notice to the surety. Upon receipt of any such document, or written authorization from the Owner's Representative directing the Contractor to proceed pending receipt of the document, Contractor shall promptly proceed with the Work involved in accordance with the terms set forth therein.

**7.1.3** Until such time as the change order is formalized and signed by both the Owner and the Contractor it shall be considered a Change Order Request.

**7.1.4** The amount of adjustment in the contract price for authorized Change Orders will be agreed upon before such Change Orders becomes effective and will be determined as follows:

- .1 By a lump sum proposal from the Contractor and the Subcontractors of any tier, including overhead and profit.
- .2 By a time and material basis with or without a specified maximum. The Contractor shall submit to the Owner's Representative itemized time and material sheets depicting labor, materials, equipment utilized in completing the Work on a daily basis for the Owner's Representative approval. If this pricing option is utilized, the Contractor may be required to submit weekly reports summarizing costs to date on time and material change orders not yet finalized.
- .3 By unit prices contained in the Contractor's original bid and incorporated in the Construction Contract or subsequently agreed upon. Such unit prices contained in the Contractor's original proposal are understood to include the Contractor's overhead and profit. If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are so changed in a proposed Change Order that application of such unit prices to quantities of the Work proposed will cause substantial inequity to the Owner or to the Contractor, the applicable unit prices shall be equitably adjusted.

**7.1.5** The Contractor shall submit all fully documented change order requests with corresponding back-up documentation within the time requested by the Owner but no later than fourteen (14) working days following 1.) the Owner's request for change order pricing in the case of a lump sum; or 2.) the completion of unit price or time and material work.

**7.1.6** The Contractor shall submit change order requests in sufficient detail to allow evaluation by the Owner. Such requests shall be fully itemized by units of labor, material and equipment and overhead and profit. Such breakdowns shall be itemized as follows:

- .1 Labor: The Contractor's proposal shall include breakdowns by labor, by trade, indicating number of hours and cost per hour for each Subcontractor as applicable. Such breakdowns shall only include employees in the direct employ of Contractor or Subcontractors in the performance of the Work. Such employees shall only include laborers at the site, mechanics, craftsmen and foremen. Payroll cost shall include base rate salaries and wages plus the cost of fringe benefits required by agreement or custom and social security contributions, unemployment, payroll taxes and workers' or workmen's compensation insurance and other customary and legally required taxes paid by the Contractor or Subcontractors. Any item or expense outside of these categories is not allowed. The expense of performing Work after regular working hours, on Saturdays, Sundays or legal holidays shall not be included in the above, unless approved in writing and in advance by Owner.
- .2 Material, supplies, consumables and equipment to be incorporated into the Work at actual invoice cost to the Contractor or Subcontractors; breakdowns showing all material, installed equipment and consumables fully itemized with number of units installed and cost per unit extended. Any singular item or items in aggregate greater than one thousand dollars (\$1,000) in cost shall be supported with supplier invoices at the request of the Owner's Representative. Normal hand tools are not compensable.
- .3 Equipment: Breakdown for required equipment shall itemize (at a minimum) delivery / pick-up charge, hourly rate and hours used. Operator hours and rate shall not be included in the equipment breakdown. Contractor must use the most cost effective equipment available in the area and should not exceed the rates listed in the Rental Rate Blue Book for Construction Equipment (Blue Book). Contractor shall submit documentation for the Blue Book to support the rate being requested.

## **7.2 Construction Change Directive**

**7.2.1** A construction change directive is a written order prepared and signed by the Owner, issued with supporting documents prepared by the Architect (if applicable), directing a change in the Work prior to agreement on adjustment of the Contract amount or Contract time, or both. A Construction Change Directive shall be used in the absence of complete agreement between the Owner and Contractor on the terms of a change order. If the Construction Change Directive allows an adjustment of the contract amount or time, such adjustment amount shall be based on one of the following methods:

- .1 A lump sum agreement, properly itemized and supported by substantiating documents of sufficient detail to allow evaluation.

- .2 By unit prices contained in the Contractor's original proposal and incorporated in the Construction Contract or subsequently agreed upon.
- .3 A method agreed to by both the Owner and the contractor with a mutually agreeable fee for overhead and profit.
- .4 In the absence of an agreement between the Owner and the Contractor on the method of establishing an adjustment of the contract amount, the Owner, with the assistance of the architect, shall determine the adjustment amount on the basis of expenditures by the Contractor for labor, materials, equipment and other costs consistent with other provisions of the Contract. The contractor shall keep and submit to the Owner an itemized accounting of all cost components, either expended or saved, while performing the Work covered under the Construction Change Directive.

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

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

### 7.3 Overhead and Profit

7.3.1 Overhead and Profit on Change Orders shall be applied as follows:

- .1 The overhead and profit charged by the Contractor and Subcontractors shall be considered to include, but not limited to, job site office and clerical expense, normal hand tools, incidental job supervision, field supervision, payroll costs and other compensation for project manager, officers, executives, principals, general managers, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, time-keepers, and other personnel employed whether at the site or in principal or a branch office for general superintendent and administration of the Work.
- .2 The percentages for overhead and profit charged on Change Orders shall be negotiated and may vary according to the nature, extent, and complexity of the Work involved but in no case shall exceed the following:

15% To the Contractor or the Subcontractor of any tier for Work performed with their respective forces or materials purchased

5% To the Contractor on Work performed by other than his forces

5% To first tier Subcontractor on Work performed by his Subcontractor

- .3 The Contractor will be allowed to add 2% for the cost of bonding and insurance to their cost of work. This 2% shall be allowed on the total cost of the added work, including overhead and profit.
- .4 Not more than three mark-ups, not to exceed individual maximums shown above, shall be allowed regardless of the number of tier subcontractors. Overhead and profit shall be shown separately for each subcontractor of any tier and the Contractor.
- .5 On proposals covering both increases and decreases in the amount of the Contract, the application of overhead and profit shall be on the net change in direct cost for the Contractor or Subcontractor of any tier performing the Work.
- .6 The percentages for overhead and profit credit to the Owner on Change Orders that are strictly decreases in the quantity of work or materials shall be negotiated and may vary according to the nature, extent, and complexity of the Work involved, but shall not be less than the following:  
Overhead and Profit  
7.5% Credit to the Owner from the Contractor or Subcontractor of any tier for Work performed with their respective forces or materials purchased  
2.5% Credit to the Owner from the Contractor on Work performed by other than his forces  
2.5% Credit to the Owner from the first tier Subcontractor on Work performed by his Subcontractor of any tier

### 7.4 Extended General Conditions

7.4.1 The Contractor acknowledges that the percentage mark-up allowed on change orders for overhead and profit cover the Contractor's cost of administering and executing the Work, inclusive of change orders that increase the contract time. Contractor further acknowledges that no compensation beyond the specified mark-up percentages for extended overhead shall be due or payable as a result of an increase in the Contract Time.

7.4.2 The Owner may reimburse the Contractor for extended overhead if an extension of the Contract Time is granted by the Owner, in accordance with Article 4.7.1 and the Owner determines that the extension of the Contract Time creates an inequitable condition for the Contractor. If these conditions are determined by the Owner to exist the Contractor may be reimbursed by unit prices contained in the Contractor's original bid and incorporated in the Construction Contract or by unit prices subsequently agreed upon.

**7.4.3** If unit prices are subsequently agreed upon, the Contractor's compensation shall be limited as follows:

- .1** For the portion of the direct payroll cost of the Contractor's project manager expended in completing the Work and the direct payroll cost of other onsite administrative staff not included in Article 7.3.1. Direct payroll cost shall include base rate salaries and wages plus the cost of fringe benefits required by agreement or custom and social security contributions, unemployment, payroll taxes and workers' or workmen's compensation insurance and other customary and legally required taxes paid by the Contractor;
- .2** Cost of Contractor's temporary office, including temporary office utilities expense;
- .3** Cost of temporary utilities required in the performance of the work;
- .4** Profit not to exceed 5% of the total extended overhead direct costs;

**7.4.4** All costs not falling into one of these categories and costs of the Contractors staff not employed onsite are not allowed.

### **7.5 Emergency Work**

**7.5.1** If, during the course of the Work, the Owner has need to engage the Contractor in emergency work, whether related to the Work or not, the Contractor shall immediately proceed with the emergency work as directed by the Owner under the applicable provisions of the contract. In so doing, Contractor agrees that all provisions of the contract remain in full force and effect and the schedule for the Work is not impacted in any way unless explicitly agreed to in writing by the Owner.

## **ARTICLE 8 TIME**

### **8.1 Progress and Completion**

**8.1.1** Contractor acknowledges and agrees that time is of the essence of this Contract

**8.1.2** Contract Time is the period of time set forth in the Contract for Construction required for Substantial Completion and Final Completion of the entire Work or portions of the Work as defined in the Contract Documents. Time limits stated in the Contract Documents are of the essence of the Contract. The Contract Time may only be changed by a Change Order. By executing the Contract, the Contractor confirms that the Contract Time is a sufficient period for performing the Work in its entirety.

**8.1.3** The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance and

bonds required by Article 11 to be furnished by the Contractor.

**8.1.4** The Contractor shall proceed expeditiously and diligently with adequate forces and shall achieve Substantial Completion and Final Completion within the time specified in the Contract Documents.

### **8.2 Delay in Completion**

**8.2.1** The Contractor shall be liable for all of the Owner's damages for delay in achieving Substantial Completion and/or Final Completion of the entire Work or portions of Work as set forth in the Contract Documents within the Contract Time unless liquidated damages are specifically provided for in the Contract Documents. If liquidated damages are specifically provided for in the Contract for Construction, Contractor shall be liable for such liquidated damages as set forth in Paragraph 8.3

**8.2.2** All time limits stated in the Contract are of the essence of the Contract. However, if the Contractor is delayed at any time in the progress of the Work by any act or neglect of the Owner or by the Owner's Representative, by changes ordered in the Work, Force Majeure including but not limited to war, armed conflict, riot, civil commotion or disorder, act of terrorism or sabotage; epidemic, pandemic, outbreaks of infectious disease or any other public health crisis, including quarantine or other employee restrictions, compliance with any law or governmental order, rule, regulation or direction, curfew restriction, act of God or natural disaster such as earthquake, volcanic activity, landslide, tidal wave, tsunami, flood, damage or destruction by lightning, drought; explosion, fire, destruction of machines, equipment, prolonged break-down of transport, telecommunication or electric current; general labor disturbance such as but not limited to boycott, strike and lock-out, occupation of factories and premises, or any other causes beyond the Contractor's reasonable control which the Owner's Representative determines may justify delay then, upon submission of the Time Impact Schedule Analysis (TIA) justifying the delay called out in Section 4.7 of these General Conditions, the Contract Time may be extended for a reasonable time to the extent such delay will prevent Contractor from achieving Substantial Completion and/or Final Completion within the Contract Time and if performance of the Work is not, was not or would not have been delayed by any other cause for which the Contractor is not entitled to an extension of the Contract Time under the Contract Documents. It shall be a condition precedent to any adjustment of the Contract Time that Contractor provide the Owner's Representative with written notice of the cause of delay within seven (7) days from the occurrence of the event or condition which caused the claimed delay. If a Force Majeure is approved by the Owner as the basis for a delay claim, an adjustment in the contract time to the extent the Force Majeure impacts the schedule is the only remedy. No increase in the contract sum for any reason shall be allowed due to a Force Majeure.



**8.2.3** The Contractor further acknowledges and agrees that adjustments in the Contract Time will be permitted for a delay only to the extent such delay (1) is not caused, or could not have been anticipated, by the Contractor, (2) could not be limited or avoided by the Contractor's timely notice to the Owner of the delay, (3) prevents Contractor from completing its Work by the Contract Time, and (4) is of a duration not less than one (1) day. Delays attributable to and within the control of a Subcontractor or supplier shall not justify an extension of the Contract Time.

**8.2.4** Notwithstanding anything to the contrary in the Contract Documents, except as otherwise noted in these General Conditions, an extension in the Contract Time, to the extent permitted under this Article, shall be the sole remedy of the Contractor for any (1) delay in the commencement, prosecution or completion of the Work, (2) hindrance or obstruction in the performance of the Work, (3) loss of productivity, or (4) other claims due to or caused by any events beyond the control of both the Owner and Contractor defined herein as Force Majeure. In no event shall the Contractor be entitled to any compensation or recovery of any damages or any portion of damages resulting from delays caused by or within the control of Contractor or by acts or omissions of Contractor or its Subcontractors of any tier or delays beyond the control of both Owner and Contractor. If the Contractor contends that delay, hindrance, obstruction or other adverse condition results from acts or omissions of the Owner, the Owner's Representative or the Architect, Contractor shall provide written notice to the Owner within seven (7) calendar days of the event giving rise to such claim. Contractor shall only be entitled to an adjustment in the Contract Sum to the extent that such acts or omissions continue after the Contractor's written notice to the Owner of such acts or omissions, but in no case shall Force Majeure be the basis of an increase in the Contract sum. The Owner's exercise of any of its rights or remedies under the Contract Documents (including, without limitation, ordering changes in the Work, or directing suspension, rescheduling or correction of the Work) regardless of the extent or frequency of the Owner's exercise of such rights or remedies, shall not be the basis of any Claim for an increase in the Contract Sum or Contract Time. In the event Contractor is entitled to an adjustment in the Contract Sum for any delay, hindrance, obstruction or other adverse condition caused by the acts or omissions of the Owner, the Owner's Representative or the Architect, Contractor shall only be entitled to its actual direct costs caused thereby and Contractor shall not be entitled to and waives any right to special, indirect, or consequential damages including loss of profits, loss of savings or revenues, loss of anticipated profits, labor inefficiencies, idle equipment, home office overhead, and similar type of damages.

**8.2.5** If the Contractor submits a progress report or any construction schedule indicating, or otherwise expressing an intention to achieve completion of the Work prior to any completion date required by the Contract Documents or

expiration of the Contract Time, no liability of the Owner to the Contractor for any failure of the Contractor to so complete the Work shall be created or implied. Further, the Contractor acknowledges and agrees that even if Contractor intends or is able to complete the Work prior to the Contract Time, it shall assert no Claim and the Owner shall not be liable to Contractor for any failure of the Contractor, regardless of the cause of the failure, to complete the Work prior to the Contract Time.

### **8.3 Liquidated Damages**

**8.3.1** If Liquidated Damages are prescribed on the Bid Form and Special Conditions in the Contract Documents, the Owner may deduct from the Contract Sum and retain as Liquidated Damages, and not as penalty or forfeiture, the sum stipulated in the Contract Documents for each calendar day after the date specified for completion of the Work that the entire Work is not substantially complete and/or finally complete.

**8.3.2** The Owner's Representative shall establish the date of Substantial completion and the date of Final Completion of the Work which shall be conclusive and binding on the Owner and Contractor for the purpose of determining whether or not Liquidated Damages shall be assessed under terms hereof and the sum total amount due.

**8.3.3** Liquidated Damages or any matter related thereto shall not relieve the Contractor or his surety of any responsibility or obligation under this Contract.

## **ARTICLE 9 PAYMENTS AND COMPLETION**

### **9.1 Commencement, Prosecution, and Completion**

**9.1.1** The Contractor shall commence Work within five (5) days upon the date of a "Notice to Proceed" from the Owner or the date fixed in the Notice to Proceed. Contractor shall prosecute the Work with faithfulness and diligence, and the Contractor shall complete the Work within the Contract Time set forth in the Contract Documents.

**9.1.2** The Owner will prepare and forward three (3) copies of the Contract and Performance Bond to the bidder to whom the contract for the Work is awarded and such bidder shall return two (2) properly executed prescribed copies of the Contract and Bond to the Owner.

**9.1.3** The construction period, when specified in consecutive calendar days, shall begin when the Contractor receives notice requesting the instruments listed in below. Before the Owner will issue Notice to Proceed to permit the Contractor to begin Work, the Owner shall have received the following instruments, properly executed as described in the Contract Documents. The documents below shall have been received by the Owner within fifteen (15) days after receipt of request for documents:

- .1** Contract
- .2** Bond (See Article 11)

- .3 Insurance (See Article 11)
- .4 List of Subcontractors of any tier
- .5 Affirmative Action Plan (see Article 13.4)

**9.1.4** In the event Contractor fails to provide Owner such documents, Contractor may not enter upon the site of the Work until such documents are provided. The date the Contractor is required to commence and complete the Work shall not be affected by the Owner denying Contractor access to the site as a result of Contractor's failure to provide such documents and Contractor shall not be entitled to an adjustment of the Contract Time or Contract sum as a result of its failure to comply with the provisions of this Paragraph

**9.1.5** Contracts executed by partnerships shall be signed by all general partners of the partnership. Contracts signed by corporations shall be signed by the President or Vice President and the Secretary or Assistant Secretary. In case the Assistant Secretary or Vice President signs, it shall be so indicated by writing the word "Asst." or "Vice" in front of the words "Secretary" and "President". The corporate seal of the corporation shall be affixed. For all other types of entities, the Contractor and the person signing the Contract on behalf of Contractor represent and warrant that the person signing the Contract has the legal authority to bind Contractor to the Contract.

**9.1.6** Any successful bidder which is a corporation organized in a state other than Missouri or any bidder doing business in the State of Missouri under a fictitious name shall furnish, at no cost to the Owner, no later than the time at which the executed Contract for Construction, the Payment Bond, and the Performance Bond are returned, a properly certified copy of its current Certificate of Authority and License to do business in the State of Missouri. No contract will be executed by the Owner until such certificate is furnished by the bidder, unless there already is on file with the Owner a current certificate, in which event, no additional certificate will be required during the period of time for which such current certificate remains in effect.

**9.1.7** Within fifteen (15) calendar days of the issuance of a Notice to Proceed, the Contractor shall submit one (1) signed copy of the following instruments. No payment will be processed until all of these instruments are received and approved by the Owner's Representative.

- .1 Reproducible progress and payment schedule
- .2 Contractor's Schedule of Values
- .3 List of material suppliers
- .4 Itemized breakdown of all labor rates for each classification. Overhead and profit shall not be included. Payroll cost shall include base rate salaries and wages plus the cost of fringe benefits required by agreement or custom and social security contributions, unemployment, payroll taxes and workers' or workmen's compensation

insurance and other customary and legally required taxes paid by the Contractor or Subcontractors. Any item or expense outside of these categories is not allowed. The expense of performing Work after regular working hours, on Saturdays, Sundays or legal holidays shall not be included in the above, unless approved in writing and in advance by Owner.

- .5 Itemized breakdown of anticipated equipment rates (breakout operator rate). Overhead and profit shall not be included. Breakdown for required equipment shall itemize (at a minimum) delivery/ pick-up charge, hourly rate and hours used. Operator hours and rate shall not be included in the equipment breakdown. Contractor must use the most cost effective equipment available in the area and should not exceed the rates listed in the Rental Rate Blue Book for Construction Equipment (Blue Book). Contractor shall submit documentation for the Blue Book to support the rate being requested.

**9.1.8** The Contractor shall be paid electronically using the Owner's web-based payment program with a direct electronic transfer from the Owner's account into the Contractor's account. The Contractor must submit the following information to the Owner's Representative:

- .1 Bank Transit Number for the Contractor's bank into which the electronic deposit will be made.
- .2 Bank Account Number for the Contractor's account into which the electronic deposit will be made.
- .3 Contractor's E-Mail address so that formal notification of the deposit by the Owner can be provided.

**9.2 Contract Sum**

**9.2.1** The Owner shall compensate Contractor for all Work described herein and in the Contract Documents the Contract Sum set forth in the Contract for Construction, subject to additions and deletions as provided hereunder.

**9.3 Schedule of Values**

**9.3.1** Within fifteen (15) days after receipt of the Notice to Proceed, the Contractor shall submit to the Owner's Representative a schedule of values allocated to various portions of the Work, prepared in such form and supported by such data to substantiate its accuracy as the Owner's Representative may require. This schedule, unless objected to by the Owner's Representative, shall be used as a basis for reviewing the Contractor's Applications for Payment. The values set forth in such schedule may, at the Owner's option be used in any manner as fixing a basis for additions to or deletions from the Contract Sum.

**9.3.2** The progress and payment schedule of values shall show the following:

- .1 Enough detail as necessary to adequately evaluate the actual percent complete of any line item on a

monthly basis, as determined by the Owner's Representative.

.2 Line items, when being performed by a subcontractor or material supplier, shall correlate directly back to the subcontract or purchase order amount if requested by the Owner's Representative.

#### 9.4 Applications for Payment

9.4.1 The Contractor shall submit monthly to the Owner's Representative and the Architect an itemized Application for Payment for operations completed in accordance with the Schedule of Values. Such application shall be supported by such data substantiating the Contractor's right to payment as the Owner's Representative or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and reflecting retainage as provided for herein.

9.4.2 Such applications shall not include requests for payment of amounts the Contractor does not intend to pay to a Subcontractor or material supplier

9.4.3 Progress payments shall be made on account of materials and equipment delivered to the site and incorporated in the Work. No payments will be made for materials and equipment stored at the Project site but not yet incorporated into the Work except as provided in Paragraph 9.4.4.

9.4.4 If approved in writing and in advance by Owner, progress payments may be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. Owner may in its sole discretion refuse to grant approval for payments for materials and equipment stored at the Project site but not yet incorporated in the Work. Any approval by Owner for payment for materials and equipment delivered and suitably stored at the site, or stored offsite as noted below, for subsequent incorporation in the Work shall be conditioned upon Contractor's demonstrating that such materials and equipment are adequately protected from weather, damage, vandalism and theft and that such materials and equipment have been inventoried and stored in accordance with procedures established by or approved by the Owner. Nothing in this clause shall imply or create any liability on the part of the Owner for the Contractor's inventory and storage procedures or for any loss or damage to material, equipment or supplies stored on the site, whether incorporated into the work or not. In the event any such loss or damage occurs, the Contractor remains solely responsible for all costs associated with replacement of the affected materials, supplies and equipment including labor and incidental costs, and shall have no claim against the Owner for such loss.

No allowance shall be made in the project pay requests for materials not delivered to the site of the work and incorporated into the work, except as noted below. For

the purposes of this Article, Offsite is defined as any location not owned or leased by the Owner. Contractor shall submit a list of materials that they are requesting payment for offsite storage within 60 days of Notice Proceed.

- .1 Items considered to be major items of considerable magnitude, if suitably stored, may be allowed in project pay requests on the basis of ninety percent (90%) of invoices
- .2 Determination of acceptable "major items of considerable magnitude" and "suitably stored" shall be made by the Owner's Representative.
- .3 Aggregate quantities of materials not considered unique to this project will not be considered for offsite storage payment.
- .4 Contractor shall submit to the Owner's Representative a list of the material for which application for payment for offsite storage is anticipated no less than forty-five days prior to the submission of the applicable pay request. The list shall include a material description, applicable division, quantity and discounts offered to the Owner for early payment. Contractor shall also submit the location the material will be stored and the method of protection
- .5 The storage facility shall be subject to approval by the Owner's representative, shall be located within an acceptable distance of the project sites as established by the Owner's Representative and all materials for the Owner's project must be stored separately from all other items within the storage facility and shall be labeled and stored in the name of the Curators of the University of Missouri.
- .6 The Owner's representative shall be provided a minimum of two weeks time to visit the storage facility and inspect the stored material prior to submission of the pay request.
- .7 Upon favorable inspection by the Owner's Representative, the Contractor shall, at the Owner's option, submit the appropriate UCC filing, transferring title of the material or equipment to The Curators of the University of Missouri.
- .8 An invoice provided by the supplier shall be included with the applicable pay request.
- .9 The contractor shall remain fully responsible for all items, until acceptance of the project by the Owner.
10. The contractor shall reimburse all costs incurred by the Owner in inspecting and verifying all material stored offsite, including mileage, airfare, meals, lodging and time, charged at a reasonable hourly rate.

9.4.5 The Application for Payment shall constitute a representation by the Contractor to the Owner that the Work has progressed to the point indicated; the quality of the Work covered by the Application for Payment is in accordance with the Contract Documents; and the Contractor is entitled to payment in the amount requested.

9.4.6 The Contractor will be reimbursed for ninety-five percent (95%) of the value of all labor furnished and

material installed and computed in the same manner, less all previous payments made. On projects where a bond is not required, the contractor will be reimbursed for ninety percent (90%) of the value of all labor furnished and material installed and computed in the same manner, less all previous payments made

## **9.5 Approval for Payment**

**9.5.1** The Owner's Representative will, within fifteen (15) days after receipt of the Contractor's Application for Payment, either approve Contractor's Application for Payment for such amount as the Owner's Representative determines is properly due, or notify the Contractor of the Owner's Representative's reasons for withholding certification in whole or in part as provided in Section 9.6.

## **9.6 Decisions to Withhold Approval**

**9.6.1** The Owner's Representative may decide not to certify payment and may withhold approval in whole or in part, to the extent reasonably necessary to protect the Owner. If the Owner's Representative is unable to approve payment in the amount of the Application, the Owner's Representative will notify the Contractor as provided in Paragraph 9.5.1. If the Contractor and Owner's Representative cannot agree on a revised amount, the Owner's Representative will promptly issue approval for payment for the amount for which the Owner's Representative is able to determine is due Contractor. The Owner's Representative may also decide not to approve payment or, because of subsequently discovered evidence or subsequent observations, may nullify the whole or a part of approval for payment previously issued, to such extent as may be necessary in the Owner's Representative opinion to protect the Owner from loss because of:

- .1** defective Work not remedied or damage to completed Work;
- .2** failure to supply sufficient skilled workers or suitable materials;
- .3** third party claims filed or reasonable evidence indicating probable filing of such claims;
- .4** failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment, Owner may, at its sole option issue joint checks to subcontractors who have presented evidence that it has not been paid in accordance with the Contract;
- .5** reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .6** damage to the Owner or another contractor;
- .7** reasonable evidence that the Work will not be completed within the Contract Time or an unsatisfactory rate of progress made by Contractor;
- .8** Contractor's failure to comply with applicable Laws;
- .9** Contractor's or Subcontractor's failure to comply with contract Prevailing Wage requirements; or

**.10** Contractor's failure to carry out the Work in strict accordance with the Contract Documents.

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

## **9.7 Progress Payments**

**9.7.1** Based upon Applications for Payment submitted to the Owner by the Contractor and approvals issued by the Owner's Representative, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

**9.7.2** The period covered by each Application for Payment shall be one (1) calendar month.

**9.7.3** The Owner shall make payment to Contractor for amounts due and approved by Owner's Representative not later than thirty (30) days after the Owner approves a properly detailed Application for Payment which is in compliance with the Contract Documents. The Owner shall not have the obligation to process or pay such Application for Payment until it receives an Application for Payment satisfying such requirements.

**9.7.4** Based on the Schedule of Values submitted by Contractor, Applications for Payment submitted by Contractor shall indicate the actual percentage of completion of each portion of Contractor's Work as of the end of the period covered by the Application for Payment.

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

**9.7.6** Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor of any tier nor a laborer or employee of Contractor except to the extent required by law. Retainage provided for by the Contract Documents are to be retained and held for the sole protection of Owner, and no other person, firm or corporation shall have any claim or right whatsoever thereto.

**9.7.7** An approval for payment by Owner's Representative, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

## **9.8 Failure of Payment**

**9.8.1** If the Owner is entitled to reimbursement or payment from the Contractor under or pursuant to the Contract Documents, such payment by Contractor shall be made promptly upon demand by the Owner. Notwithstanding anything contained in the Contract Documents to the contrary, if the Contractor fails to promptly make any payment due the Owner, or the Owner incurs any costs and expenses to cure any default of the Contractor or to correct defective Work, the Owner shall have an absolute right to offset such amount against the Contract Sum and may, in the Owner's sole discretion, elect either to: (1) deduct an amount equal to that to which the Owner is entitled from any payment then or thereafter due the Contractor from the Owner, or (2) issue a written notice to the Contractor reducing the Contract Sum by an amount equal to that to which the Owner is entitled.

## **9.9 Substantial Completion**

**9.9.1** Substantial Completion is the stage in the progress of the Work as defined in Paragraph 1.1.9 as certified by the Owner.

**9.9.2** When the Contractor considers the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall notify the Owner and the Architect. The Owner's Representative will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Owner's Representative's inspection discloses any item which is not in accordance with the requirements of the Contract Documents, the Contractor shall complete or correct such item upon notification by the Owner's Representative. The Contractor shall then submit a request for another inspection by the Owner's Representative to determine Substantial Completion. When the Work or designated portion thereof is substantially complete, the Owner will issue a Certificate of Substantial Completion. Substantial Completion shall transfer from the Contractor to the Owner responsibilities for security, maintenance, heat, utilities, damage to the Work and insurance. In no event shall Contractor have more than thirty (30) days to complete all items on the Punch List and achieve Final Completion. Warranties required by the Contract Documents shall commence on the date of Substantial Completion or as agreed otherwise.

**9.9.3** At the date of Substantial Completion, the Contractor may apply for, and if approved by Owner's Representative, the Owner, subject to the provisions herein, shall increase total payments to one hundred percent (100%) of the Contract Sum less one hundred fifty percent (150%) of the value of any incomplete Work and unsettled claims, as determined by the Owner's Representative.

## **9.10 Partial Occupancy or Use**

**9.10.1** The Owner may occupy or use any completed or partially completed portion of the Work at any stage when

such portion is designated by separate agreement with the Contractor. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, security, maintenance, heat, utilities, damage to the Work and insurance. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by the Owner's Representative.

**9.10.2** Immediately before such partial occupancy or use, the Owner, and Contractor shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work. Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

## **9.11 Final Completion and Final Payment**

**9.11.1** Upon receipt of written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Owner's Representative and the Architect will promptly make such inspection and, when the Owner's Representative and Architect find the Work acceptable under the Contract Documents and the Contract fully performed, the Owner's Representative will promptly issue a final approval for payment; otherwise, Owner's Representative will return Contractor's Final Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application. Submission of a Final Application for Payment shall constitute a further representation that conditions listed in Paragraph 9.11.2 as precedent to the Contractor's being entitled to final payment have been fulfilled. All warranties and guarantees required under or pursuant to the Contract Documents shall be assembled and delivered by the Contractor to the Owner's Representative as part of the final Application for Payment. The final approval for payment will not be issued by the Owner's Representative until all warranties and guarantees have been received and accepted by the Owner.

**9.11.2** The Owner will request the Contractor to submit the application for final payment along with a manually signed notarized letter on the Contractor's letterhead certifying that:

- .1** Labor costs, prevailing wage rates, fringe benefits and material costs have been paid.
- .2** Subcontractors of any tier and manufacturers furnishing materials and labor for the project have fully completed their Work and have been paid in full.
- .3** The project has been fully completed in accordance with the Contract Documents as modified by Change Orders.
- .4** The acceptance by Contractor of its Final Payment, by check or electronic transfer, shall be and operate

as a release of all claims of Contractor against Owner for all things done or furnished or relating to the Work and for every act or alleged neglect of Owner arising out of the Work.

**9.11.3** Final Payment constituting the entire unpaid balance due shall be paid by the Owner to the Contractor within thirty (30) days after Owner's receipt of Contractor's Final Application for Payment which satisfies all the requirements of the Contract Documents and Owner's receipt of all information and documents set forth in Section 9.11.

**9.11.4** No payment under this Contract, including but not limited to final payment, shall constitute acceptance by Owner of any Work or act not in accordance with the requirements of the Contract Documents.

**9.11.5** No recourse shall be had against any member of the Board of Curators, or officer thereof, for any payment under the Contract or any claim based thereon.

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

### **10.1 Safety Precautions and Programs**

**10.1.1** The Contractor shall at all times conduct operations under this Contract in a manner to avoid the risk of bodily harm to persons or risk of damage to any property. The Contractor shall promptly take precautions which are necessary and adequate against conditions created during the progress of the Contractor's activities hereunder which involve a risk of bodily harm to persons or a risk of damage to property. The Contractor shall continuously inspect Work, materials, and equipment to discover and determine any such conditions and shall be solely responsible for discovery, determination, and correction of any such conditions. The Contractor shall comply with applicable safety laws, standards, codes, and regulations in the jurisdiction where the Work is being performed, specifically, but without limiting the generality of the foregoing, with rules regulations, and standards adopted pursuant to the Williams-Steiger Occupational Safety and Health Act of 1970 and applicable amendments.

**10.1.2** All contractors, subcontractors and workers on this project are subject to the Construction Safety Training provisions 292.675 RSMo.

**10.1.3** In the event the Contractor encounters on the site, material reasonably believed to be asbestos, polychlorinated biphenyl (PCB), lead, mercury, or other material known to be hazardous, which has not been rendered harmless, the Contractor shall immediately stop Work in the area affected and report the condition to the Owner's Representative and the Architect in writing. The Work in the affected area shall not thereafter be resumed

except by written agreement of the Owner's Representative and Contractor if in fact the material is asbestos or polychlorinated biphenyl (PCB) and has not been rendered harmless. The Work in the affected area shall be resumed in the absence of asbestos or polychlorinated biphenyl (PCB), or when it has been rendered harmless by written agreement of the Owner's Representative and the Contractor. "Rendered Harmless" shall mean that levels of such materials are less than any applicable exposure standards, including but limited to OSHA regulations.

### **10.2 Safety Of Persons And Property**

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

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

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

**10.2.3** The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, safeguards for safety and protection, including, but not limited to, posting danger signs and other warnings against hazards, promulgating safety regulations, and notifying owners and users of adjacent sites and utilities.

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

**10.2.5** The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Article 10 caused in whole or in part by the Contractor, a Subcontractor of any tier, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable, and for which the Contractor is responsible under Article 10, except damage or loss attributable solely to acts or omissions of Owner or the Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are

in addition to the Contractor's other obligations stated elsewhere in the Contract.

**10.2.6** The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents, and the maintaining, enforcing and supervising of safety precautions and programs. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner's Representative and Architect. The Contractor shall hold regularly scheduled safety meetings to instruct Contractor personnel on safety practices, accident avoidance and prevention, and the Project Safety Program. The Contractor shall furnish safety equipment, and enforce the use of such equipment by its employees and its subcontractors of any tier.

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

**10.2.8** The Contractor shall promptly report in writing to the Owner all accidents arising out of or in connection with the Work which cause death, lost time injury, personal injury, or property damage, giving full details and statements of any witnesses. In addition, if death, serious personal injuries, or serious property damages are caused, the accident shall be reported immediately by telephone or messenger to the Owner

**10.2.9** The Contractor shall promptly notify in writing to the Owner of any claims for injury or damage to personal property related to the work, either by or against the Contractor.

## **ARTICLE 11 INSURANCE & BONDS**

### **11.1 Insurance**

**11.1.1** Contractor shall secure from the date of the Contract for Construction and maintain for such periods of time as set forth below, insurance of such types and in such amounts specified below, to protect Contractor, Owner and others against all hazards or risks of loss described below. The form of such insurance together with carriers thereof, in each case, shall be approved by Owner, but, regardless of such approval, it shall be the responsibility of Contractor to maintain the insurance coverages set forth herein.

**11.1.2** The contractor shall not be allowed on the Owners property without proof of the insurance coverages set forth herein

### **11.2 Commercial General Liability**

**11.2.1** Contractor shall secure and maintain from the date of the Contract and for a period of at least five (5)

years from the date of Final Completion of the entire Work Commercial General Liability insurance ("CGL") with a combined single limit of not less than \$2,000,000 per occurrence, \$5,000,000 general aggregate, \$5,000,000 products and completed operations aggregate and \$1,000,000 personal injury and advertising injury. General Aggregate should apply per project. An umbrella policy may be used to satisfy these limits. If the General Aggregate is not on a per project basis, the contractor shall provide an additional \$2,000,000 general aggregate.

**11.2.2** CGL insurance shall be written on a comprehensive form and shall cover claims and liability in connection with or resulting from the Contractor's operations and activities under the Contract, for personal injuries, occupational sickness, disease, death or damage to property of others, including loss of use resulting therefrom, arising out of any operations or activities of the Contractor, its agents, or any Subcontractors of any tier or by anyone directly or indirectly employed by either of them.

**11.2.3** CGL insurance shall include premises, operations, independent contractors, products-completed operations, personal injury and advertising injury and liability assumed under an insured contract (including the tort liability of another assumed in a business contract) coverages. In particular, and not by way of any limitation, the CGL insurance shall cover the Contractor's indemnity obligations contained in the Contract Documents.

**11.2.4** There shall be no endorsement or modification of the CGL policy limiting the scope of coverage for liability arising from blasting, explosion, collapse, or underground property damage.

**11.2.5** "The Curators of the University of Missouri" shall be endorsed as an "additional insured" under the CGL policy. The additional insured status must be conveyed by using the ISO CG 2 10 (2004) edition or equivalent and the ISO CG 20 37 (2004) edition. The policy shall be endorsed to be primary coverage and any other insurance carried by the Owner shall be excess only and will not contribute with Contractors' insurance. To confirm, the Endorsement should accompany the insurance certificate.

**11.2.6** Contractor waives all rights against Owner and its agents, officers, representatives and employees for recovery of damages to the extent those damages are covered by the CGL policy required hereunder.

### **11.3 Licensed for Use Vehicle Liability**

**11.3.1** Contractor shall secure and maintain from the date of the Contract for Construction until the date of Final Completion of the entire Work, insurance, to be on comprehensive form, which shall protect Contractor against any and all claims for all injuries and all damage to property arising from the use of automobiles, trucks and motorized vehicles, in connection with the performance of Work under this Contract, and shall cover the operation on or off the site of

the Work of all motor vehicles licensed for highway use whether they are owned, non-owned or hired. Such insurance shall include contractual liability coverage and shall provide coverage on the basis of the date of any accident. The liability limits under such policy shall not be less than \$2,000,000 combined single limit for bodily injury and property damage per accident.

**11.3.2** Contractor waives all rights against Owner and its agents, officers, directors and employees for recovery of damages to the extent such damages are covered by the automobile liability insurance required hereunder.

#### **11.4 Workers' Compensation Insurance**

**11.4.1** Contractor shall purchase and maintain workers' compensation insurance and employers' liability insurance which shall protect Contractor from claims for injury, sickness, disease or death of Contractor's employees or statutory employees. The insurance policies required hereunder shall include an "all states" or "other states" endorsement. In case any Work is sublet, Contractor shall require any Subcontractor of any tier to provide the insurance coverages required under this Section 11.4.

**11.4.2** Contractor's workers' compensation insurance coverage shall be in compliance with all applicable Laws, including the statutes of the State of Missouri. Contractor's employers' liability coverage limits shall not be less than \$1,000,000 each accident for bodily injury by accident or \$1,000,000 each employee for bodily injury by disease.

#### **11.5 Liability Insurance General Requirements**

**11.5.1** All insurance coverages procured by Contractor shall be provided by agencies and insurance companies acceptable to and approved by Owner. Any insurance coverage shall be provided by insurance companies that are duly licensed to conduct business in the State of Missouri as an admitted carrier. The form and content of all insurance coverage provided by Contractor are subject to the approval of Owner. All required insurance coverages shall be obtained and paid for by Contractor. Any approval of the form, content or insurance company by Owner shall not relieve the Contractor from the obligation to provide the coverages required herein.

**11.5.2** All insurance coverage procured by the Contractor shall be provided by insurance companies having policyholder ratings no lower than "A-" and financial ratings not lower than "XI" in the Best's Insurance Guide, latest edition in effect as of the date of the Contract, and subsequently in effect at the time of renewal of any policies required by the Contract Documents. Insurance coverages required hereunder shall not be subject to a deductible amount on a per-claim basis of more than \$10,000.00 and shall not be subject to a per-occurrence deductible of more than \$25,000.00. Insurance procured by Contractor covering the additional insureds shall be primary insurance

and any insurance maintained by Owner shall be excess insurance.

**11.5.3** All insurance required hereunder shall provide that the insurer's cost of providing the insureds a defense and appeal, including attorneys' fees, shall be supplementary and shall not be included as part of the policy limits but shall remain the insurer's separate responsibility. Contractor shall cause its insurance carriers to waive all rights of subrogation, except for Workers' Compensation, against the Owner and its officers, employees and agents.

**11.5.4** The Contractor shall furnish the Owner with certificates, Additional Insured endorsements, policies, or binders which indicate the Contractor and/or the Owner and other Contractors (where required) are covered by the required insurance showing type, amount, class of operations covered, effective dates and dates of expiration of policies prior to commencement of the work. Contractor is required to maintain coverages as stated and required to notify the University of a Carrier Change or cancellation within 2 business days. The University reserves the right to request a copy of the policy. Contractor fails to provide, procure and deliver acceptable policies of insurance or satisfactory certificates or other evidence thereof, the Owner may obtain such insurance at the cost and expense of the Contractor without notice to the Contractor.

**11.5.5** With respect to all insurance coverages required to remain in force and affect after final payment, Contractor shall provide Owner additional certificates, policies and binders evidencing continuation of such insurance coverages along with Contractor's application for final payment and shall provide certificates, policies and binders thereafter as requested by Owner.

**11.5.6** The maintenance in full current force and effect of such forms and amounts of insurance and bonds required by the Contract Documents shall be a condition precedent to Contractor's exercise or enforcement of any rights under the Contract Documents.

**11.5.7** Failure of Owner to demand certificates, policies and binders evidencing insurance coverages required by the Contract Documents, approval by Owner of such certificates, policies and binders or failure of Owner to identify a deficiency from evidence that is provided by Contractor shall not be construed as a waiver of Contractor's obligations to maintain the insurance required by the Contract Documents.

**11.5.8** The Owner shall have the right to terminate the Contract if Contractor fails to maintain the insurance required by the Contract Documents.

**11.5.9** If Contractor fails to maintain the insurance required by the Contract Document, Owner shall have the right, but not the obligation, to purchase said insurance at Contractor's expense. If Owner is damaged by Contractor's failure to maintain the insurance required by the Contract Documents,



Contractor shall bear all reasonable costs properly attributable to such failure.

**11.5.10** By requiring the insurance set forth herein and in the Contract Documents, Owner does not represent or warrant that coverage and limits will necessarily be adequate to protect Contractor, and such coverages and limits shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

**11.5.11** If Contractor's liability policies do not contain a standard separation of insureds provision, such policies shall be endorsed to provide cross-liability coverage.

**11.5.12** If a part of the Work hereunder is to be subcontracted, the Contractor shall: (1) cover any and all Subcontractors in its insurance policies; (2) require each Subcontractor to secure insurance which will protect said Subcontractor and supplier against all applicable hazards or risks of loss designated in accordance with Article 11 hereunder; and (3) require each Subcontractor or supplier to assist in every manner possible in the reporting and investigation of any accident, and upon request, to cooperate with any insurance carrier in the handling of any claim by securing and giving evidence and obtaining the attendance of witnesses as required by any claim or suit.

**11.5.13** It is understood and agreed that the insurance coverages required by the provisions of this Article 11 are required in the public interest and that the Owner does not assume any liability for acts of Contractor or Subcontractors of any tier or their employees in the performance of the Contract or Work.

## **11.6 Builder's Risk Insurance**

**11.6.1** The Contractor shall purchase and maintain, in a company or companies lawfully authorized to do business in the State of Missouri, as an admitted carrier, builder's risk insurance on the entire Work. Such insurance shall be written on a completed value form for the entire Work. The insurance shall apply on a replacement cost basis.

**11.6.2** The insurance as required herein shall name as insureds the Owner, Contractor and all Subcontractors of any tier. The insurance policy shall contain a provision that the insurance will not be canceled, allowed to expire or materially changed until at least thirty (30) days prior written notice has been given to Owner.

**11.6.3** The insurance as required herein shall cover the entire Work, including reasonable compensation for Architect's services and expenses made necessary by an insured loss. Insured property shall include portions of the Work located away from the site (including all offsite stored materials) but intended for use at the site, and shall also cover portions of the Work in transit, including ocean transit. The policy shall include as insured property scaffolding, falsework, and temporary buildings located at

the site. The policy shall cover the cost of removing debris, including demolition as may be made legally necessary by the operation of any law, ordinance or regulation.

**11.6.4** The insurance required herein shall be on an all risk form and shall be written to cover all risks of physical loss or damage to the insured party and shall insure at least against the perils of fire and extended coverage, theft, vandalism, malicious mischief, collapse, lightening, earthquake, flood, frost, water damage, windstorm and freezing.

**11.6.5** If there are any deductibles applicable to the insurance required herein, Contractor shall pay any part of any loss not covered because of the operation of such deductibles.

**11.6.6** The insurance as required herein shall be maintained in effect until the earliest of the following dates:

- .1** the date which all persons and organization who are insureds under the policy agree in writing that it shall be terminated;
- .2** the date on which final payment of this Contract has been made by Owner to Contractor; or
- .3** the date on which the insurable interests in the property of all insureds other than the Owner have ceased.

**11.6.7** The Owner and Contractor waive all rights against (1) each other and any of their subcontractors of any tier, suppliers, agents and employees, each of the other, (2) the Architect and Architect's consultants, and (3) separate contractors described in Article 6, if any, and any of their subcontractors of any tier, suppliers, agents and employees, for damages caused by fire or other perils to the extent covered by property insurance obtained pursuant to this Section 11.7 or other insurance applicable to the Work, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors of any tier, suppliers, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, was at fault or was negligent in causing the loss and whether or not the person or entity had an interest in the property damaged.

**11.6.8** A loss insured under Contractor's property insurance shall be adjusted by the Owner in good faith and made payable to the Owner for the insureds, subject to requirements of the Contract Documents. The Contractor shall pay Subcontractors of any tier their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors of

any tier to make payments to their Sub-subcontractors in similar manner.

### **11.7 Bonds**

**11.7.1** When the Contract sum exceeds Fifty Thousand Dollars (\$50,000), the Contractor shall procure and furnish a Performance Bond and a Payment Bond in the form prepared by the Owner, each in an amount equal to one hundred percent (100%) of the Contract Sum, as well as adjustments to the Contract Sum. The Performance Bond shall secure and guarantee Contractor's faithful performance of this Contract, including but not limited to Contractor's obligation to correct defects after final payment has been made as required by the Contract Documents. The Payment Bond shall secure and guarantee payment of all persons performing labor on the Project under this Contract and furnishing materials in connection with this Contract. These Bonds shall be in effect through the duration of the Contract plus the Guaranty Period as required by the Contract Documents.

**11.7.2** The bonds required hereunder shall be executed by a responsible surety licensed in the State of Missouri, with a Best's rating of no less than A-/XI. The Contractor shall require the attorney in fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of this power of attorney indicating the monetary limit of such power.

**11.7.3** If the surety of any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to conduct business in the State of Missouri is terminated, or it ceases to meet the requirements of this paragraph, Contractor shall within ten (10) days substitute another bond and surety, both of which must be acceptable to Owner. If Contractor fails to make such substitution, Owner may procure such required bonds on behalf of Contractor at Contractor's expense.

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

**11.7.5** The Contractor shall keep the surety informed of the progress of the Work, and, where necessary, obtain the surety's consent to or waiver of: (1) notice of changes in the Work; (2) request for reduction or release of retention; (3) request for final payment; and (4) any other material required by the surety. The Owner shall be notified by the Contractor, in writing, of all communications with the surety, as it relates to items one through four. The Owner may, in the Owner's sole discretion, inform surety of the progress of the Work, any defects in the Work, or any defaults of Contractor under the Contract Documents and obtain consents as necessary to protect the Owner's rights, interest, privileges and benefits under and pursuant to any bond issued in connection with the Work.

**11.7.6** Contractor shall indemnify and hold harmless the Owner and any agents, employees, representative or member of the Board of Curators from and against any claims, expenses, losses, costs, including reasonable attorneys' fees, as a result of any failure of Contractor to procure the bonds required herein.

## **ARTICLE 12**

### **UNCOVERING AND CORRECTION OF THE WORK**

#### **12.1 Uncovering of the Work**

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

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

#### **12.2 Correction of the Work**

**12.2.1** The Architect or Owner's Representative shall have the right to reject Work not in strict compliance with the requirements of the Contract Documents. The Contractor shall promptly correct Work rejected by the Architect or the Owner's Representative for failing to conform to the requirements of the Contract Documents, whether observed before or after final completion and whether or not fabricated, installed, or completed. If Work has been rejected by Architect or Owner's Representative, the Architect or Owner's Representative shall have the right to require the Contractor to remove it from the Project site and replace it with Work that strictly conforms to the requirements of the Contract Documents regardless if such removal and replacement results in "economic waste." Contractor shall pay all claims, costs, losses and damages caused by or resulting from the correction, removal or replacement of defective Work, including but not limited to, all costs of repair or replacement of Work of others. The Contractor shall bear costs of correcting, removing and replacing such rejected Work, including additional testing and inspections and compensation for the Architect's services and expenses made necessary thereby. If prior to the date of final payment, the Contractor, a Subcontractor or anyone for whom either is responsible uses or damages any portion of the Work, including, without limitation, mechanical, electrical,

plumbing and other building systems, machinery, equipment or other mechanical device, the Contractor shall cause such item to be restored to "like new" condition at no expense to the Owner.

**12.2.2** If, within twelve (12) months after the date of Final Completion of the Work or designated portion thereof, or after the date for commencement of warranties, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found not to be in strict accordance with the requirements of the Contract Documents, the Contractor shall correct or remove and replace such defective Work, at the Owner's discretion. Such twelve (12) month period is referred to as the "Guarantee Period." The obligations under this Paragraph 12.2.2 shall cover any repairs, removal and replacement to any part of the Work or other property caused by the defective Work.

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

**12.2.4** If the Contractor fails to correct nonconforming Work within a reasonable time, the Owner may correct or remove it and replace such nonconforming Work. If the Contractor does not proceed with correction of such nonconforming Work within a reasonable time fixed by written notice from the Owner, the Owner may take action to correct or remove the nonconforming work at the contractor's expense.

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

**12.2.6** Nothing contained in Article 12 shall be construed to establish a period of limitation with respect to other obligations that the Contractor might have under the Contract Documents. Establishment of the twelve (12) month Guarantee Period as described in Article 12 relates only to the specific obligation of the Contractor to correct, remove or replace the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations under the Contract Documents. The requirements of Article 12 are in addition to and not in limitation of any of the other requirements of the Contract for warranties or conformance of the Work to the requirements of the Contract Documents.

### **12.3 Acceptance of Nonconforming Work**

**12.3.1** The Owner may accept Work which is not in accordance with the Contract Documents, instead of requiring its removal and correction, in its sole discretion. In Such case the Contract Sum will be adjusted as appropriate and equitable. Such adjustment shall be made whether or not final payment has been made. Nothing contained herein shall impose any obligation upon the Owner to accept nonconforming or defective Work.

## **ARTICLE 13 MISCELLANEOUS PROVISIONS**

### **13.1 Written Notice**

**13.1.1** All notices required to be given by the contractor under the terms of this Contract shall be made in writing. Written notice when served by the Owner will be deemed to have been duly served if delivered in person to the individual or a member of the firm or entity or to an office of the corporation for which it was intended, or if delivered at or sent to the last business address known to the party giving notice.

### **13.2 Rights and Remedies**

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

**13.2.2** No action or failure to act by the Owner, the Architect, or the Owner's Representative will constitute a waiver of a right or duty afforded to the Owner under the Contract Documents, nor will such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed in writing.

**13.2.3** The terms of this Contract and all representations, indemnifications, warranties and guarantees made in, required by or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion and acceptance of the Work and termination or completion of the Work and shall remain in effect so long as the Owner is entitled to protection of its rights under applicable law.

**13.2.4** Contractor shall carry out the Work and adhere to the current construction schedule during all disputes or disagreements with the Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements except as the Owner and Contractor may otherwise agree to in writing.

### **13.3 Tests and Inspections**

**13.3.1** Tests, inspections, and approvals of portions of the Work required by the Contract Documents or by laws, ordinances, rules or regulations shall be made at an appropriate time. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and

approvals with an independent testing laboratory or entity acceptable to the Owner, and shall bear related costs of tests, inspections, and approvals. The Contractor shall give the Architect and the Owner's Representative timely notice of when and where tests and inspections are to be made so the Architect and/or the Owner's Representative may observe procedures.

**13.3.2** If the Architect or the Owner's Representative determine that portions of the Work require additional testing, inspection or approval not included in the Contract Documents, or required by law, the Architect, or the Owner's Representative will instruct the Contractor to make arrangements for such additional testing, inspection, or approval by an entity acceptable to the Owner's Representative and the Contractor shall give timely notice to the Architect, and the Owner's Representative, of when and where tests and inspections are to be made so the Architect and/or the Owner's Representative may observe such procedures. The Owner will bear such costs except as provided elsewhere in Article 13.

**13.3.3** If such procedures for testing, inspection, or approval under Article 13 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, the Contractor shall bear all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses.

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

**13.3.5** Contractor shall take all necessary actions to ensure that all tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

**13.3.6** Contractor shall arrange for and pay for all costs of all testing required by the Contract Documents or any applicable Laws for materials to be tested or certified at or on the place or premises of the source of the material to be supplied. The Owner shall have the right to require testing of all materials at the place of the source of the material to be supplied if not required by the Contract Documents or any applicable Laws. The Owner shall bear the costs of such tests and inspections not required by the Contract Documents or by applicable Laws unless prior defective Work provides Architect or Owner with a reasonable belief that additional defective Work may be found, in which case Contractor shall be responsible for all costs of tests and inspections ordered by the Owner or Architect, whether or not such tests or inspection reveals that Work is in compliance with the Contract Documents.

### **13.4 Nondiscrimination in Employment Equal Opportunity**

**13.4.1** The University serves from time to time as a contractor for the United States government. Accordingly, the provider of goods and/or services shall comply with federal laws, rules and regulations applicable to subcontractors of government contracts including those relating to equal employment opportunity and affirmative action in the employment of minorities (Executive Order 11246), women (Executive Order 11375), persons with disabilities (29 USC 706) and Executive Order 11758, and certain veterans (38 USC 4212 formerly [2012]) contracting with business concerns with small disadvantaged business concerns (Publication L. 95-507). Contract clauses required by the Government in such circumstances are incorporated herein by reference.

### **13.5 Supplier Diversity Goal Program**

**13.5.1** The Contractor shall subcontract with diverse firms no less than the amount pledged in the Contractor's Bid and/or the amount accepted by the Owner.

**13.5.2** If the Contractor must remove any diverse subcontractor of any tier, the Contractor shall replace the diverse subcontractor of any tier with another diverse subcontractor(s) of equal dollar value to the diverse supplier removed. The Contractor shall immediately notify the Owner's Representative in writing of the Contractor's intent to remove any, and the Contractor's plan to maintain subcontracts with diverse firms of no less than amount pledged in the Contractor's Bid and/or the amount accepted by the Owner. All changes of diverse subcontractor of any tier shall be approved by the Director of Facilities Planning & Development.

**13.5.3** If the Contractor fails to meet or maintain the contractor's Supplier Diversity subcontracting pledge, the Contractor shall immediately notify in writing the Owner's Representative, and the Director of Facilities Planning & Development. Such notice shall include a description of the Contractor's good faith effort to comply with their Supplier Diversity subcontracting pledge.

**13.5.4** If the Director of Facilities Planning & Development finds the Contractor has failed to comply in good faith with the Owner's Supplier Diversity goal program, the Director may take appropriate action, including but not limited to, declaring the Contractor ineligible to participate in any contracts with the Owner for a period not to exceed six (6) months, and/or directing that the Contractor's actions be declared a material breach of the Contract and that the Contract be terminated.

**13.5.5** The Contractor and his subcontractors shall develop, implement, maintain, and submit in writing to the Director of Facilities Planning & Development, an affirmative action program if at least fifty (50) persons in the aggregate are employed under this contract. If less than fifty (50) persons in the aggregate are to be employed under this contract, the Contractor shall submit, in lieu of the written affirmative action program, a properly executed "Affidavit for

Affirmative Action" in the form as included in the Contract Documents. For the purpose of this section, an "Affirmative Action Program" means positive actions to influence all employment practices (including, but not limited to, recruiting, hiring, promoting, and training) in providing equal employment opportunity regardless of race, color, sex, national origin, religion, age (where the person affected is between 40 and 70), disabled and Vietnam-era veteran status, and handicapped otherwise qualified status. Such affirmative action program shall include:

- .1 A written policy statement committing the total organization to affirmative action and assigning management responsibilities and procedures for evaluation and dissemination.
- .2 The identification of a person designated to handle affirmative action.
- .3 The establishment of non-discriminatory selection standards, objective measures to analyze recruitment, an upward mobility system, a wage and salary structure, and standards applicable to lay-off, recall, discharge, demotion, and discipline.
- .4 The exclusion of discrimination from collective bargaining agreements.
- .5 Performance of an internal audit of the reporting system to monitor execution and to provide for future planning.

**13.5.6** In the enforcement of this non-discrimination requirement, the Owner may use any reasonable procedures available, including but not limited to: requests, reports, site visits, and inspection of relevant documents of Contractors and Subcontractors of any tier. The contractor shall submit a final Affidavit of Supplier Diversity Participation for each diverse firm at the end of the project stating the actual amount paid to the diverse firm.

**13.6 Wage Rates (If the contract amount is less than \$75,000, the requirements of this section will not apply. Any contract adjustments that increase the contract above \$75,000 will be subject to this section.)**

**13.6.1** The Contractor shall pay workers employed in the execution of this contract in full each week and not less than the predetermined wage rates and overtime for work of a similar character that have been made a part of this Contract. These rates are determined by the University of Missouri Director of Facilities Planning and Development. The rates are based on wage rates published in the Annual Wage Orders of the Missouri Department of Labor and Industrial Relations (MDLIR). The Contractor is to use MDLIR 8 CSR 30-3.020; .030; .040, .060 in determining the appropriate occupational titles and rates for workers used in the execution of this contract. All determinations and/or interpretations regarding wage rates and classification of workers will be made by the office of the University of Missouri Director

of Facilities Planning and Development. The Contractor is responsible for the payment of the aggregate of the Basic Hourly Rate and the Total Fringe Benefits to the workers on the project. Fringe benefit payments may be made to the worker in cash, or irrevocably made by a Contractor or Subcontractor to a trustee or to a third person pursuant to a fund, plan or program, or pursuant to an enforceable commitment, or any combination thereof, to carry out a financially responsible plan or program which was communicated in writing to the workmen affected, for medical or hospital care, pensions on retirement or death, compensation for injuries or illness resulting from occupational activity, or insurance to provide any of the foregoing, for unemployment benefits, life insurance, disability and sickness insurance, accident insurance, for vacation and holiday pay, for defraying costs of apprenticeship or other similar programs, or for other bona fide fringe benefits, but only where the Contractor or Subcontractor is not required by other federal or state law to provide any of the benefits as referenced in §290.210(5) RSMo 1994. Pay for travel, mileage, meals, bonuses, or other expenses are not fringe benefits and cannot be considered part of the workers wage rate. The Contractor shall not make any deductions for food, sleeping accommodations, transportation, use of small tools, uniforms, or anything of any kind or description, unless the Contractor and employee enter into an agreement in writing at the beginning of the worker's term of employment, and such agreement is approved by the Owner. In the event the contract contains more than one wage determination the Contractor shall comply with both.

**13.6.2** The Contractor shall submit to the Owner with the Contractor's periodic pay request, certified payroll records for labor performed by the Contractor and Subcontractors of any tier. The Contractor shall submit all required certified payroll information records electronically in pdf format using the Owner's web-based payment program. The certified payroll forms shall contain the name, address, personal identification number, and occupational title of the workers as well as the hours they work each day. The Owner's acceptance of certified payroll records does not in any way relieve the Contractor of any responsibility for the payment of prevailing wages to workers on the project. The Contractor shall also maintain copies of the certified payroll records. The Owner may, at any time, request copies of, and/or inspect all of the Contractor's payroll records for the Work to verify compliance. The Contractor shall furnish the Owner copies of payroll records within 10 days of the Owner's written request. The Contractor shall provide copies of workers I-9 forms within 24 hours of written notice. (If applicable, and required by Owner, the Contractor will demonstrate that the Contractor is enrolled and participating in a federal work authorization program with respect to the employees working in connection with this project.) Such payroll records shall be maintained in accordance with Article 13.7.1 and shall be available for inspection for two (2) years after final completion of the Work. The contractor further agrees, in the event the records are not presented as

requested, he will abide by any decision made by the Owner regarding underpayment of wages to workers and amounts owed them as well as liquidated damages for underpayment of wages. Falsification of the certified payroll records may result in the debarment of the contractor or subcontractor from future work with the University.

**13.6.3** The acquisition of products or services is subject to the supplier's conformance to the rules and regulations of the President's Committee on Equal Employment Opportunity (41 CFR, Ch. 60).

**13.6.4** The Contractor shall comply with the Copeland Regulations of the Secretary of Labor (29 CFR, Part 3), which are incorporated herein by reference. In addition, the Weekly Statement of Compliance required by these Regulations shall also contain a statement that the applicable fringe benefits paid are equal to or greater than those set forth in the minimum wage decision.

**13.6.5** Contractor acknowledges that violation of the requirements of Article 13.6 result in additional costs to Owner, including, but not limited to, cost of construction delays, of additional work for Owner's staff and legal expense. The cost of Contractor's violation of the provisions of Article 13.6 would be and is difficult to determine and establish. In the event that Contractor fails to comply with the provisions of this Article 13.6, Owner shall be entitled to retain or recover from the Contractor, as liquidated damages and not as a penalty, the sum of Fifty Dollars (\$50.00) per day per individual who is paid less than the applicable prevailing wage, to approximate the investigative cost resulting to the Owner for such violations. To approximate the delay costs, Owner shall be entitled to retain or recover from the Contractor, as liquidated damages and not as a penalty, the sum of One Hundred Dollars (\$100.00) per day for each day the Contract cannot be closed out and final payment made because of Contractor's failure to comply with the provisions of this Article 13.6. Such liquidated damages shall be collected regardless of whether the Work has been completed. The liquidated damages and other amounts set forth in this Article 13.6 shall be in addition to all other liquidated damages the Owner may be entitled to as set forth in the Contract Documents.

**13.6.6** The Owner may deduct liquidated damages described Article 13 and the amounts set forth in Article 13 from any unpaid amounts then or thereafter due the Contractor under the Contract. Any liquidated damages not so deducted from any unpaid amounts due the Contractor shall be payable to the Owner at the demand of the Owner.

**13.6.7** The Contractor shall specifically incorporate the obligations of Article 13 into the subcontracts, supply agreements and purchase orders for the Work and require the same of any Subcontractors of any tier.

**13.6.8** Contractor acknowledges and recognizes that a material factor in its selection by the Owner is the Contractor's willingness to undertake and comply with the requirements of this Article 13.6. If Contractor fails to comply with the provisions of this Article 13.6, Owner may, in its sole discretion, immediately terminate the Contract upon written notice. The rights and remedies of Owner provided herein shall not be exclusive and are in addition to other rights and remedies provided by law or under this Contract.

**13.6.9** Only such workers who are individually registered in a bona fide apprenticeship program approved by the U.S. Department of Labor, Office of Apprenticeship can be paid less than the journeyperson rate of pay. "Entry Level Workers; must be registered apprentices. The apprenticeship ratio will be one to one with a journeyperson of the same classification. Any worker not registered as an apprentice per this section will be paid as a journeyperson.

**13.6.10** The Contractor shall post the wage rates for the contract in a conspicuous place at the field office on the project. On projects where there is no field office the Contractor may post the wage rates at their local office, as long as they provide a copy of the wage rates to a worker upon request. The wage rates shall be kept in a clearly legible condition for the duration of the project.

**13.6.11** Neither the Contractor, nor any Subcontractor of any tier, nor any person hired by them or acting on their behalf, shall request or demand that workers pay back, return, donate, contribute or give any part, or all, of said workers wages, salary, or any thing of value, upon the statement, representation or understanding that failure to comply with such request or demand will prevent such worker from procuring or retaining employment. The exception being to an agent or representative of a duly constituted labor organization acting in the collection of dues or assessments of such organization.

**13.6.12** No contractor or subcontractor may directly or indirectly receive a wage subsidy, bid supplement, or rebate for employment on this project if such wage subsidy, bid supplement, or rebate has the effect of reducing the wage rate paid by the employer on a given occupational title below the prevailing wage rate as provided in contract. In the event a wage subsidy, bid supplement, or rebate is provided or received, the entity receiving such subsidy, supplement, or rebate shall report the date and amount of such subsidy, supplement, or rebate to the University within thirty days of receipt of payment. This disclosure report shall be a matter of public record. Any employer not in compliance with this Article shall owe to the University double the dollar amount per hour that the wage subsidy, bid supplement, or rebate has reduced the wage rate paid by the employer below the prevailing wage rate for each hour that work was performed.

**13.6.13** Time and one half overtime will be paid on all hours over 10 hours per day or 40 hours per week. The wage rate is the total of the “Basic Hourly Rate” plus “Total Fringe Benefits” or the “public works contracting minimum wage”. For all work performed on a Sunday or Holiday, not less than twice the prevailing hourly rate of pay or public works contracting minimum wage will apply. Holidays are as follows: January first, the last Monday in May, July fourth, the first Monday in September, November 11, the fourth Thursday in November, December twenty-fifth. If any holiday falls on a Sunday, the following Monday shall be considered a holiday.

### **13.7 Records**

**13.7.1** The Owner, or any parties it deems necessary, shall have access to and the right to examine any accounting or other records of the Contractor involving transactions and Work related to this Contract for five (5) years after final payment or five (5) years after the final resolution of any on going disputes at the time of final payment. All records shall be maintained in accordance with generally accepted accounting procedures, consistently applied. Subcontractors of any tier shall be required by Contractor to maintain records and to permit audits as required of Contractor herein.

### **13.8 Codes and Standards**

**13.8.1** The Work shall be performed to comply with the International Code Council (ICC) Codes, and the codes and standards noted below. The latest editions and supplements of these Codes and Standards in effect on the date of the execution of the Contract for Construction shall be applicable unless otherwise designated in the Contract Documents. Codes and standards required by accreditation agencies will also be used unless the ICC requirements are more stringent. In the event that special design features and/or construction systems are not covered in the ICC codes, the applicable edition of the National Fire Protection Association (NFPA) family of standards and/or the NFPA 101 Life Safety Code shall be used.

- .1** ICC International Building Code and reference standards
- .2** ICC International Plumbing Code
- .3** ICC International Mechanical Code
- .4** NFPA 70 National Electric Code (NEC)
- .5** Americans with Disabilities Act – Standards for Accessible Design.
- .6** American National Standard Safety Code for Elevators, Dumbwaiters, Escalators, and Moving Walks as published by the American Society of Mechanical Engineers (ASME), American National Standards Institute (ANSI) A17.1
- .7** NFPA 101 Life Safety Code (as noted above)
- .8** American Concrete Institute (ACI)
- .9** American National Standards Institute (ANSI)
- .10** American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)

- .11** American Refrigeration Institute (ARI)
- .12** American Society for Testing and Materials (ASTM)
- .13** Missouri Standard Specification for Highway Construction, Missouri State Highway Commission
- .14** National Electrical Manufacturers Association (NEMA)
- .15** Underwriter's Laboratories, Inc. (UL), Federal Specifications
- .16** Williams Steiger Occupational Safety and Health Act of 1970 (OSHA)

### **13.9 General Provisions**

**13.9.1** Any specific requirement in this Contract that the responsibilities or obligations of the Contractor also apply to a Subcontractor is added for emphasis and are also hereby deemed to include a Subcontractor of any tier. The omission of a reference to a Subcontractor in connection with any of the Contractor's responsibilities or obligations shall not be construed to diminish, abrogate or limit any responsibilities or obligations of a Subcontractor of any tier under the Contract Documents or the applicable subcontract.

**13.9.2** This Contract shall be interpreted, construed, enforced and regulated under and by the laws of the State of Missouri. Whenever possible, each provision of this Contract shall be interpreted in a manner as to be effective and valid under applicable law. If, however, any provision of this Contract, or a portion thereof, is prohibited by law or found invalid under any law, only such provision or portion thereof shall be ineffective, without invalidating or affecting the remaining provisions of this Contract or valid portions of such provision, which are hereby deemed severable. Contractor and Owner further agree that in the event any provision of this Contract, or a portion thereof, is prohibited by law or found invalid under any law, this Contract shall be reformed to replace such prohibited or invalid provision or portion thereof with a valid and enforceable provision which comes as close as possible to expressing the intention of the prohibited or invalid provision.

**13.9.3** Contractor and Owner each agree that the State of Missouri Circuit Court for the County where the Project is located shall have exclusive jurisdiction to resolve all Claims and any issue and disputes between Contractor and Owner. Contractor agrees that it shall not file any petition, complaint, lawsuit or legal proceeding against Owner in any other court other than the State of Missouri Circuit Court for the County where the Project is located.

**13.9.4** Owner's total liability to Contractor and anyone claiming by, through, or under Contractor for any Claim, cost, loss, expense or damage caused in part by the fault of Owner and in part by the fault of Contractor or any other entity or individual shall not exceed the percentage share that Owner's fault bears to the total fault of Owner, Contractor and all other entities and individuals as determined on the basis of comparative fault principles.

**13.9.5** Contractor agrees that Owner shall not be liable to Contractor for any special, indirect, incidental, or consequential damage whatsoever, whether caused by Owner's negligence, fault, errors or omissions, strict liability, breach of contract, breach of warranty or other cause or causes whatsoever. Such special, indirect, incidental or consequential damages include, but are not limited to loss of profits, loss of savings or revenue, loss of anticipated profits, labor inefficiencies, idle equipment, home office overhead, and similar types of damages.

**13.9.6** Nothing contained in this Contract or the Contract Documents shall create any contractual relationship with or cause of action in favor of a third party against the Owner.

**13.9.7** No member or officer of the Board of Curators of the University incurs or assumes any individual or personal liability under the Contract or by reason of the default of the Owner in the performance of any terms thereof. Contractor releases and discharges all members or officers of the Board of Curators of the University from any liability as a condition of and as consideration for the award of the Contract to Contractor.

**13.9.8** The Contractor hereby binds itself, its partners, successors, assigns and legal representatives to the Owner in respect to covenants, agreements and obligations contained in the Contract Documents. Contractor shall not assign the Contract or proceeds hereof without written consent of the Owner. If Contractor attempts to make such an assignment without such consent, it shall be void and confer no rights on third parties, and Contractor shall nevertheless remain legally responsible for all obligations under the Contract. The Owner's consent to any assignment is conditioned upon Contractor entering into a written assignment which contains the following language: "it is agreed that the funds to be paid to the assignee under this assignment are subject to performance by the Contractor and to claims and to liens for services rendered or materials supplied for the performance of the Work required in said Contract in favor of all persons, firms, corporations rendering such services or supplying such materials."

### **13.10 Certification**

**13.10.1** The contractor certifies to the best of its knowledge and belief that it and its principals are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency in accordance with Executive Order 12549 (2/18/86).

**13.10.2** If this contract is for \$100,000 or more, and if the Contractor is a company with ten (10) or more employees, then Contractor certifies that it, and any company affiliated with it, does not boycott Israel and will not boycott Israel during the term of this Contract. In this paragraph, the terms

"company" and "boycott Israel" shall have the meanings described in Section 34.600 of the Missouri Revised Statutes.

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

### **14.1 Termination by Owner for Cause**

**14.1.1** In addition to other rights and remedies granted to Owner under the Contract Documents and by law, the Owner may terminate the Contract if the Contractor:

- .1** refuses or fails to supply enough properly skilled workers, superintendents, foremen, or managers;
- .2** refuses or fails to supply sufficient or proper materials;
- .3** fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
- .4** disregards laws, ordinances, rules, or regulations or orders of a public authority having jurisdiction;
- .5** disregards the authority of the Owner's Representative or Architect;
- .6** breaches any warranty or representations made by the Contractor under or pursuant to the Contract Documents;
- .7** fails to furnish the Owner with assurances satisfactory to the Owner evidencing the Contractor's ability to complete the Work in compliance with all the requirements of the Contract Documents;
- .8** fails after commencement of the Work to proceed continuously with the construction and completion of the Work for more than ten (10) days, except as permitted under the Contract Documents;
- .9** fails to maintain a satisfactory rate of progress with the Work or fails to comply with approved progress schedules; or
- .10** violates in any substantial way any provisions of the Contract Documents.

**14.1.2** When any of the above reasons exist, the Owner may, without prejudice to any other rights or remedies of the Owner, terminate this Contract by delivering a written notice of termination to Contractor and Contractor's surety, and may:

- .1** take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2** accept assignment of subcontracts pursuant to Paragraph 5.3; and
- .3** finish the Work by whatever reasonable method the Owner may deem expedient, including turning the Work over to the surety.

**14.1.3** The Contractor, in the event of a termination under Section 14.1, shall not be entitled to receive any further payments under the Contract until the Work is completed in its entirety. Then, if the unpaid balance under the Contract shall exceed all expenses of the Owner in finishing the Work,



including additional compensation for the Architects services and expenses made necessary thereby, such excess will be paid to the Contractor; but, if such expenses of Owner to finish the Work shall exceed the unpaid balance, the Contractor and its surety shall be liable for, and shall pay the difference and any damages to the Owner. The obligation of the Contractor and its surety for payment of said amounts shall survive termination of the Contract.

**14.1.4** In exercising the Owner's right to secure completion of the Work under any of the provisions hereof, the Owner shall have the right to exercise the Owner's sole discretion as to the manner, methods, and reasonableness of costs of completing the Work.

**14.1.5** The rights of the Owner to terminate pursuant to Article 14.1 will be cumulative and not exclusive and shall be in addition to any other remedy provided by law or the Contract Documents.

**14.1.6** Should the Contractor fail to achieve Final Completion of the Work within thirty (30) calendar days following the date of Substantial Completion, the Owner may exercise its rights under Article 14.1.

#### **14.2 Suspension by the Owner for Convenience**

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

**14.2.2** An adjustment will be made to the Contract Sum for increases in the cost of performance of the Contract caused by suspension, delay or interruption. However, in the event of a suspension under this Article 14.2, Contractor hereby waives and forfeits any claims for payment of any special, indirect, incidental or consequential damages such as lost profits, loss of savings or revenue, loss of anticipated profits, idle labor or equipment, home office overhead, and similar type damages. No adjustment will be made to the extent:

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

#### **14.3 Owner's Termination for Convenience**

**14.3.1** The Owner may, at any time, terminate the Contract in whole or in part for the Owner's convenience and without cause. Termination by the Owner under this Paragraph shall be by a notice of termination delivered to the Contractor specifying the extent of termination and the effective date.

**14.3.2** Upon receipt of a notice of termination for convenience, the Contractor shall immediately, in

accordance with instructions from the Owner, proceed with performance of the following duties regardless of delay in determining or adjusting amounts due under this Paragraph:

- .1 cease operation as specified in the notice;
- .2 place no further orders and enter into no further subcontracts for materials, labor, services or facilities except as necessary to complete Work not terminated;
- .3 terminate all subcontracts and orders to the extent they relate to the Work terminated;
- .4 proceed to complete the performance of Work not terminated; and
- .5 take actions that may be necessary, or that the Owner may direct, for the protection and preservation of the terminated Work.

**14.3.3** Upon such termination, the Contractor shall recover as its sole remedy payment for Work properly performed in connection with the terminated portion of the Work prior to the effective date of termination and for items properly and timely fabricated off the Project site, delivered and stored in accordance with the Owner's instructions and for all Owner approved claims, costs, losses and damages incurred in settlement of terminated contracts with Subcontractors and suppliers. The Contractor hereby waives and forfeits all other claims for payment and damages, including, without limitation, anticipated profits, consequential damages and other economic losses.

**14.3.4** The Owner shall be credited for (1) payments previously made to the Contractor for the terminated portion of the Work, (2) claims which the Owner has against the Contractor under the Contract and (3) the value of the materials, supplies, equipment or other items that are to be disposed of by the Contractor that are part of the Contract Sum.

**14.3.5** Upon determination by a court that termination of Contractor or its successor in interest pursuant to Paragraph 14.1 was wrongful, such termination will be deemed converted to a termination for convenience pursuant to Paragraph 14.3, and Contractor's sole and exclusive remedy for wrongful termination is limited to recovery of the payments permitted for termination for convenience as set forth in Paragraph 14.3.

SECTION 1.ESPECIAL CONDITIONS

## 1. DEFINITIONS

## a. "Drawings"

Drawings referred to in and accompanying Project Manual consist of Drawings prepared by and bearing name of below defined Architect, bearing Date of August 10, 2021, entitled "University of Missouri Teaching Hospital – Fitout Space 2W".

b. Architect / Engineer  
TreasorHL Architects, PA  
1811 Baltimore  
Kansas City, MO 64108  
(816) 221-0900

c. Mechanical & Electrical Engineer  
McClure Engineering Association  
1000 Clark Ave.  
St. Louis, MO 63102  
(314) 645-6232

d. Interior Design  
Spellman Brady & Company  
8251 Maryland Ave., Ste. 300  
St. Louis, MO 63105  
(314) 862-0070

e. Structural Engineer  
KH Engineering Group  
15377 West 95<sup>th</sup> Street  
Lenexa, KS 66219  
(913) 825-9381

f. Other Definitions: See Article 1., General Conditions.

## 2. SPECIAL SCHEDULING

## a. Working Hours:

- (1) Normal working hours are defined as weekdays from 7:00 a.m. to 5:00 p.m.
- (2) Night working hours are defined as Monday thru Thursday after 8:00 p.m. and before 4:00 a.m.
- (3) Weekend hours are defined as after 8:00 p.m. Friday until 4:00 a.m. Monday.
- (4) Generally, all demolition work will occur after normal working hours.

### 3. SCOPE OF WORK

- a. The Contractor shall furnish all labor, materials, tools, equipment necessary for, and incidental to, construction of this project as indicated on Drawings and specified herein.
- b. Work shall include everything requisite and necessary to finish work properly, notwithstanding that every item of labor or materials or accessories required to make project complete may not be specifically mentioned.
- c. General Description of Work:
  - (1) Project consists of Renovation of the Physicians Work Room, approximately 4500 sq ft located on the second floor of the University of Missouri Teaching Hospital located at 1 Hospital Drive in Columbia, MO. This Work includes Physicians Workrooms consist of three conference/study rooms, one large conference room and a break room. Also included in the Work is the connecting Corridor, Restrooms and Support spaces. Note Materials Management area has been removed from the earlier scope.

### 4. LOCATION

- a. Work shall be performed under this Contract on campus of the University of Missouri - Columbia, at One Hospital Drive.

### 5. NUMBER OF CONSTRUCTION DOCUMENTS

- a. The Owner's Representative will furnish the Contractor a copy of executed Contract and a complete set of Drawings and Specifications in PDF format.
- b. The Owner will provide electronic data files to the Contractor for their convenience and use in progressing the Work and the preparation of shop drawings or other submittal requirements required for construction of the referenced project. The electronic data files shall reflect Construction Documents and Bid Addenda only. These files will be transmitted subject to the following terms and conditions:
  - (1) The Owner makes no representation as to the compatibility of these files with the Contractor's hardware or software.
  - (2) Data contained on these electronic files shall not be used by the Contractor or anyone else for any purpose other than as a convenience in progressing the Work or in the preparation of shop drawings or other required submittals for the referenced project. Any other use or reuse by the Contractor or by others will be at their own sole risk and without liability or legal exposure to Owner. The Contractor agrees to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of

action of any nature against the Owner and its consultants, contractors, agents, employees, and representatives that may arise out of or in connection with the use of the electronic files transmitted.

- (3) Furthermore, the Contractor shall, to the fullest extent permitted by law, indemnify and hold harmless the Owner and its consultants, contractors, agents, employees, and representatives, against all damages, liabilities or costs, including reasonable attorney's fees and defense costs, arising out of or resulting from the use of these electronic files.
- (4) These electronic files are not contract documents. Differences may exist between these electronic files and corresponding hard-copy construction documents. The Owner makes no representation regarding the accuracy or completeness of the electronic files you receive. In the event that a conflict arises between the signed or sealed hard-copy construction documents prepared by the Consultant and the electronic files, the signed and sealed hard-copy construction documents shall govern. The Contractor is responsible for determining if any conflict exists. By use of these electronic files, the Contractor is not relieved of their duty to fully comply with the contract documents.
- (5) Because information presented on the electronic files can be modified, unintentionally or otherwise, the Owner reserves the right to remove all indications of ownership and/or involvement from each electronic display.
- (6) Under no circumstances shall delivery of the electronic files be deemed a sale by the Owner and no warranties are made, either expressed or implied, of merchantability and fitness for any particular purpose. In no event shall the Owner be liable for any loss of profit, or any consequential damages as a result of use or reuse of these electronic files.

## 6. SUBMITTALS

- a. The Contractor shall submit for approval to the Architect, equipment lists and Shop Drawings, as expediently as possible. Failure of the Contractor to submit Shop Drawings in a timely manner will result in the Owner holding back Contractor payments. (See General Conditions)
- b. The material and equipment lists shall be submitted and approved before any material or equipment is purchased and shall be corrected to as-built conditions before the completion of the project.
- c. The Contractor shall submit electronic versions of all required Shop Drawings, material and equipment lists. The Contractor shall upload all Shop Drawings to a secure information sharing website determined by the Owner notifying the Owner and Consultant that these shop drawings are available for review. Each submittal shall have the General Contractors digital stamp affixed to the first page signifying their review and acceptance. Review comments, approvals, and rejections will be posted on this same site with notification to the contractor. Submittals requiring a professional seal shall be submitted

hard copy with a manual seal affixed.

- (1) The Contractor shall identify each submittal item with the following:
    - (a) Project Title and Location
    - (b) Project Number
    - (c) Supplier's Name
    - (d) Manufacturer's Name
    - (e) Contract Specification Section and Article Number
    - (f) Contract Drawing Number
    - (g) Acrobat file name: Spec Section\_Times Submitted-Spec Title: (Example - 033000 \_01-Cast In Place Concrete.pdf)
  - (2) Reference the accompanying Shop Drawing and Submittal Log at the end of this section (1.E.4) for required submittal information.
- d. The Contractor shall submit to the Architect one (1) electronic copy, in PDF form of all required Operating Instructions and Service Manuals with one PDF file per specification division for the Architect's and the Owner's sole use prior to completing 50% of the adjusted contract. Payments beyond 50% of the contract amount may be withheld until all Operating Instructions and Service Manuals are received as referenced in the accompanying Operating Instructions and Service Manual Log at the end of this section (1.E.5).
- e. The Contractor shall submit to the Owner's Representative all items referenced in the accompanying Closeout Log (1.E.6) within 30 days following substantial completion of the work. The Owner's Representative will maintain the closeout log and include as an agenda item at all coordination meetings.

## 7. NOTIFICATION

- a. Before beginning Demolition Work or service outages, the Contractor shall provide, at minimum, seventy-two (72) hours advance notice to Owner's Representative for purpose of verifying utility locations including, but not limited to, gas, telecommunications, electric, water, steam, sewer, and nitrogen. Contractor shall minimize the number of outages, minimize the length of outages and related work shall be continuous until the utility is restored.

## 8. USE OF PREMISES

- a. Access: Access to construction site shall be as indicated on Drawings and as directed by the Owner's Representative.
- b. Parking: The Contractors parking lot on Ashland Road may be utilized for employee parking. Coordinate availability and permits through the Owner's Representative.

- (1) Parking of personal vehicles within project access/lay down/staging areas is

prohibited. Violation of this requirement may result in ticketing and/or towing at the vehicle owner's expense and suspension of progress payments.

- (2) Parking or driving on sidewalks, landscaped areas, within fire and service lanes or generally in areas not designated for vehicular traffic is prohibited except as allowed in the contract documents. Violation of this requirement may result in ticketing and/or towing at the vehicle owner's expense and suspension of progress payments.
  - (3) Free parking for contractor employees is available in the Ashland Road Contractor lot on an as available basis. This space is for use by contractor employees for parking their personal vehicles only and is not to be used for staging or storage.
  - (4) Vendor Permits may be purchased by contractor management personnel on an as available basis by contacting the Parking and Transportation office in the General Services Building. These permits will allow contractor management personnel to park in various University lots while conducting business on University construction projects.
  - (5) Temporary University parking permits may be purchased by contractor employees for use with their personal vehicles on an as available basis by contacting the Parking and Transportation office in the General Services Building.
  - (6) Conley Avenue between Missouri Avenue and University Avenue and Hitt Street between University Avenue and the Memorial Union are designated for pedestrian use only during the work week between the hours of 8:15 AM and 3:45 PM. Unless otherwise indicated in the contract documents, this area is strictly off limits to vehicular traffic without authorization from the Owner's Representative.
- c. Storage of materials: The Contractor shall store all materials within project limits. The Contractor shall confine apparatus, materials, and operation of workers to location established by the Owner's Representative. The Contractor shall not unreasonably encumber premises with materials. In addition, storage trailer locations may be available within 1-1/2 miles of project site as directed by the Owner's Representative. Storage trailer locations shall be subject to approval by the Owner's Representative and are available to the Contractor without cost.
- d. Utilities: Drinking water, water required to carry on work, and 120 volt electrical power required for small tool operation may be obtained without cost to the Contractor from existing utilities at locations designated by the Owner's Representative. Provisions for obtaining power, including temporary extensions, shall be furnished and maintained by the Contractor. Upon completion of work such extensions shall be removed and any damage caused by use of such extensions shall be repaired to satisfaction of the Owner's Representative, at no cost to the Owner.
- e. Utilities: Steam, water, sewer, and electricity can be obtained from existing utilities at locations designated by the Owner's Representative at the following rates:

Provisions for obtaining power, including temporary extensions, shall be furnished and maintained by the Contractor. Upon completion of the work, such extensions shall be removed and any damage caused by use of such extensions shall be repaired to the satisfaction of the Owner's Representative, at no cost to the Owner.

- f. Restroom: Existing toilet facilities within Project Limits or Restrooms designated by the Owner's Representative for use by the Contractor will be available. Failure of the Contractor to maintain restrooms in a clean condition will be cause for the Contractor's discontinued use of the restroom.
- g. Smoking is prohibited at the University of Missouri and all properties owned, operated, leased or controlled by the University of Missouri. Violation of the policy is defined as smoking any tobacco products, including e-cigarettes.
- h. Landfill: The Contractor shall not use the Owner's landfill. Dumping or disposal of excavated or demolition materials on Owner's property shall not be permitted. The Contractor shall remove and legally dispose of excavated or demolished materials off the Owner's property.
- i. Care of Project Work Site: The contractor shall be responsible for maintaining the construction site in a reasonably neat and orderly condition by regular cleaning and mowing of the premises as determined by the Owner's Representative.
- j. Discharge to Sewer Request: The University of Missouri's MS4 permit and NPDES Storm Water Discharge Permits along with the City of Columbia's POTW Operating Permit as well as local ordinances, and state and federal environmental regulations prohibit hazardous materials from being disposed into either the storm water or sanitary sewer systems. Unless specifically approved, all chemical products such as paints, dyes, lawn care products, maintenance products, and oil are prohibited from drain disposal. Any product, including contaminated water, being discarded into the storm water or sanitary sewer systems requires written approval from the Owner through a formal "Discharge to Sewer Request" form obtained at Discharge to Sewer Request Form. The contractor should submit the form to the Owner's Representative, not to the Department of Environmental Health and Safety as the form indicates.
- k. All concrete waste material including washout water shall be totally contained and removed from the Owner's property.
- m. Permit Required Confined Space" Entry Communication and Coordination:  
(See OSHA 1926 subpart aa – Construction Confined Space for the definition of "permit required confined spaces" - Note: OSHA does not apply to the University. However, the University will provide a list of all known "permit required confined spaces")

There are no known "permit required confined spaces" within the project limits. Each contractor shall conduct a survey to confirm whether or not any confined spaces exist within the project limits. It is incumbent upon each contractor to list all "permit required spaces".

The Contractor shall notify the Owner’s Representative if 1) conditions change resulting in a non-permit required confined space being reclassified to a “permit required confined space” after evaluation of the space by a competent person; 2) a space previously thought to be non-permit required space is classified as a “permit required confined space”; or 3) during the course of construction a “permit required confined space” is created after evaluation by a competent person.

The Contractor shall submit to the Owner’s Representative a copy of the cancelled confined space entry permit and a written report summarizing the permit space program followed and all hazards confronted or created during entry operations. This information shall be submitted within one week of cancelling the permit.

9. PROTECTION OF OWNER'S PROPERTY

- a. The Contractor shall be responsible for repair of damage to building exterior and interior, drives, curbs, streets, walks, grass, shrubbery and trees, which was caused by workmen or equipment employed during progress of work. All such repairs shall be made to satisfaction of the Owner's Representative, at no cost to the Owner, or reimburse the Owner if the Owner elects to make repairs. For landscape damage, the Owner shall make such repairs. Compensation for these repairs shall be determined by the Owner's Representative using the "Valuation of Landscape Trees, Shrubs, and other Plants" as published by the International Society of Arboriculture, as last revised.
- b. Construction Project Fencing:
  - (1) Fencing will not be required as a part of work.

10. SUBSTITUTIONS and EQUALS

- a. Substitutions are defined in General Conditions article 3.11.8 for and Equals are defined General Conditions Article 3.12 .
- b. If the Architect and Owner approve a proposed substitution prior to receipt of Bids, such approval will be set forth in an Addendum. Bidders shall not rely upon approval made in any other manner.
- c. No substitutions *and/or equal* will be allowed for the following items:

<u>Item</u>	<u>Specification Section</u>
Fire Alarm	
Johnson Controls	

11. CODES AND STANDARDS

- a. City of Columbia - Sewer Line Installation Standards - Department of Public Works
 

“All sanitary sewer construction shall be in accordance with the City of Columbia Specifications and Standards and in conformance with the rules and regulations of the



Missouri Clean Water Commission.”

## 12. PERMITS

- a. Before commencement of Boilers, Water Heaters or Pressure Vessels the Contractor must obtain an installation permit from the State of Missouri, Division of Fire Safety, Boiler and Pressure Unit as required by 11 CSR 40-2.010 through 11 CSR 40-2.065. The permit applications are available at <http://www.dfs.dps.mo.gov/programs/bpv/>
- b. The contractor shall comply with applicable codes and standards as listed in the Contract Documents, General Conditions, and the Healthcare Construction Guidelines.
- c. The Owner has hired a third-party Code Inspection Agency, George Butler & Associates (GBA), for this project. The Owner will secure a building permit and furnish to the Contractor prior to Construction commencing on site. A temporary Certificate of Occupancy and Certificate of Occupancy process will be incorporated into this project.
- d. The Contractor shall be responsible for coordinating inspections with GBA.

## 13. MODIFICATION TO INFORMATION FOR BIDDERS

### a. Information to Bidders:

- (1) Referenced Information to Bidders, Page IFB/6.  
Add new Article 15.9.2 as follows:

**15.9.2.1** Within 48 hours of the receipt of bids, the apparent low bidder shall submit to the Director of Facilities Planning and Development an “Affidavit of Supplier Diversity Participation” for every diverse subcontractor or supplier the bidder intends to award work to on the contract. The affidavit will be signed by both the bidder and the diverse firm.

## 14. PROJECT SCHEDULING

- a. The project scheduling specification for the project are included immediately after the Special Conditions. For this project the Contractor shall meet the following scheduling requirements.
  - (1) Contractor Schedule with Third Party Scheduling Consultant: Contractor is responsible for the schedule, but the Contractor will hire a Third-Party Scheduling Consultant, approved by the Owner, at the Contractor’s expense. See Contractor Schedule with Third Party Scheduling Consultant Specification included in these documents.

Thomas D. Wilson Consulting, Inc.  
(314) 918-0210  
tom@tdwilsom.com

## 15 PROJECT COORDINATION

- a. Coordinate construction operations included in various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections that depend on each other for proper installation, connection, and operation.
- (1) Schedule construction operations in the sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  - (2) Coordinate installation of different components to assure maximum accessibility for required maintenance, service, and repair.
  - (3) Make provisions to accommodate items scheduled for later installation.
- b. Coordination Drawings: Within thirty (30) days of Notice to Proceed provide coordination drawings for the integration of the Work, including work first shown in detail on shop drawings or product data. Show sequencing and relationship of separate units of work which must interface in a restricted manner to fit in the space provided, or function as indicated.
- (1) Show the interrelationship of components shown on separate shop drawings.
  - (2) Indicate required installation sequences.
  - (3) Call attention in advance to Architect of any dimensional or detail information needed to complete the coordination drawings.

## 16. BUILDING SYSTEM COMMISSIONING

- a. Contractor shall provide all personnel and equipment required to complete the commissioning activities referenced in the Commissioning Plan. The requirements of the commissioning plan shall be completed in their entirety before substantial completion and submitted as referenced in the Closeout Log.
- b. The contractor shall designate a competent person, separate from the superintendent or project manager, to act as the contractor's commissioning coordinator. The commissioning coordinator is responsible for planning, scheduling, coordinating, conducting and verifying all commissioning activities required by the commissioning plan and ensuring all building systems are complete, operable and ready for use by the Owner. At a minimum, building ventilation systems, chilled/hot water generation systems, hydronic distribution systems, power distributions systems and fire detection and alarm systems, as applicable.

**17. MECHANICAL, ELECTRICAL, PLUMBING (MEP) PRE-INSTALLATION MEETING(S)**

- a. Before the start of MEP installation, the Owner's Representative will convene an MEP pre-installation meeting. Meeting participants to include contractor (including MEP subcontractors), Owner's Representative and additional contractor and University operational staff invited by the Owner's Representative. Topics will include underground rough-ins, steam piping, chilled water piping, sprinkler piping, hot water piping, electrical system, duct, telephone/data wiring, control wiring. Additional meetings will be conducted as required for the review of coordination drawings and scope specific installations. Cross section drawings of corridor ceilings and other congested areas will be of highest priority and will be reviewed prior to the start of installations in the affected areas. Meeting minutes and sign-up sheet will be transcribed by contractor and distributed to attendees.

**18 PROJECT MANAGEMENT/COMMUNICATION REQUIREMENTS**

- a. The Contractor shall be represented at the site by a full-time, competent superintendent with no other assigned duties or responsibilities from the beginning of the work until its final acceptance, unless otherwise permitted by the Owner's Representative. The superintendent for the Contractor for the general building work shall exercise general supervision over all subcontractors of any tier engaged on the work with decision-making authority of the Contractor.
- b. The Contractor shall use a current industry standard (Primavera, Microsoft Project, etc.) project scheduling software which provides as a minimum: Critical paths, milestones, estimated and actual start and completion dates, scheduled vs. actual progress, and detailed task and subtask breakdown. The following schedules shall be provided as a minimum and kept current: Overall project schedule, four- (4-) week look-ahead, and two- (2-) week look-ahead.
- c. The Contractor shall furnish on-site Internet access for use by his project manager and superintendent. The contractor shall utilize the Owner's secure information sharing system for submittals, construction payment process, change orders, RFI's/ASI's, O&M manuals and all other project manual requirements as directed by the Owner's Representative. Field staff are also required to utilize this software as directed by the Owner's Representative.
- d. The Contractor shall provide his on-site superintendent with a handheld cellular telephone.

**19. SAFETY PRECAUTIONS AND PROGRAMS**

- a. The Bidder's Statement of Qualifications includes a requirement that the Bidder provide its Worker's Compensation Experience Modification Rates (EMR) and Incidence Rates for the three recent years. The Bidder shall also include the EMR and Incidence Rates of listed major subcontractors on the Bid for Lump Sum Contract. If the EMR exceeds 1 or the Incidence Rate exceeds 13, the Contractor or major subcontractor shall take additional safety measures including, but not limited to, developing a site-specific safety

plan and assigning a Safety Manager to the Project to perform inspections on a schedule as determined acceptable by the Owner with written reports to be submitted to the Owner. The Owner reserves the right to reject a Bidder or major subcontractor whose rates exceed these stated rates.

- b. The contractor shall provide Emergency Contact Information for the Contractor's on-site staff and home office management as well as contact information for all major subcontractor personnel. This information shall contain business and personal phone numbers for each individual for contact during or after hours in case of an emergency. This information shall be submitted within 15 days of the Notice to Proceed.

## 20. GENDER NEUTRAL SIGNAGE

- a. All contractor installed signs including signs referenced in General Conditions articles 3.5.3 and 10.2.3 shall be gender neutral in wording.

## 21. HOT WORK PERMITTING AND GENERAL REQUIREMENTS

- a. Hot work Requirements: The contractor shall comply with the following hot work requirements and the requirements of the International Fire Code and 2014 NFPA 51B.
- b. Hot work shall be defined as any work involving burning, welding, grinding, cutting, or similar operations that are capable of initiating fires or explosions.
- c. The Contractor shall utilize the hot work permit decision tree and permit provided in the 2014 NFPA 51B for all Hot Work operations.
- d. A hot work permit shall be used on all hot work performed outside a designated hot work area. The hot work permit shall be posted and clearly visible within proximity of the hot work area. The hot work permit authorizing individual (PAI) shall be as designated by the Contractor.
- e. Notify the Owner's Representative 24 hours prior to starting hot work in buildings with operational fire alarm or fire suppression systems. The Contractor will coordinate the appropriate system outage with MUHC personnel.
- f. MUHC will collect and file Hot Work Permits.

## 22. CONSTRUCTION WASTE MANAGEMENT

- a. The goal of Construction Waste Management is to divert construction waste from the sanitary landfill. This shall be accomplished through reuse, recycling and/or salvage of non-hazardous construction and demolition debris to the greatest extent practical. Track and report all efforts related to reuse, recycling and/or salvage of materials from the project (including clean fill material). Report all material types and weights, where material was diverted, type of diversion, documentation (e.g.: waste or recycling tickets) of this diversion, and applicable dates. In order to calculate the diversion percentage,

total weights of all landfill material (non-hazardous) must also be reported.

This information shall be updated monthly with final submission prior to project substantial Completion. Copies of all applicable receipts, tickets and tracking logs shall be uploaded to the Owner's information sharing website or reported as required by the construction project manager. Tracking logs shall be reported in tabular form utilizing the MU Construction Waste Management Worksheet.

<https://operations.missouri.edu/facilities/contractor-information>

## 23. WARRANTY WALKTHROUGH

- a. Contractor shall attend a walk-thru with the Owner at 11 months after acceptance to review and document any warranty items to be addressed as part of the 12-month warranty stated in article 3.1 of the General Conditions.

**END OF SECTION**

## Option #4 – Contractor Schedule with 3<sup>rd</sup> Party Scheduling Consultant

### 1. GENERAL

a) Time is of the essence for this contract.

The time frames spelled out in this contract are essential to the success of this project. The University understands that effective schedule management, in accordance with the General Conditions and these Special Conditions is necessary to insure that the critical milestone and end dates spelled out in the contract are achieved.

b) Related Documents

Drawings and general provisions of the Contract, including General Conditions' Article 3.17 shall apply to this Section.

a) Stakeholders

A Stakeholder is anyone with a stake in the outcome of the Project, including the University, the University Department utilizing the facility, the Design Professionals, the Contractor and subcontractors.

b) Weather

- (1) Contractor acknowledges that there will be days in which work cannot be completed due to the weather, and that a certain number of these lost days are to be expected under normal weather conditions in Missouri.
- (2) Rather than speculate as to what comprises "normal" weather at the location of the project, Contractor agrees that it will assume a total of 44 lost days due to weather over the course of a calendar year, and include same in its as planned schedule. For projects of less than a calendar year, lost weather days should be prorated for the months of construction in accordance with the following schedule.
- (3) Anticipated weather days for allocation/proration only. For projects lasting 12 months or longer, the 44 days per year plus whatever additional months are included will constitute normal weather.

Jan – 5 days	Feb – 5 days	Mar – 4 days	Apr – 4 days
May – 3 days	Jun – 3 days	Jul – 2 days	Aug – 2 days
Sep – 3 days	Oct – 4 days	Nov – 4 days	Dec – 5 days

### 2. SCHEDULING PROCESS

a) The intent of this section is to insure that a well-conceived plan, that addresses the milestone and completion dates spelled out in these documents, is developed with input from all stakeholders in the project. Input is limited to all reasonable requests that are consistent with the requirements of the contract documents, and do not prejudice the Contractor's ability to perform its work consistent with the contract documents.

Further, the plan must be documented in an understandable format that allows for each stakeholder in the project to understand the plan for the construction and/or renovation contained in the Project.

b) Project Controlled Scheduling

The content (Activity Descriptions, Activity Codes, Durations, Predecessors and Successors) of the Project Schedule will be the responsibility of the Contractor. The Contractor will provide the services of a Third Party Scheduling Consultant (TPSC), at the Contractor's expense, to prepare and maintain the CPM schedule program for the duration of the project. Upon Contractor's compliance with the requirements listed below, TPSC will take responsibility for organizing the Project CPM schedule, which reflects the Contractor's plan, using Primavera Project Planner (P3), in a manner that complies with this section of the Special Conditions.

c) Contractor Requirements

(1) Schedule Development

Contractor shall fully cooperate with the TPSC Consultant to make personnel available to describe the Contractor's plan for executing the work. Personnel shall be made available as noted for the series of meetings/working sessions listed below.

(2) Schedule Strategy (Week 1-2)

Within 10 days of award, the Project Executive, Project Manager, Project Engineer(s) and Project Superintendent (Contractor Team) will meet with TPSC to establish the general plan and sequencing of the project. At this meeting, the Contractor Team will agree upon the overall work plan, commit to the level of detail to be included in the schedule, the number of activity codes necessary for effective project control, the necessity of cost loading and/or crew loading the schedule. It is anticipated that this meeting(s) will take between 2 and 4 hours.

(3) Activity Identification and Logic Development (Weeks 3-4)

During the two weeks following the Strategy Meeting, Contractor will make the Project Team (minimum of Project Manager and Project Superintendent) available, up to ½ time, to identify the specific activities that will be included in the schedule and determine the specific logic that the contractor intends to follow in constructing the project. This effort is normally accomplished in a few ½ day sessions, with the TPSC facilitating the discussion and recording the plan. The Project Team will provide preliminary durations for all activities, including those of subcontractors. Final durations will be developed after receiving input from the major subcontractors and/or craft superintendents, during the Schedule Reconciliation Phase described below.

Contractor will provide TPSC with a complete submittal list, from which the TPSC and Project Team will determine which submittals and procurement activities are necessary to include in the CPM schedule in order to effectively manage the project.

(4) Schedule Development (Week 5)

During Week #5 TPSC will produce a Preliminary Schedule "fragnet" or "subnet" that describes the work plan for the first 90 days of the project. This "fragnet" will be used to monitor the work on the project until the final schedule is prepared and accepted by the University and the Project Team.

By the end of week 5, the TPSC will have all of the identified activities, durations, logic and activity codes input into the schedule, ready to review with each major subcontractor and/or craft superintendent.

Contractor will distribute one full copy of the schedule and one copy of each individual subcontractors scheduled activities to each subcontractor for review.

(5) Subcontractor Review (Week 6)

(6) Schedule Reconciliation (Week 7)

Contractor will arrange a series of meetings with each major subcontractor and/or craft superintendent. Project Manager and/or Project Superintendent must be present at each meeting. Meetings should take between 1 to 2 hours, depending on the subcontractor's scope, capability and work complexity. Upon completion of this series of meetings, each subcontractor's reconciled schedule will be printed out and the subcontractor will sign the printout, signifying its commitment to performing in accordance with the reconciled.

schedule.

(7) Final Schedule Development (Week 8)

During this time frame, TPSC and Project Team will secure subcontractor commitment to the finished schedule. TPSC will finalize all agreed upon activity coding and resource loading. TPSC will print out the final schedule, including various “fragnets” for review by the entire Project Team, TPSC and the University, at a Schedule Finalization Meeting, to be held prior to final acceptance of the schedule by the entire Project Team.

(8) Schedule Updates.

- (a) Schedule Updates will be conducted once a month, at a minimum. TPSC will provide Contractor with a “Schedule Update Form”, which contains blanks for Actual Start and Actual Finish dates, Percent Complete and Remaining Duration. Actual Start and Finish dates should be recorded regularly during the month. Percent Complete, or Remaining Duration shall be updated as of the data date, just prior to Contractor’s submittal of the update data.
- (b) Contractor will submit completed update form to TPSC.
- (c) TPSC will copy the previous months schedule and will input update information into the new monthly update version.
- (d) TPSC will meet with Contractor to review the draft of the updated schedule. At this meeting, TPSC and Contractor will:
  - (i) Review out of sequence progress, making adjustments as necessary,
  - (ii) Add any fragnets necessary to describe changes or other impacts to the project schedule and
  - (iii) Review the resultant critical and near critical paths to determine any impact of the occurrences encountered over the last month.

(9) Schedule Narrative

After finalization of the update, the TPSC will prepare a Narrative that describes progress for the month, impacts to the schedule and an assessment as to the Contractor’s entitlement to a time extension for occurrences beyond its control during the month and submit in accordance with this Section.

(10) Progress Meetings

- (a) Review the updated schedule at each monthly progress meeting. Payments to the Contractor may be suspended if the progress schedule is not adequately updated to reflect actual conditions.
- (b) Submit progress schedules to subcontractors to permit coordinating their progress schedules to the general construction work. Include 4 week look ahead schedules to allow subs to focus on critical upcoming work.

3. CRITICAL PATH METHOD (CPM)

- a) This Section includes administrative and procedural requirements for the critical path method (CPM) of scheduling and reporting progress of the Work.
- b) Refer to the General and Special Conditions and the Agreement for definitions and specific dates of Contract Time.
- c) Critical Path Method (CPM): A method of planning and scheduling a construction project where activities are arranged based on activity relationships and network calculations determine when activities can be performed and the critical path of the Project.
- d) Critical Path: The longest continuous chain of activities through the network schedule that establishes the minimum overall project duration.
- e) Network Diagram: A graphic diagram of a network schedule, showing the activities and activity relationships.



- f) Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling, the construction project. Activities included in a construction schedule consume time and resources.
- g) Critical activities are activities on the critical path.
- h) Predecessor activity is an activity that must be completed before a given activity can be started.
- i) Milestone: A key or critical point in time for reference or measurement.
- j) Float or Slack Time: The measure of leeway in activity performance. Accumulative float time is not for the exclusive use or benefit of the Owner or Contractor but is a project resource available to both parties as needed to meet contract milestones and the completion date.
- k) Total float is herein defined as the measure of leeway in starting or completing an activity without adversely affecting the planned project completion date.
- l) Weather: Adverse weather that is normal for the area must be taken into account in the Contractor's Project Schedule. See 1.d.3, above.
- m) Force Majeure Event: Any event that delays the project but is beyond the control and/or contractual responsibility of either party.
- n) Schedule shall including the following, in addition to Contractor's work.
  - (1) Phasing: Provide notations on the schedule to show how the sequence of the Work is affected by the following:
    - (a) Requirements for phased completion and milestone dates.
    - (b) Work by separate contractors.
    - (c) Work by the Owner.
    - (d) Coordination with existing construction.
    - (e) Limitations of continued occupancies.
    - (f) Uninterruptible services.
    - (g) Partial occupancy prior to Substantial Completion.
- o) Area Separations: Use Activity Codes to identify each major area of construction for each major portion of the Work. For the purposes of this Article, a "major area" is a story of construction, a separate building, or a similar significant construction element.

#### 4. TIME EXTENSION REQUESTS

- a) Refer to General Conditions of the Contract for Construction, Article 4.7 Claims for Additional Time.
- b) Changes or Other Impacts to the Contractor's Work Plan  
The Owner will consider and evaluate requests for time extensions due to changes or other events beyond the control of the Contractor on a monthly basis only, with the submission of the Contractor's updated schedule, in conjunction with the monthly application for payment. The Update must include:
  - (1) An activity depicting the event(s) impacting the Contractors work plan shall be added to the CPM schedule, using the actual start date of the impact, along with actually required predecessors and successors.
  - (2) After the addition of the impact activity(ies), the Contractor shall work with the TPSC to identify subsequent activities on the critical path, with finish to start relationships that can be realistically adjusted to overlap using good, standard construction practice.
    - (a) If the adjustments above result in the completion date being brought back within the contract time period, no adjustment will be made in the contract time.
    - (b) If the adjustments above still result in a completion date beyond the contract completion date, the delay shall be deemed excusable, and the contract completion date shall be extended by the number of days indicated by the analysis.
    - (c) Contractor agrees to continue to utilize its best efforts to make up the time caused by the delays. However, the Contractor is not expected to expend costs not contemplated in its contract, in making those efforts.

- c) Questions of compensability of any delays shall be held until the actual completion of the project. If the actual substantial completion date of the project based on excusable delays, excluding weather delays, exceeds the original contract completion date, AND there are no delays that are the responsibility of the contractor to consider, the delays days shall be considered compensable. The actual costs, if any, of the Contractor's time sensitive jobsite supervision and general conditions costs, shall be quantified and a change order issued for these costs.

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## Section 1.E.1

### Healthcare Construction Guideline

*(Included for your information on Healthcare projects only)*

**SEPT 2017 Edition**

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## **Section 1 Training Requirements**

The purpose of the training requirements for contractors is to ensure that construction project work in and around the healthcare environment is managed in such a way to minimize health and safety risks associated with construction activities and that contractors know and understand their responsibilities.

### **Required Training**

1. Contractor project managers, superintendents and subcontractor foremen will be required to attend the following training:
  - Minimum of One (1) hour training related to ***“Infection Control & Dust Barriers”*** and ***“Healthcare Construction Training for Contractors”***.
2. Contractor project managers, superintendents and subcontractor foremen have the responsibility for ensuring that contractor employees are knowledgeable of the training requirements and direct their employees and project work accordingly.
3. Contractors will be required to utilize the MU Hospital online **eMeditrack** system for initiating work requests of various types, examples may include infection control barriers, utility outage, various permits required.
4. Contractors are required to report in and sign in and out at the designated location per building location each work day upon arrival and exit of the work location.

### **Training Agenda**

At a minimum the topics to be covered in the training include the following:

1. Construction Risk Assessment, Infection Control, ventilation, barrier plans and Interim Life Safety.
2. Contractor Training Requirements.

### **Documentation**

1. All employees who receive training will be required to sign their name on a training acknowledgement form stating that they have been oriented to the training requirements.
2. Healthcare Safety and Infection Control Requirements will be in the project contract documents for further review as required.
3. **COMPLIANCE VIOLATIONS:** Contractors/Vendors who violate the requirements of this Guideline are subject to disciplinary action and removal from the project.

## **Section 2 Emergency Phone Numbers & Contact Information**

Telephone contacts should be used by the contractor for emergency situations which may arise during the construction project. Contact Plan will be identified and coordinated at the project Pre-Construction Meeting by the owner’s representative.

## **Section 3 Contractor Identification Badge**

Contractors working in and around the MUHC facilities will be required to display and wear the ***“Contractor Identification Badge”*** and in accordance with the information displayed below. It is the responsibility of the contractor to provide the computer and color printer for reproduction of badges required. Consult the Owner’s Representative for the electronic file.

### **Contractor ID Badge**

1. Contractor is to issue badges to employees as required. (Contractor to validate employee with proof of ID).
2. Contractor to edit the information, print in color, cut out the badges, fold in the center and insert. Contractor will provide badge holders.
3. Contractor shall keep a roster/log of badged employees by trade/subcontractor at the project jobsite for reference by the Owners Representative.
4. All badges to be collected and returned to PD&C at the end of the project.
5. Any orientation required will be discussed at the pre-construction meeting with the Owner’s Representative.
6. Contractor employees are to wear the badge on the upper chest facing forward unless approved otherwise for safety reasons.
7. All contractor superintendent and foreman shall attend “Healthcare Construction Training” and affix issued “T” sticker in the circle area on badge as shown. This will show evidence that the employee has completed training

8. The Badge document will be provided to the Contractor to make copies and distribute as required. See Page HCG 12.

#### **Section 4 General Safety Requirements for Health Care Projects**

The General Contractor and its Subcontractors are responsible for understanding, planning and implementing the following requirements in the management of the project.

1. Make sure shoes/boots and clothing are free of excessive dirt/debris before entering and leaving the construction area.
2. If you leave any dust/dirt or tracks in the occupied area of the healthcare facility, you must stop and clean them up immediately by using a HEPA filtered vacuum and/or a clean dampened floor mop with a UMTH hospital approved furnished cleaning solution.
3. Assure that all construction material, supplies and tools are cleaned and covered with a clean covering material while transporting through the healthcare facility.
4. Ensure that the carts and wheels on tool and supply carts as well as trash/demolition waste carts are properly wiped clean before leaving the construction area. Cleaning/wiping solutions are provided by the hospital and must be approved per direction of the Owner's Representative.
5. Staff and patients **ALWAYS** have priority and the "**Right of Way**" in the elevators and corridors.
6. Never use aerosol sprays or cleaning solvents that could dispense fumes, odors or cause potentially allergenic reactions or medical problems to susceptible patients, staff or visitors.

#### **Section 5 Construction-Renovation-Maintenance Risk Assessment (CRMRA)**

The "**Construction-Renovation-Maintenance Risk Assessment**" (**CRMRA**) planning process establishes criteria to be used and measures to be taken for the protection of patients, healthcare workers, visitors and contractors, from construction/renovation activities which could lead to infections or compromise existing life safety systems in the healthcare facility.

Once the Contractor is selected, they will be required, and the Subcontractors as applicable to participate in the "**CRMRA**" planning process for orientation of project requirements and help in identifying any additional project needs or risks prior to any contract construction work commencing.

The owner's representative will work with the contractor to coordinate and facilitate these **CRMRA** planning activities with MUHC engineering services, infection control department and others as required during the duration of the project.

#### **Section 6 Construction – Renovation – Maintenance Infection Control Risk Mitigation Criteria**

The "**Construction–Renovation-Maintenance Infection Control Risk Mitigation Criteria**" (**CRMICRMIC**) is a process to evaluate construction projects for required interventions during construction in order to minimize Hospital Acquired Infections (HAI's), and controlling dispersal of air and/or water-borne infectious agents concealed within the building components.

All construction activities shall be defined and managed in such a way that occupant's exposure to dust, moisture and their accompanying hazards is limited.

1. **Construction–Renovation-Maintenance Infection Control Risk Mitigation Criteria and the Construction–Renovation-Maintenance Infection Control Risk Mitigation Permit** which will be used for all MUHC construction and renovation projects.
2. **Any work required outside the main project limits will require a NEW Infection Control Risk Assessment.**
3. The owner's representatives and Contractor will work together to coordinate the assessment and determine the requirements and permit.
4. The owner's representative will ensure that all required infection control interventions and needed life safety measures required for the project are in place by the contractor prior to starting work. (i.e. barrier walls, tacky mats, required exits, etc.)
5. The contractor shall follow all requirements to support the "**Construction – Renovation- Maintenance Infection Control Risk Mitigation Criteria**".
6. The contract documents and CRM IC Permit will provide requirements specific to the project.

7. Work outside of construction limits. Prior to contractor performing any work outside of construction limits, the owner's representative must be notified.
8. Contractors that violate the requirements of the "**Construction – Renovation- Maintenance Infection Control Risk Mitigation Criteria/Permit**" will be removed from the project.

## **Section 7 Construction of Dust Barrier Walls**

Infection control is the number one health concern in a construction project. Infection can occur when workers are not cautious about keeping dust, bacteria, mold, etc. from becoming airborne during the construction process. For these reasons, barrier walls are built to isolate dust and fumes in the construction site to separate the patient care and public areas of the healthcare facility.

### **Dust Barriers Walls and Contamination Reduction**

1. A signed copy of the "**CRM Infection Control Construction Permit**" shall be kept at the job site at all times. Large AND small projects may have several "CRM Infection Control Construction Permits" issued as project phases, needs and assessments evolve.
2. Barriers are required to contain the ceiling envelope, chases, interstitial spaces, etc.
3. When access and exiting to the construction site can only be accomplished through a public area, the interior space of the construction site must be cleaned once every 8 – hour shift to control excessive dust and ventilation filtering issues. Debris shall be removed daily.
4. A temporary fire resistant 6 mil., polyethylene dust barrier is required to control dust while the rigid barrier is being constructed as well as at the end of the job during removal of the rigid barrier.
5. Contractors are responsible to ensure that barrier systems and walls are properly constructed, penetrations sealed and maintained for effectiveness for the duration of the project. Anytime polyethylene is used in a control barrier, it must be fire resistant, 6 mil. See "**Approved Equipment and Product Information**".
6. Once barrier walls are built they are required to be cleaned or wiped down prior to the start of work.
7. Barrier doors and exits from the construction site must be installed with a closer and kept in good working order with positive latching.
8. Keep doors closed except when in use in order to minimize migration of dust and to maintain negative air pressure relationships.
9. Doors must have a seal/door sweep installed at the undercut and weather stripping around the metal frame to control the migration of dust from the construction site.
10. Doors in barrier walls which are not in use by the contractor to the public spaces must be sealed off and taped around the door, frame and threshold undercut, in order to minimize migration of dust and to maintain negative air pressure requirements.
11. If an elevator, dumb waiter, pneumatic tube system, stairway, linen chute, or any other chased or open type building system is located within the construction site, a barrier wall system will be required to be built around the open building system from deck to deck and properly sealed at top, bottom and sidewalls.
12. Upon completion of barriers and prior to beginning work, the contractor shall notify the owner's representative and healthcare construction compliance manager to coordinate an inspection and verify that the barrier wall meets requirements and that acceptable negative air pressure is being achieved.

### **Special Notes:**

1. See "**Barrier Wall Design Details**" for additional requirements.
2. See section in this manual on "**Ventilation and Negative Air Pressure Requirements**" for additional requirements *when* building dust barrier systems and walls.
3. See section in this manual on "**Approved Equipment and Product Information**".

## **Section 8 Ventilation and Negative Air Pressure Requirements**

The first step is building of dust barrier walls to isolate the construction site from patient care and public areas of the healthcare facility to protect patients and the public from construction related dust, fumes and other activities. The effectiveness of barrier walls is minimal unless the construction site is also under negative air pressure. (i.e. air must flow from clean or public spaces into the dirty or construction site).

The following are the "**Ventilation and Negative Air Pressure Requirements**" which contractors shall strictly follow in the management and construction of their projects.

### **Negative Air Pressure Requirements**

1. The contractor shall provide all necessary ***“Negative Air HEPA Filtered Ventilation Units”*** required for the negative air requirements of the construction area.
2. See section in this manual on ***“Approved Equipment and Product Information”*** for more information.
3. The contractor will work with the owner’s representative to determine best methods and equipment set up requirements for the project.
4. The contractor shall run the ***“Negative Air HEPA Filtered Ventilation Unit”*** in the work zone location prior to starting any barrier wall construction or work.
5. ***“Negative Air HEPA Filtered Ventilation Units”***, may be connected to normal or emergency power and shall run continuously, 24/7. Critical areas of the healthcare facility may require the HEPA filtered ventilation units to be connected to emergency power only.
6. A secondary method to maintain negative air pressure is by using the hospitals exhaust system attached to the ***“Negative Air HEPA Filtered Ventilation Units”***. This process and installation must be approved by the owner’s representative.
7. **Pre-Filters shall be changed at least twice weekly during demolition and drywall sanding and a minimum of once a week during other times.** This frequency requirement may be relaxed for lower risk projects and on prior approval from the owner’s representative.
8. The contractor shall furnish and install the negative air-monitoring device to monitor daily negative air pressure ***-.01 inches of water column.*** See section in this manual on ***“Approved Equipment and product Information”***.
9. The contractor shall record daily on the ***“Negative Air Pressure and Filter Change Log”*** the air pressure reading in the construction area to insure that appropriate negative air pressure is being maintained.
10. See ***“Negative Air Pressure and Filter Change Log”*** form at the end of this section.

## **Barrier Walls and Negative Air Ventilation**

### **Special Infection Control Requirements and Interventions for Contractors When Working In (Surgical OR’s, Sterile Processing, Bone Marrow Transplant)**

Construction activities can lead to increased Aspergillus counts in the air and increased risk for Aspergillus infections in high risk patients. In an effort to minimize and contain dust, and lessen the possibility of microbial contamination during renovation work in high risk special care units, Interventions are typically initiated and maintained until the completion of the project. The owner’s representative, MUHC infection control and engineering services departments will be involved in contractor orientation for project work procedures in high risk special care units.

**Special work scheduling in these special care units may be a requirement of the project and contractor.**



**Negative Air Pressure and Filter Change Log**

Project Name: \_\_\_\_\_

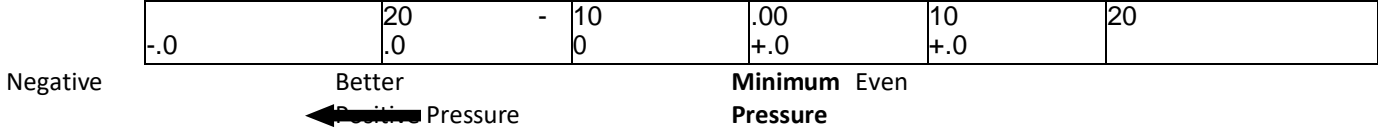
Location: \_\_\_\_\_

Date:	Time	Negative Air			Unit No.	Inspected By:	Actions Taken (Filter Change, Pre Filter, HEPA, Other)
		Yes	No	Pressure Reading			

Project Number: \_\_\_\_\_

Contractor to complete the **Negative Air Pressure and Filter Change Log** daily at the start of each work shift and maintain completed forms in the project safety file for future review. Post this log inside construction site entrance for use and review.

**Pressure Relationship Illustration**



## **Section 9 Interim Life Safety Measures Assessment (ILSM)**

Interim Life Safety Measures (ILSM) are a series of administrative actions that must be taken to compensate temporarily for the hazards posed by existing NFPA Life Safety Code 101, 2014 edition deficiencies, other building code issues or construction activities. Examples of when construction activities require ILSM's to be implemented are as follows:

1. Fire alarm system, detection, and/or sprinkler system are impaired or disabled.
2. Normal exits or exit routes and/or exit lighting have been compromised.
3. Re-routing of traffic due to construction activities.
4. Temporary narrowing of the corridor.
5. Deficiencies in fire and/or smoke separations and systems caused by construction activities. (Changes to wall, door, dampers, penetrations, etc.)
6. Emergency lighting not compliant.
7. Major and minor construction/renovation in an occupied health care occupancy.
8. Hot work.

Whenever an ***“Interim Life Safety Measure”*** is identified for implementation during the construction project, there will typically be measures or actions required by both the MUHC engineering services department as well as the contractor. The contractor has the responsibility prior to the beginning of work and throughout the project to become familiar with the ILSM in order to plan and identify what construction related activities will require an evaluation of ILSM's as noted in the ILSM. The ***“Interim Life Safety Measures Evaluation”*** is a required team effort.

## **Section 10 Noise and Vibration Control Management**

Construction related noise and vibration control and mitigation measures are to be implemented when the contractor is working in and around healthcare facilities. The contractor shall work with the owner's representative to develop means and methods for controlling excessive noise and vibration during construction.

## **Section 11 Above Ceiling Work Permit**

All contractors who need access above ceilings in the public areas of the healthcare facility and outside the approved construction site shall be required to obtain an ***“Above Ceiling Work Permit”*** from the owner's representative prior to disrupting or lifting out ceiling tiles. The contractor shall notify the owner's representative fourteen (14) days prior to the need for ceiling access in order to process and evaluate any special requirements of the permit.

### **General Requirements for Working above Ceilings (*“Above Ceiling Permit Required”*)**

1. The Construction-Renovation-Maintenance Infection Control Risk Mitigation Permit issued for the work activity will note specifics required for Barrier Types.
2. Any cable and wiring pulls through the healthcare facility which will require a ceiling disturbance must be approved in advance by obtaining an ***“Above Ceiling Work Permit”***.
3. Ceiling tiles must not be left displaced by the contractor if he walks away from the area unless the area has been contained by an approved ***“Dust Barrier”***.
4. If a ceiling tile is damaged by the contractor he should notify the owner's representative to acquire a new tile for replacement.
5. All debris shall be cleaned up by the contractor daily when working in cabling and electrical closets.
6. Pulling of communication cables in a patient care or other critical care areas will require special scheduling. Consult with the owner's representative for coordination.
7. When cables must be pulled in an active patient care unit, a dust partition must be used at the site of entry and exit of the cable.
8. The dust partition may be attached to the false ceiling because taking it to deck may interfere with the work.
9. The site of entry and exit of the cable or other above ceiling work must be HEPA vacuumed (ceiling tiles and pipes) before the work begins.

## **Section 12 Lock Out/Tag out Permit**

**The contractor shall give a minimum fourteen (14) working days) notice** to the owner's representative for shutdown work on electrical systems or other critical utility systems which could significantly impact the healthcare facilities operations, **the contractor will be required to plan these "Lock Out/Tag Out" activities ten (14) days in advance.** Major utility shutdowns may require weeks of notice and planning. The contractor shall work with the owner's representative to identify these time planning requirements.

## **Section 13 Utility Systems Shutdown & Service Permit**

The "***Utility Systems Shutdown & Service Permit***" is to be used when work on an existing utility system **may cause** a disruption within the MUHC facility.

"Utility Systems" shall be defined as any system that would hinder the delivery of patient care and hospital operations should the system be interrupted for any reason. Planning for this work usually requires a contingency plan by the healthcare facility management department to address any failure of the utility system.

### **Utility Shutdown**

Any and all utility or system connections, shut-off, or interruptions must be scheduled with the owner's representative prior to commencement of the work. This work shall be defined as a "***Utility Shutdown***" and notice shall be made to the owner's representative to coordinate the request and facilitation.

### **Utility Service - (System must be worked live or energized)**

In addition to utility system connection, shut-off, or interruption, the contractor must also schedule any work on existing utility systems that either **do not require interruption or cannot be interrupted** to accomplish the work. This type of work shall be defined as "***Utility Service***" and notice shall be made to the owner's representative.

**The contractor shall give up to 14 working days' notice** to the owner's representative in order to properly plan and coordinate required activities.

All permits are to be posted at the job site location for the duration of the permit. When complete the contractor shall file the permits in the contractor job safety file for future review as may be required.

## **Section 14 Hot Work & Permit**

Hot work shall be defined as welding, brazing, cutting soldering, grinding, or other activities which produce sparks or use flame which are capable of initiating fires or explosions.

All contractors performing construction, renovation and installation work for MUHC facilities are required to follow the requirements and provisions of **NFPA 51B** and the owner's representative procedures related to "Hot Work" and obtaining a "***Hot Work Permit***".

The following are the requirements for a contractor to obtain a "***Hot Work Permit***".

1. Contractors shall contact the owner's representative two (2) days, forty eight (48) hours in advance to request a hot work permit. A request for complex projects which requires extensive planning on behalf of the owner's representative may require a longer notice period.
2. All hot work sites are inspected by the owner's representative using the requirements printed on the "***Hot Work Permit***".
3. The owner's representative will issue a "***Hot Work Permit***" tag to be attached in the vicinity of the actual hot work being performed. Upon completion, the hot work tag shall be returned to the owner's representative.
4. "***Hot Work Permits***" will be issued for only one shift unless other arrangements have been made with owner's representative. All permits expire 30 minutes prior to the end of the shift.
5. If hot work cannot be completed within one work shift, the contractor is responsible for obtaining approval for a revised permit extension from the owner's representative. The contractor is responsible for meeting all the safety requirements required by the permit for any and all extensions granted.
6. The contractor shall be responsible for supplying a trained worker for the requirement of a fire watch during the actual hot work. The fire watch's only responsibility will be as a fire watch.

7. A fire watch shall be provided for 30 minutes following the completion of work, including during lunch and breaks by the contractor.
8. The contractor shall provide at a minimum a ten pound (10) ABC fire extinguisher that has a current, valid inspection tag.
9. A copy of the **"Hot Work Permit"** shall be kept in the general contractors project file for future review as may be required.
10. The contractor shall upload completed Hot Work Permits to the owner's electronic construction document program (Projex 4) in the Hot Work Permit folder for the project not less than on a weekly basis or as instructed by the owner's representative.

### **Section 15 Exterior Construction Site Helicopter Landings**

Any contractor doing construction work or activities on the hospital grounds, property or on the roof of the buildings is required to follow the guidelines regarding construction activities during helicopter landings on the helipad. The contractor shall coordinate with the owner's representative roof access, roof protection, keying, roof and safety precautions to be taken when working close to the roof edge regarding helicopter landings and contractor responsibilities during this time. In addition, the placement of vertical installations such as tall lighting poles and the use of project cranes or hoisting on the hospital property might affect the **"Final Approach and Take Off"** of medical center ambulance helicopters. It is essential that the contractor plans these types of activities with the owner's representative prior to the beginning of work.

## Section 16 Required Forms, Permits, Postings and Documentation

**Note:** Refer to the sections in the “Healthcare Construction Requirements” manual for detailed information on each form and permit approval procedure.

Category	Required Notice	Form	Permit Approval	Job Site Posting	Contractor Safety File
CRM Infection Control Construction Permit	Before Starting	√	√	√	√
Above Ceiling Permit	14 Days	√	√	√	√
Utility Systems Shutdown & Service Permit	14 Days	√	√	√	√
Fire Protection System Impairment Permit	14 Days	√	√	√	√
Hot Work Permit	2 Days	√	√	√	√
Lock Out/Tag Out Permit	14 Days	√	√	√	√
CRM Interim Life Safety Measures Assessment		√			
Negative Air Pressure Log		√		√	√
CRM Risk Assessment		√			
Construction Safety Deficiency Notice		√			√
Violations and “Notice To Contractor”		√			√
Hazardous Material Abatement Signage				√	
Required Construction Jobsite Signage				√	
Interim Life Safety Signage				√	
Contractor & Employee Training Acknowledgment		√			√
Contractor Safety Meeting Minutes					√

The contractor will be required to furnish and install a “Project Safety Information” bulletin board on their project site for posting of required safety information. Small, short duration projects may have this requirement waived by the owner’s representative.

**LEGEND** CRM = Construction-Renovation-Maintenance

## Section 17 Project Cleaning and Barrier Removal Process

The following is the typical sequence prior to the removal of barrier walls.

With the barrier in place and with the “**Negative Air HEPA Filtered Ventilation Unit**” running, the contractor will HEPA vacuum all horizontal and vertical surfaces.

1. Clean the covers that are isolating the HVAC ducts.
2. Clean the outside of the negative air HEPA machine and its exhaust duct.
3. The contractor shall notify the owner’s representative to schedule a walk-through of the clean space for inspection and approval prior to removal of the barrier wall.
4. Following all job site cleaning and flushing of plumbing, the contractor can begin the barrier cleaning process.

5. During construction or removal of barrier walls, fire resistant polyethylene barriers must be put into place to help control any construction or demolition dust of the barrier wall system.
6. MUHC must approve removal of any Infection Control or other barriers. Prior to removal of the temporary fire resistant polyethylene barrier, it shall be vacuumed with a HEPA vacuum to eliminate any dust attached to the plastic. The polyethylene barrier is then wiped down with the use of damp cleaning cloths and using a hospital furnished approved infection control cleaning solution. The contractor shall roll or fold the polyethylene in on itself creating as little dust as possible prior to transporting out of the building in a covered cart.
7. Remove the covers or caps from any and all HVAC system supply, return and exhaust ducts and restore the HVAC system.
8. The **“Negative Air HEPA Filtered Ventilation Unit”** is removed from the project site once the HVAC system is verified is operating properly.

#### **If Air Sampling Is Required**

When construction/renovation is done and completed in or near a high risk assessment critical care unit (i.e. Burn Unit, Operating Rooms, Intensive Care, etc.) there may be a requirement to do air sampling after the negative air system has been removed and the building HVAC system has been restored. This will be a requirement only if the infection control department determines the need at the end of the project and prior to occupancy.

### **Section 18 Approved Equipment and Product Information**

**“NEGATIVE AIR HEPA FILTERED VENTILATION UNIT”**, HEPA filter equipped negative air machines that provide rough in filters, primary filters and a HEPA final filter. Rating of 300 to 2000 cubic feet per minute, (CFM). HEPA filters **must** be a minimum 99.97% efficient @ 0.3 microns. Differential pressure alarm required if not installed in another fashion to monitor construction site negative air of  
– 0.01 water column. Or approved equal.

- MICRO Trap Corporation, Models MT 1000 or Model MT 2000. 1300 W. Steel Road, No. 2 Morrisville, PA 19067 (215) 295-8208 or (877) 646-8208.
- ABATEMENT Technologies, Inc. Model HEPA-AIRE PAS2400HC Portable Air Scrubber or Model PAS1200HC\_605 Satellite Blvd. Suite 300 Suwanee, GA 30024 (800) 634-9091

**“HEPA VACUUM”**, A shop style vacuum with a HEPA filter cartridge at 99.97% filtration @ 0.3 microns. Or approved equal.

- ABATEMENT Technologies Inc. Model V8000WD Canister Style Wet/Dry HEPA Vacuum. 605 Satellite Blvd. Suite 300 Suwanee, GA 30024 (800) 634-9091.
- ABATEMENT Technologies Inc. Model V1300H Hip Mounted HEPA Vacuum, designed for use on scaffolding and mobile conditions such as ceiling tile type cleaning. Lightweight at 6.4 lbs. 605 Satellite Blvd. Suite 300 Suwanee, GA 30024 (800) 634-9091.

**“ADHESIVE WALK OFF MATS”**, 24” x 36” Tacky Mat. Peel up dirty layer and dispose to reveal a new, fresh clean tacky mat.

- Tacky walk off mat No. 5838 24” x 36”, 60 tacky mats to a unit. Four units per case. 3M Company, St. Paul, MN 55144 (888) 364-3577. Or approved equal.

**“NEGATIVE AIR PRESSURE INDICATOR”**, Manometer.

- Model “Mark II Model No. 25 inclined-vertical Manometer. Dwyer Instruments Inc. PO Box 373, Michigan City, IN 46361 (219) 879-2000.
- MICRO Trap Corporation, Model Tri/Mon, digital recording manometer for tracking differential pressure. 1300 W. Steel Road, No. 2 Morrisville, PA 19067 (215) 295-8208 or (877) 646-8208.

**“PORTABLE WORK ENCLOSURE”**, For temporary fire resistant polyethylene dust barrier. System components supplier of zip poles, door opening access zippers, dust sealing system parts, etc.

- Zip Wall, LLC. 37 Broadway, Arlington, MA 02474 (800) 718-2255. Or approved equal.

**“FIRE RESISTANT POLYETHYLENE”**, For temporary dust barriers and use with Zip Wall Barrier System. Fire resistant polyethylene 6 mil. Underwriters Laboratories listed. Americover, Inc. 6 mil. Fire Retardant Polyethylene No. ASFR6. Use with Zip Pole System also sold by Americover. 2067 Wineridge Place. Suite F Escondido, CA 92029. 800-747-6095 Dept. 48. Or approved equal.

Example of Badge for Contractor use -

	
<p><b>Enter Name</b></p>	
<p><b>Enter Company Name</b></p>	
Project#:	Enter Project #
Project Name:	Enter Project Name
Expires:	Enter Expiration

	
<p><b>Enter Name</b></p>	
<p><b>Enter Company Name</b></p>	
Project#:	Enter Project #
Project Name:	Enter Project Name
Expires:	Enter Expiration

	
<p><b>Enter name</b></p>	
<p><b>Enter Company Name</b></p>	
Project#:	Enter Project #
Project Name:	Enter Project Name
Expires:	Enter Expiration

Protocol for Hospital Contractor Badges:

Contractor to issue badges to employees as necessary. (Need to show proof of ID)

Contractor to edit the information, print in color, cut out the badges, fold in the center and insert in badge holders.

Contractor shall keep a log of badged employees on site for reference by MU as necessary.

All permits to be collected and returned to MU at the end of the project.

Any orientation required will be discussed at the preconstruction meeting with the Owner’s Representative.

## **SECTION 19 Health Care Construction Cleaning Definitions**

### Construction Clean

1. Remove tools & equipment from the work area.
2. Remove all bulk trash from the work area.
3. Thoroughly sweep all floor surfaces in the work area utilizing a dust compound (floor sweep) material.
4. Dry wipe all horizontal & vertical surfaces in the work area. Surfaces to include but not limited to walls, window sills, doors & door frames, base trim, casework (inside & out), fixtures, and wall-mounted equipment.
5. Sweep all floor surfaces utilizing a dust mop.
6. Wet mop all floor surfaces.

### Thorough Clean

1. To be implemented only after Construction Clean procedures have been completed.
2. Wet wipe all horizontal and vertical surfaces utilizing a MUHC – Infection Control Department approved germicidal disinfectant. Surfaces to include but not limited to walls, window sills, doors & door frames, base trim, casework (inside & out), all fixtures, and wall-mounted equipment.
3. Wet mop all floor surfaces utilizing a MUHC Infection Control Department approved germicidal disinfectant.

### Terminal Clean

1. To be implemented only after Through Clean procedures have been completed.
2. Cleaning procedures shall be conducted by MUHC trained Environmental Services, Sterile Processing or Surgical Services staff only.
3. Thoroughly clean and disinfect surfaces on the ceiling such as diffusers, light fixtures, and ceiling mounted devices & equipment.
4. Thoroughly clean and disinfect all equipment in the work area.
5. Thoroughly clean and disinfect all flooring including moving equipment & furnishings to allow access to all floor surfaces.
6. Move all portable equipment and furnishings away from the walls. Wet wipe and disinfect all wall surfaces and wall mounted equipment.



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**SHOP DRAWING AND SUBMITTAL LOG**

<u>Section</u>	<u>Description</u>	<u>Contr.</u>	<u>Date Rec'd</u>	<u>#</u>	<u>Date Sent to Cons.</u>	<u>Date Ret'd</u>	<u>Rem.</u>	<u>Date Ret'd</u>	<u>Copies To</u>		
									<u>Contr.</u>	<u>Owner</u>	<u>File</u>
<b>02 4119</b>	<b>SELECTIVE DEMOLITION</b>										
	Qualification Data - Refrigerant Recovery										
	Proposed Protection Measures										
	Schedule of Selective Demo Activities										
	Predemolition Photographs										
	Statement of Refrigerant Recovery										
	Warranty Documentation										
<b>05 5000</b>	<b>Miscellaneous Metal Fabrications</b>										
	Shop Drawings										
	Sample - Exposed Material Finishes										
<b>06 1053</b>	<b>Miscellaneous Rough Carpentry</b>										
	Wood Preseervative Data										
	Fire Retardant Data										
	ICC ES Evaluation Reports										
<b>06 4116</b>	<b>Plastic Laminate clad Architectural Cabinets</b>										
	Fire Retardant Treatment Data										
	Shop Drawings										
	Samples for EA product & hardware										
	Qualification Data - Manufacture & Installer										
	ICC ES Evaluation Reports										
<b>07 8100</b>	<b>Applied Fire Protection</b>										
	Product Data										
	Qualification Data										
	Product Certificates										
	Evaluation Reports										

	Field Quality Control Report										
<b>07 8123</b>	<b>Intumescent Fire Protections</b>										
	Product Data										
	Qualification Data										
	Product Certificates										
	Evaluation Reports										
	Field Quality Control Report										
<b>07 8413</b>	<b>Penetration Firestopping</b>										
	Product Data										
	Product Schedule										
	Qualification Data										
	Product Test Reports										
<b>07 9200</b>	<b>Joint Sealants</b>										
	Product Data										
	Joint Sealant Schedule										
	Qualification Data										
	Product Test Reports										
<b>07 9219</b>	<b>Acoustical Joint Sealants</b>										
	Product Data										
	Samples for Verification										
	Acoustical Joint Sealant Schedule										
	Product Test Reports										
	Product Data										
<b>08 1113</b>	<b>Hollow Metal Frames</b>										
	Product Data										
	Shop Drawings										
	Samples for Verification										
	Product Schedule										
	Qualification Data of Compliance										
	Product Test Results										

	Field Quality Control Report										
<b>08 1416</b>	<b>Flush Wood Doors</b>										
	Product Data										
	Shop Drawings										
	Samples for Verification										
	Qualification Data										
	Field Quality Control Report										
<b>08 7100</b>	<b>Door Hardware</b>										
	Product Data										
	Hardware Schedule										
<b>08 8000</b>	<b>Glazing</b>										
	Product Data										
	Samples for Verification										
	Glazing Schedule										
	Qualification Data										
	Product Certificates										
<b>09 2216</b>	<b>Non-Structural Metal Framing</b>										
	Product Data										
	Product Certificates										
	Evaluation Reports										
<b>09 2900</b>	<b>Gypsum Board</b>										
	Product Data										
	Samples - Trim Accessories										
<b>09 3013</b>	<b>Ceramic Tiling</b>										
	Product Data										
	Samples for Verification										
<b>09 5123</b>	<b>Acoustical Tile Ceilings</b>										
	Product Data										
	Samples for Verification										
	Qualification Data										
	Product Test Results										

	Field Quality Control										
<b>09 6513</b>	<b>Resilient Base and Accessories</b>										
	Product Data										
	Samples for Verification										
	Product Schedule										
<b>09 6516</b>	<b>Resilient Sheet Flooring</b>										
	Product Data										
	Samples for Verification										
	Shop Drawings										
	Test Results										
	Certifications										
<b>09 6519</b>	<b>Luxury Vinyl Tile Flooring</b>										
	Product Data										
	Samples for Verification										
	Shop Drawings										
	Product Schedule										
<b>09 6813</b>	<b>Tile Carpeting</b>										
	Product Data										
	Samples for Verification										
	Shop Drawings										
	Product Schedule										
	Sustainable Product Certification										
	Warranty										
<b>09 9123</b>	<b>Interior Painting</b>										
	Product Data										
	Samples for Verification										
	Product Schedule										
<b>10 2600</b>	<b>Wall &amp; Door Protection</b>										
	Product Data										
	Samples for Verification										
	Shop Drawing										
	Certifications										

	Warranty										
<b>10 4416</b>	<b>Fire Ext and Cabinets</b>										
	Product Data										
	Product Schedule										
	Warranty										
<b>12 2413</b>	<b>Roller Window Shades</b>										
	Product Data										
	Shop Drawings										
	Samples for Verification										
	Qualification Data										
	Certificates										
	Product Test Results										
<b>12 2623</b>	<b>Plam Clad Countertops</b>										
	Product Data										
	Shop Drawings										
	Samples for Verification										
	Qualification Data										
	Certificates										
	Evaluation Reports										
<b>12 3661</b>	<b>Solid Surface Countertops</b>										
	Product Data										
	Shop Drawings										
	Samples for Verification										
<b>20 1010</b>	<b>BASIC PIPING MATERIALS</b>										
	Product Data										
	Data for Operating and Maintenance Manual										
<b>20 1030</b>	<b>BASIC MECHANICAL - JOINTS AND CONNECTIONS METHODS</b>										

	Product Data										
	Data for Operating and Maintenance Manual										
<b>20 1040</b>	<b>BASIC MECHANICAL - HANGARS, SHIELDS, SUPPORTS AND ANCHORS</b>										
	Product Data										
	Data for Operating and Maintenance Manual										
<b>20 1080</b>	<b>TESTING, ADJUSTING AND BALANCING</b>										
	Final Report										
	Record Documents										
<b>20 1090</b>	<b>BASIC MECHANICAL METHODS - IDENTIFICATION</b>										
	Product Data										
	Data for Operating and Maintenance Manual										
<b>20 2510</b>	<b>BASIC MECHANICAL - INSULATION MATERIALS</b>										
	Product Data										
	Data for Operating and Maintenance Manual										
<b>21 0030</b>	<b>WET-PIPE SPRINKLER SYSTEM</b>										
	Product Data										
	Delegated Design - Sprinkler Drawings										
<b>23 1000</b>	<b>HYDRONIC PIPING</b>										
	Product Data										
	Data for Operating and Maintenance Manual										
<b>24 3100</b>	<b>SHEETMETAL DUCTWORK</b>										
	Drawings										
	Shop Fabricated Balance Dampers										
<b>24 3300</b>	<b>AIR DISTRIBUTION ACCESSORIES</b>										
	Product Data										
	Data for Operating and Maintenance Manual										
<b>24 3700</b>	<b>AIR DEVICES</b>										

	Product Data										
	Data for Operating and Maintenance Manual										
<b>25 0000</b>	<b>TEMPERATURE CONTROL SYSTEMS</b>										
	Schematic diagrams										
	Sequence of Operation										
	Product Data										
	Wiring Diagrams										
	Existing Control Drawings										
	As-Built Drawings										
<b>26 0500</b>	<b>COMMON WORK RESULTS FOR ELECTRICAL</b>										
	Power Conductors Product Data										
	Raceway Product Data										
	Boxes Product Data										
	Seismic Restraint Product Data										
	Data for Operating and Maintenance Manual										
<b>26 0900</b>	<b>INSTRUMENTATION AND CONTROL FOR ELECTRICAL SYSTEMS</b>										
	Lighting Control Devices Layout and connection Drawing										
	Lighting Control Devices Product Data										
<b>26 2000</b>	<b>LOW-VOLTAGE ELECTRICAL TRANSMISSION</b>										
	Circuit Breaker Product Data										
	Wiring Devices Product Data										
	Data for Operating and Maintenance Manual										
<b>26 5000</b>	<b>INTERIOR LIGHTING</b>										
	Product Data										
	Data for Operating and Maintenance Manual										
<b>28 3000</b>	<b>ELECTRONIC SAFETY AND SECURITY</b>										
	Product Data										



	Data for Operating and Maintenance Manual										
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## OPERATING INSTRUCTIONS AND SERVICE MANUAL LOG

Section	Description	Catalog Data	Wiring Diagrams	Installation Instructions	Service & Maintenance Instructions	Parts List & Availability	Performance Curves	Startup & Operating Instructions
10 4416	Fire Extinguisher Cabinets							
11 7300	All IV Track and Patient Lift							
20 1030	Basic Mechanical - Joints and Connections Methods	X			X			
20 1040	Basic Mechanical - Hangers, Shields, Supports and Anchors	X			X			
20 1090	Testing, Adjusting and Balancing							
20 2510	Basic Mechanical - Insulation Materials	X			X			
21 0030	Wet-Pipe Sprinkler System	X	X	X	X	X		
23 1000	Hydronic Piping	X		X	X	X		
24 3100	Sheetmetal Ductwork	X			X			
24 3300	Air Distribution Accessories	X			X			
24 3700	Air Devices	X			X			
26 0060	Electrical Material and Equipment	X	X	X	X			
26 0090	Electrical Testing and Adjusting	X	X	X	X			
26 0500	Common Work Results for Electrical	X			X			X
26 0600	Low-Voltage Electrical Transmission	X	X		X			X
26 5000	Interior Lighting	X	X	X	X			X
27 1500	Communications Horizontal Cabling							
28 3000	Electronic Safety and Security	X	X	X	X			X

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## CLOSEOUT LOG

Section	Description	Contractor Subcontractor	Date Rec'd	# of Copies	CPM Initials	Remarks
GC/3.11	As-Built Drawings					
SC/20	Executed Commissioning Plan with Required Documentation					
02 4119	Items Removed & Salvaged					
06 4116	AWI Quality Certificates					
07 8413	Installer Certificates					
08 1113	Record Documents					
08 1416	Special Warranties					
	Closeout AWI Compliance Certificate					
	Record Documents					
08 7113	Maintenance Data					
09 5123	Maintenance Data					
09 6516	Maintenance Data					
09 6519	Maintenance Data					
09 6813	Maintenance Data					
10 1100	Maintenance Data					
10 2600	Maintenance Data					
12 3661	Maintenance Data					
20 1030	Basic Mechanical - Joints and Connections Methods					
20 1040	Basic Mechanical - Hangers, Shields, Supports and Anchors					
20 1080	Testing, Adjusting and Balancing					
20 2510	Basic Mechanical - Insulation Materials					
21 0030	Wet-Pipe Sprinkler System					
23 1000	Hydronic Piping					
23 8200	Terminal Units					
24 3100	Sheetmetal Ductwork					
24 3300	Air Distribution Accessories					
24 3700	Air Devices					

26 0900	Instrumentation and Control for Electrical Systems					
26 2800	Low Voltage Circuit Protective Devices					
26 5000	Interior Lighting					
28 3000	Electronic Detection and Alarm					

# CP210701 -UMTH – FIT OUT SPACE 2W Quality Assurance Check List

Commissioning Items by CSI Division	Name	Firm	Date compl	Coord Initial	Documentation Required	Owner Witness Required
1						
<b>Building System Commissioning</b>						
Commissioning Agent - Conduct pre-installation meetings per specifications.					Meeting Minutes	<input checked="" type="checkbox"/>
24119						
<b>Selective Demolition</b>						
Carefully remove and return to owner those items designated as owner salvage						<input type="checkbox"/>
Clean adjacent structures and improvements of dust, dirt and debris caused by selective demolition operations. Return adjacent areas to conditions existing before demolition.						<input checked="" type="checkbox"/>
Do not start demolition until utility disconnect and sealing has been verified in writing						<input checked="" type="checkbox"/>
Hold a preinstallation meeting as specified					Meeting Minutes	<input checked="" type="checkbox"/>
55000						
<b>Metal Fabrications</b>						
Provide welder qualification report for each welder on site					Welder Certification	<input checked="" type="checkbox"/>
64116						
<b>Plastic-Laminate-Clad Architectural Cabinets</b>						
Check all cabinet doors and drawers for smooth operation, correct hardware, fit & finish						<input type="checkbox"/>
Hold Preinstallation Meetings as specified					Meeting Minutes	<input checked="" type="checkbox"/>

Verified by:						
Commissioning Items by CSI Division	Name	Firm	Date compl	Coord Initial	Documentation Required	Owner Witness Required
Perform Field Quality Control Section of specifications					Test Report	<input checked="" type="checkbox"/>
<b>78100</b>						
<b>Applied Fire Protection</b>						
Conduct a preinstallation conference at project site per specifications					Meeting Minutes	<input checked="" type="checkbox"/>
Perform Field Quality Control section of specifications					Test Report	<input checked="" type="checkbox"/>
<b>78123</b>						
<b>Intumescent Fire Protection</b>						
Perform Field Quality Control per specifications					field report	<input checked="" type="checkbox"/>
<b>78413</b>						
<b>Penetration Firestopping</b>						
Conduct a preinstallation conference at project site per specifications					Meeting Minutes	<input checked="" type="checkbox"/>
Perform Field Quality Control section of specifications					Test Report	<input checked="" type="checkbox"/>
<b>78443</b>						
<b>Joint Firestopping</b>						
Conduct a preinstallation conference at project site per specifications					Meeting Minutes	<input checked="" type="checkbox"/>
Perform Field Quality Control section of specifications					Test Report	<input checked="" type="checkbox"/>

Commissioning Items by CSI Division	Verified by:		Date compl	Coord Initial	Documentation Required	Owner Witness Required
	Name	Firm				
79200						
Joint Sealants						
Perform Field Quality Control per specifications					field report	<input checked="" type="checkbox"/>
80671						
Door Hardware Schedule						
Verify door closures comply with ADA requirements					Door list	<input checked="" type="checkbox"/>
81113						
Hollow Metal Frames						
Hold PreInstallation Meetings as specified					Meeting Minutes	<input checked="" type="checkbox"/>
Perform inspection section of specifications					itemized list of doors	<input checked="" type="checkbox"/>
Perform Field Quality Control per specifications					Test Report	<input checked="" type="checkbox"/>
81416						
Flush Wood Doors						
Conduct a preinstallation conference at project site per specifications					Meeting Minutes	<input checked="" type="checkbox"/>
Perform Field Quality Control section of specifications. Include Fire Tag inspection.					Field report	<input checked="" type="checkbox"/>
84243						
Intensive Care Unit/Critical Care Unit (ICU/CCU) Entrances						
Hold Preinstallation Meeting As specified					Meeting Minutes	<input checked="" type="checkbox"/>



Commissioning Items by CSI Division	Verified by:		Date compl	Coord Initial	Documentation Required	Owner Witness Required
	Name	Firm				
87100						
Door Hardware						
Perform Demonstration section of specifications					Sign in sheet	<input checked="" type="checkbox"/>
Perform Field Quality Control section of specifications					Test Report	<input checked="" type="checkbox"/>
87113						
Automatic Door Operators						
Hold Preinstallation Meeting as specified					Meeting Minutes	<input checked="" type="checkbox"/>
Perform Field Quality Control section of specifications					Test Report	<input checked="" type="checkbox"/>
Provide factory training per specifications					Sign In sheet	<input checked="" type="checkbox"/>
88000						
Glazing						
Hold Preinstallation Meeting as specified					Meeting Minutes	<input checked="" type="checkbox"/>
92900						
Gypsum Board						
Verify fire rating compliance is maintained, including all wall penetrations					Inspection Report	<input checked="" type="checkbox"/>
93013						
Ceramic Tiling						
Hold Preinstallation meetings as specified					Meeting Minutes	<input checked="" type="checkbox"/>

Commissioning Items by CSI Division		Verified by: Name	Firm	Date compl	Coord Initial	Documentation Required	Owner Witness Required
95123							
Acoustical Tile Ceilings							
Complete all above ceiling inspections prior to installation of tiles. Perform Field Quality Control section of specs.						Inspection Report	<input checked="" type="checkbox"/>
Hold Preinstallation meetings as specified						Meeting Minutes	<input checked="" type="checkbox"/>
Provide Extra Material as specified						Transmittal	<input checked="" type="checkbox"/>
96516							
Commercial Resilient Sheet Flooring							
After installation maintain ambient temperature of not less than 55 deg F or more than 95 deg F.							<input type="checkbox"/>
Insure sub-floor surface has been prepared (ridges & bumps removed; low spots filled; cracks, joints & holes are filled.) and meet specified requirements							<input type="checkbox"/>
Perform pH, Chloride (moisture) and bond tests per manufacturer. Do not proceed until all manufacturing requirements are met.						test reports	<input checked="" type="checkbox"/>
Provide Extra Material as specified						Transmittal	<input checked="" type="checkbox"/>
96519							
Resilient Tile Flooring							
Furnish Extra Material as specified						Transmittal	<input checked="" type="checkbox"/>
Perform pH, Chloride (moisture) and bond tests per manufacturer. Do not proceed until all manufacturing requirements are met.						Test Reports	<input type="checkbox"/>
Verify product and room temperature are kept within prescribed temp ranges (typically 65F or higher) for 24 hours before and after installation.							<input type="checkbox"/>

Commissioning Items by CSI Division		Verified by: Name	Firm	Date compl	Coord Initial	Documentation Required	Owner Witness Required
96813							
Tile Carpeting							
Conduct pre-installation testing per specifications						Meeting Minutes	<input checked="" type="checkbox"/>
Furnish Extra Material as specified						Transmittal	<input checked="" type="checkbox"/>
99123							
Interior Painting							
Perform wet test for thickness of paint per Field Quality Control						Test Report	<input checked="" type="checkbox"/>
Provide Extra Material as specified						Transmittal	<input checked="" type="checkbox"/>
102600							
Wall and Door Protection							
Provide Extra Material as specified						Transmittal	<input checked="" type="checkbox"/>
117300							
Patient Care Equipment							
Hold Preinstallation Meeting as specified						Meeting Minutes	<input checked="" type="checkbox"/>
122413							
Roller Window Shades							
Provide Extra Material as specified						Transmittal	<input checked="" type="checkbox"/>
201000							
Basic Mechanical Materials and Methods							
Hold MEP pre-installation meeting(s).						Meeting Minutes and Sign-up Sheet	<input checked="" type="checkbox"/>

Commissioning Items by CSI Division	Verified by:		Date compl	Coord Initial	Documentation Required	Owner Witness Required
	Name	Firm				
201020						
Miscellaneous Materials						
Install Firestop as specified then have owners rep inspect it.					Inspection Report	<input checked="" type="checkbox"/>
201050						
Basic Mechanical Methods - General						
Hold MEP pre-installation meeting(s).					Meeting Minutes	<input checked="" type="checkbox"/>
201056						
Cleaning of Piping Systems						
Flush pipe until clear and have owners representative sample for cleanliness. Comply with paragraph D of specs.					Test Report	<input checked="" type="checkbox"/>
201057						
Pressure Testing						
Comply with specifications with pressure testing of pipe. 100 psi for hot water and 150 psi for chilled water pipe. For 1 hour if hydrostatic and 4 hours if air					test report	<input checked="" type="checkbox"/>
201080						
Testing, Adjusting, and Balancing						
Coordinate and cooperate with owner's commissioning efforts						<input type="checkbox"/>
Provide craftsmen of the proper trades to make adjustments/changes during TAB						<input type="checkbox"/>
Provide Owner with manufacturers outlet factors and recommended procedures for testing						<input type="checkbox"/>
Supply control diagram					control diagram	<input type="checkbox"/>

Commissioning Items by CSI Division	Verified by:		Date compl	Coord Initial	Documentation Required	Owner Witness Required
	Name	Firm				
Write reports per specifications					Balancing report	<input checked="" type="checkbox"/>
201097						
Valve Identification						
Install pipe markers per specifications and post valve schedule					Valve Schedule	<input checked="" type="checkbox"/>
202010						
Electrical Requirements						
Perform Test section of specifications					Test Report	<input checked="" type="checkbox"/>
Verify that every penetration through fire walls (re: life safety plans) has been properly firestopped					certification	<input type="checkbox"/>
Verify underground splices are performed per NEC article 110-14(b) ensuring connections and insulation are rated for underground use						<input type="checkbox"/>
210000						
Fire Protection System						
Perform Flow Test section of specifications					test report	<input checked="" type="checkbox"/>
Perform Sprinkler Training					Sign-up Sheet	<input checked="" type="checkbox"/>
Perform Testing section of specifications					NFPA certification	<input checked="" type="checkbox"/>
Provide extra materials as specified					Transmittal	<input checked="" type="checkbox"/>

Commissioning Items by CSI Division	Verified by:		Date compl	Coord Initial	Documentation Required	Owner Witness Required
	Name	Firm				
220000						
Plumbing Piping Systems						
Perform Water Systems Testing section of the specifications					Test Report	<input checked="" type="checkbox"/>
230000						
HVAC Piping and Equipment						
Hydrostatically Pressure test all hydronic pipe to 100 psi or 1 - 1/2 times working pressure - whichever is greater for 1 hour. If using air - 4 hours. Do not air test PVC pipe					Test Report	<input checked="" type="checkbox"/>
230900						
Control Systems						
Check Amp Draw on transformers in I/O panels					Amp Draw Report	<input checked="" type="checkbox"/>
Ensure I/O drawings are submitted and reviewed by EMCS					I/O Drawings	<input checked="" type="checkbox"/>
Ensure shipping material has been removed from thermostats and other control devices						<input type="checkbox"/>
Post laminated control diagram in mechanical room						<input type="checkbox"/>
232304						
Medical Gas and Medical Vacuum Testing						
Pressure test per specifications					Test Report	<input checked="" type="checkbox"/>
243100						
Sheetmetal Ductwork						
Pressure test all ducts per specifications and SMACNA. Minimum leakage class is 4.					Test Report	<input checked="" type="checkbox"/>

Commissioning Items by CSI Division		Verified by: Name	Firm	Date compl	Coord Initial	Documentation Required	Owner Witness Required
243300 Air Duct Accessories							
Test all fire and smoke dampers as specified						Test Report	<input checked="" type="checkbox"/>
260090 Testing and Adjusting							
Perform Instructions of Owners representative section of specs.						Sign in Sheet	<input checked="" type="checkbox"/>
262726 Wiring Devices							
Operate All Devices per spec.						Test Report	<input checked="" type="checkbox"/>
283000 Electronic Detection and Alarm							
Perform Testing Section of specifications						NFPA 72 certification	<input checked="" type="checkbox"/>
Provide factory training per Demonstration section of spec						Sign up sheet	<input checked="" type="checkbox"/>
Test system operation of pull stations horns/strobes by factory trained representative						Written certification of fire alarm system per NFP	<input checked="" type="checkbox"/>
Verify battery power available							<input checked="" type="checkbox"/>
Verify tamper/flow switches operational							<input checked="" type="checkbox"/>

Please see following website for suggested commissioning forms:

<https://www.cf.missouri.edu/cf/pdc/commissioning-forms>



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## INDEX OF DRAWINGS

Drawings referred to in and accompanying Project Manual consist of following sheets **dated August 10, 2021.**

### GENERAL

G000	COVER SHEET
G001	ADA TYP. & GENERAL SCHEDULES
G002	TYPICAL MOUNTING HEIGHTS
G003	PARTITION DETAILS AND NOTES
G101	LIFE SAFETY PLAN
G102	CONSTRUCTION ACCESS
G103	FIRST FLOOR INFECTION CONTROL
G104	SECOND FLOOR INFECTION CONTROL

### ARCHITECTURAL

AD101	FIRST FLOOR DEMOLITION PLAN
AD102	SECOND FLOOR DEMOLITION PLAN
A101	FIRST FLOOR PLAN
A102	SECOND FLOOR PLAN
A151	REFLECTED CEILING PLAN
A401	ENLARGED PLANS
A402	ENLARGED PLANS
A420	INTERIOR ELEVATIONS
A421	INTERIOR ELEVATIONS
A501	SECTIONS & DETAILS
A520	CASEWORK DETAILS
A601	DOORS AND FRAMES
A701	INTERIORS
A712	INTERIOR FINISH PLAN
A720	FURNITURE & EQUIPMENT PLAN

### STRUCTURAL

S001	STRUCTURAL GENERAL NOTES & DETAILS
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### MECHANICAL & PLUMBING

M001	SYMBOLS, ABBREVIATIONS, AND SCHEDULE
PD201	FIRST FLOOR DEMOLITION PLUMBING PLAN
PD202	SECOND FLOOR DEMOLITION PLUMBING PLAN
MD302	SECOND FLOOR DEMOLITION HVAC PLAN
P201	FIRST FLOOR PLUMBING PLAN
P202	SECOND FLOOR PLUMBING PLAN
M302	SECOND FLOOR HVAC PLAN
M501	AIRFLOW DIAGRAM
M502	MECHANICAL WATER FLOW DIAGRAM
M601	SCHEDULES, DETAILS, AND SEQUENCE OF OPERATIONS
M602	CONTROLS DETAILS

FIRE PROTECTION

FP102 SECOND FLOOR FIRE PROTECTION PLAN

ELECTRICAL

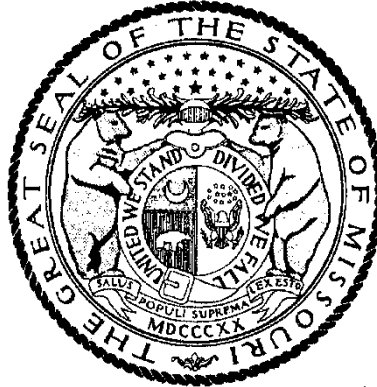
ED201 PARTIAL SECOND FLOOR PLAN -DEMOLITION  
E000 ELECTRICAL SYMBOLS AND ABBREVIATIONS  
E001 LIGHTING FIXTURE SCHEDULE AND DETAILS  
E002 PARTIAL SECOND FLOOR PLAN – LIFE SAFETY  
E003 ELECTRICAL PANEL SCHEDULES  
E201 PARTIAL SECOND FLOOR PLAN - LIGHTING  
E202 PARTIAL SECOND FLOOR PLAN - POWER  
E203 PARTIAL SECOND FLOOR PLAN - SYSTEM

END OF SECTION

# Missouri

## Division of Labor Standards

### WAGE AND HOUR SECTION



MICHAEL L. PARSON, Governor

# Annual Wage Order No. 27

Section 010  
**BOONE COUNTY**

In accordance with Section 290.262 RSMo 2000, within thirty (30) days after a certified copy of this Annual Wage Order has been filed with the Secretary of State as indicated below, any person who may be affected by this Annual Wage Order may object by filing an objection in triplicate with the Labor and Industrial Relations Commission, P.O. Box 599, Jefferson City, MO 65102-0599. Such objections must set forth in writing the specific grounds of objection. Each objection shall certify that a copy has been furnished to the Division of Labor Standards, P.O. Box 449, Jefferson City, MO 65102-0449 pursuant to 8 CSR 20-5.010(1). A certified copy of the Annual Wage Order has been filed with the Secretary of State of Missouri.

Original Signed by

Taylor Burks, Director  
Division of Labor Standards

Filed With Secretary of State: March 10, 2020

Last Date Objections May Be Filed: April 9, 2020

Prepared by Missouri Department of Labor and Industrial Relations

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Asbestos Worker	\$52.88
Boilermaker	*\$27.06
<b>Bricklayer</b>	<b>\$49.54</b>
<b>Carpenter</b>	<b>\$44.27</b>
Lather	
Linoleum Layer	
Millwright	
Pile Driver	
Cement Mason	\$41.89
Plasterer	
Communications Technician	\$51.30
Electrician (Inside Wireman)	\$51.37
Electrician Outside Lineman	\$73.26
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Elevator Constructor	*\$27.06
<b>Glazier</b>	<b>\$41.33</b>
Ironworker	\$58.10
Laborer	\$39.16
General Laborer	
First Semi-Skilled	
Second Semi-Skilled	
Mason	\$50.20
Marble Mason	
Marble Finisher	
Terrazzo Worker	
Terrazzo Finisher	
Tile Setter	
Tile Finisher	
Operating Engineer	*\$27.06
Group I	
Group II	
Group III	
Group III-A	
Group IV	
Group V	
Painter	\$39.03
<b>Plumber</b>	<b>\$56.87</b>
Pipe Fitter	
Roofer	\$49.42
<b>Sheet Metal Worker</b>	<b>\$52.30</b>
<b>Sprinkler Fitter</b>	<b>\$44.65</b>
Truck Driver	*\$27.06
Truck Control Service Driver	
Group I	
Group II	
Group III	
Group IV	

\*The Division of Labor Standards received less than 1,000 reportable hours for this occupational title. Public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center.

\*\*The Prevailing Hourly Rate includes any applicable fringe benefit amounts for each occupational title.

Heavy Construction Rates for  
BOONE County

Section 010

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Carpenter	\$49.56
Millwright	
Pile Driver	
Electrician (Outside Lineman)	\$73.26
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Laborer	\$43.60
General Laborer	
Skilled Laborer	
Operating Engineer	\$55.90
Group I	
Group II	
Group III	
Group IV	
Truck Driver	\$43.10
Truck Control Service Driver	
Group I	
Group II	
Group III	
Group IV	

Use Heavy Construction Rates on Highway and Heavy construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(3).

Use Building Construction Rates on Building construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(2).

If a worker is performing work on a heavy construction project within an occupational title that is not listed on the Heavy Construction Rate Sheet, use the rate for that occupational title as shown on the Building Construction Rate Sheet.

\*The Division of Labor Standards received less than 1,000 reportable hours for this occupational title. Public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center.

\*\*The Prevailing Hourly Rate includes any applicable fringe benefit amounts for each occupational title.

# OVERTIME and HOLIDAYS

## OVERTIME

For all work performed on a Sunday or a holiday, not less than twice (2x) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work.

For all overtime work performed, not less than one and one-half (1½) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work or contractual obligation. For purposes of this subdivision, "**overtime work**" shall include work that exceeds ten hours in one day and work in excess of forty hours in one calendar week; and

A thirty-minute lunch period on each calendar day shall be allowed for each worker on a public works project, provided that such time shall not be considered as time worked.

## HOLIDAYS

January First;  
The last Monday in May;  
July Fourth;  
The first Monday in September;  
November Eleventh;  
The fourth Thursday in November; and  
December Twenty-Fifth;

If any holiday falls on a Sunday, the following Monday shall be considered a holiday.

## SECTION 024119 - SELECTIVE DEMOLITION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

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

#### 1.3 DEFINITIONS

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

#### 1.4 MATERIALS OWNERSHIP

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

#### 1.5 PREINSTALLATION MEETINGS

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



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

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
- C. Schedule of Selective Demolition Activities: Indicate the following:
  1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
  2. Interruption of utility services. Indicate how long utility services will be interrupted.
  3. Coordination for shutoff, capping, and continuation of utility services.
  4. Use of elevator and stairs.
  5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- D. Predemolition Photographs: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Submit before Work begins.
- E. 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.
- F. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

#### 1.7 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.

#### 1.8 QUALITY ASSURANCE

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

#### 1.9 FIELD CONDITIONS

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

#### 1.10 WARRANTY

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

#### 1.11 COORDINATION

- A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

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

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

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

- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Verify that hazardous materials have been remediated before proceeding with building demolition operations.
- D. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.
  - 1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.

### 3.2 PREPARATION

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

### 3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
  - 1. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
  - 2. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
    - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
    - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
    - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

### 3.4 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent

injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
  2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
  3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
  4. Cover and protect furniture, furnishings, and equipment that have not been removed.
  5. Comply with requirements for temporary enclosures, dust control, heating, and cooling.
- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

### 3.5 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. Temporarily cover openings to remain.
  3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
  4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
  5. Maintain fire watch during and for at least 12 hours after 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 selective demolition and debris-removal

operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

### 3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.
- D. 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.
- E. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight.

### 3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.
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.

### 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 024119

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# **TECHNICAL SPECIFICATIONS - ASBESTOS-CONTAINING MATERIALS REMOVAL AND DISPOSAL**

For

**CP210701  
UNIVERSITY OF MISSOURI TEACHING HOSPITAL  
2 WEST**

Prepared for

**UNIVERSITY OF MISSOURI  
Campus Facilities  
Columbia, Missouri 65211**

Prepared by

**UNIVERSITY OF MISSOURI  
ENVIRONMENTAL HEALTH AND SAFETY**



## **PART 1 - GENERAL**

Provisions of the General Conditions and Special Conditions are part of this Division.

### **1.1 SCOPE OF WORK**

1. General: The work specified herein shall be the abatement of asbestos containing materials by certified and registered persons who are knowledgeable, qualified and trained in the abatement, handling, and disposal of asbestos containing material, and subsequent cleaning of the affected environment.

2. The Contractor shall furnish all labor, material, equipment, testing, services, permits, insurance, notifications, necessary or required to perform the work in accordance with applicable local, state, and federal regulations for the abatement of asbestos containing materials and for other work as specified in this section or as indicated in associated drawings, sketches, or reports of the work.

All fees required for notification requirements, renotifications, and/or inspections by the regulatory agencies shall be paid by the Contractor. Bulk sample analysis information required by the Department of Natural Resources, U.S. Environmental Protection Agency or local authority having jurisdiction in conjunction with the notification shall also be provided by the Contractor unless provided within this section.

3. The work shall include the removal and legal disposal of friable and non-friable asbestos containing materials including:

Friable Asbestos:

Seven hundred twenty five (725) linear feet of ACM pipe insulation

Non-friable asbestos:

Thirty (30) linear feet of ACM transite ductwork

Four thousand eight hundred sixty (4,860) square feet of asbestos-containing flooring system, consisting of floor tile, mastic, and floor leveler

### **1.2 DEFINITIONS**

1. Abatement - Procedures to decrease or eliminate the source of fiber release from asbestos containing building materials. Includes encapsulation, enclosure, and removal.

2. Adequately Wet - To sufficiently mix or penetrate with liquid to prevent the release of particulate.

3. Aggressive Air Sampling - Sweeping of floors, ceilings and walls and other surfaces with the exhaust of a minimum of one (1) horsepower leaf blower or equivalent immediately prior to air monitoring.

4. Approved Waste Disposal Site - A solid waste disposal area that is authorized by the Department of Natural Resources to receive asbestos containing solid wastes.
5. Asbestos - The asbestiform varieties of serpentine (chrysotile, antigorite), riebeckite (crocidolite), cummingtonite-grunerite (amosite), anthophyllite, and actinolite-tremolite.
6. Asbestos Abatement Supervisor - An individual who directs, controls, or supervises others in asbestos abatement projects.
7. Asbestos Containing Building Material (ACBM) - Surfacing ACM, thermal system insulation ACM, or miscellaneous ACM that is found in or on interior structural members or other parts of a building.
8. Asbestos Containing Material (ACM) - Any material containing more than 1 percent asbestos by weight.
9. Barrier - Any surface that seals off the work area to inhibit the movement of fibers.
10. Category I Nonfriable ACM - Asbestos-containing packings, gaskets, resilient floor covering and asphalt roofing products containing more than one percent (1%) asbestos as determined using the method specified in 40 CFR part 763, subpart F, Appendix A, section 1, Polarized Light Microscopy.
11. Category II Nonfriable ACM - Any material, excluding category I nonfriable ACM, containing more than one percent (1%) asbestos as determined using the methods specified in 40 CFR part 763, subpart F, Appendix A, section 1, Polarized Light Microscopy that, when dry, cannot be crumbled, pulverized or reduced to powder by hand pressure.

12. Containment - Area where asbestos abatement project is conducted. Area must be enclosed either by a glove bag or plastic sheeting barrier.

13. Contractor's Competent Person (Qualified Person) - One who is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, who has the authority to take prompt corrective measures to eliminate them, as specified in 29 CFR 1926.32 (f); in addition, for Class I, II, III, and IV work, who is specially trained in training courses which meet the criteria of EPA's Model Accreditation Plan (40 CFR Part 763) for project designer or supervisor, or its equivalent.

14. Decontamination Area - Enclosed area adjacent and connected to the regulated area which is used for decontamination of workers, materials, and equipment that are contaminated with asbestos.

15. Demolition - the wrecking or taking out of any load bearing structural member of a facility together with any related handling operations.

16. Disposal Bag - A properly labeled 6 mil. thick leak-tight plastic bag used for transporting asbestos waste from work area to disposal site.

17. Encapsulant (Sealant) - A liquid material which can be applied to asbestos-containing material and which prevents the release of asbestos fibers from the material either by creating a membrane over the surface or by penetrating into the material and binding its components together.

18. Encapsulation - Treatment of asbestos containing materials with an encapsulant.

19. Enclosure - The construction of an airtight, impermeable, permanent barrier around asbestos containing material to control the release of asbestos fibers into the air.

20. Friable Asbestos Material - Any material containing more than one percent asbestos as determined using the method specified in appendix A, subpart F, 40 CFR part 763 section 1, Polarized Light Microscopy, that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

21. Glove Bag - A manufactured or fabricated device, typically constructed of six (6) mil transparent polyethylene or polyvinyl chloride plastic. This device consist of two (2) inward projecting long sleeves, an internal tool pouch and an attached, labeled receptacle for asbestos waste.

22. Homogeneous Work Site - Continuous areas with the same type of ACM and in which one type of abatement process is performed.

23. Negative Initial Exposure Assessment - An assessment by a "Competent Person" in which it is concluded that employee exposures during the job are likely to be consistently below the Permissible Exposure Levels.

24. Outside Air - Air outside of the containment.

25. Owner's Air Monitoring Firm - Air Monitoring conducted by a person who is not under the direct control of the person carrying out the asbestos abatement project and who has been selected by the Owner.

26. Owner's Air Sampling Professional - An individual who holds a valid certification from the State of Missouri. The individual shall conduct, oversee, or be responsible for air monitoring of asbestos abatement projects before, during, and after the project has been completed. The air sampling professional must hold a 40 hour AHERA Asbestos Contractor/Supervisor Certificate, and supervised by the Owner's Certified Industrial Hygienist (C.I.H.).

27. Owner's Air Sampling Technician - An individual who has been trained by and is under the supervision of an air sampling professional to do air monitoring before, during, and after the asbestos abatement project. The air sampling technician must hold a 40 hour AHERA Asbestos Contractor/Supervisor Certificate, and be supervised by the Owner's Certified Industrial Hygienist (C.I.H.).

28. Owner's Certified Industrial Hygienist (C.I.H.) - an Industrial Hygienist, Certified in Comprehensive Practice by the American Board of Industrial Hygiene. The Owner's C.I.H. must also be certified by the Missouri Department of Natural Resources as an air sampling professional and hold a 40 hour AHERA Asbestos Contractor/Supervisor Certificate. The Owner will identify C.I.H. before application for permit.

29. Personal Monitoring - Sampling of the asbestos fiber concentrations within the breathing zone.

30. Regulated Asbestos Containing Material (RACM) - Friable asbestos material; Category I nonfriable ACM that has become friable; Category I nonfriable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading; Category II nonfriable ACM that has a high probability of becoming or has become crumbled, pulverized or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations.

31. Remove - To take out RACM or facility components that contain or are covered with RACM from any facility.

32. Renovation - Altering a facility or one or more facility components in any way, including the stripping or removal of RACM from a facility component.

33. Repair - The restoration of asbestos material that has been damaged. Repair consists of the application of rewettable glass cloth, canvas, cement or other suitable material. It may also involve filling damaged areas with non-asbestos substitutes and re-encapsulating or painting previously encapsulated materials.

34. Strip - To take off RACM from any part of a facility or facility components.

35. Waste Shipment Record - The shipping document, required to be originated and signed by the waste generator, used to track and substantiate the disposition of asbestos containing waste material.

36. Work Area - A specific isolated area, other than the space enclosed within a glove bag, in which friable asbestos-containing materials is required to be handled. The area is designated as a work area from the time that the area is secured and access restrictions are in place. The area remains designated as a work area until the time that it has been cleaned in accordance with any requirements applicable to the operations conducted.

### **1.3 CODES AND REGULATIONS**

1. General Applicability Of Codes, Regulations and Standards - All applicable codes, regulations, standards, statutes, laws, and rules have the same force and effect (and are made a part of the contract documents by reference) as if copied directly into the contract documents, or as if published copies are bound herewith. Where conflicts arise, the most stringent specification shall apply.

2. Contractor Responsibility - The Contractor shall assume full responsibility and liability for the compliance with all applicable federal, state, and local regulations pertaining to work practices, hauling, disposal and protection of workers, visitors to the site, and persons occupying areas adjacent to the site. The Contractor is responsible for providing medical examinations and maintaining medical records of personnel as required by the applicable federal, state, and local regulations. The Contractor shall hold the owner harmless for failure to comply with any applicable work, hauling, disposal, safety, health, or other regulations on the part of the contractor, contractor's employees, or contractor's subcontractors.

3. Federal and State requirements which govern asbestos abatement work or hauling and disposal of asbestos waste materials include but are not limited to the following:

1. U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) including but not limited to:

1. Title 29, Part 1910, Section 1001 and Part 1926, Section 1101 of the Code of Federal Regulations.

2. Respiratory Protection, Title 29, Part 1910, Section 134 of the Code of Federal Regulations.

3. Construction Industry, Title 29. Part 1926, of the Code of Federal Regulations.

4. Access to Employee Exposure and Medical Records, Title 29, Part 1910, Section 2 of the Code of Federal Regulations.

5. Hazard Communication, Title 29, Part 1910, Section 1200 of the Code of Federal Regulations.

6. Specifications for Accident Prevention Signs and Tags, Title 29, Part 1910, Section 145 of the Code of Federal Regulations.

2. U.S. Environmental Protection Agency (EPA) including but not limited to:

1. National Emission Standards for Hazardous Air Pollutants (NESHAPS)  
Title 40, Part 61, Subpart M, Code of Federal Regulations.

3. U.S. Department of Transportation (DOT) including but not limited to:

1. Title 49, Part 172, Section 101 of the Code of Federal Regulations.

4. State of Missouri including but not limited to:

1. H.B. 77, 85th General Assembly.

2. Missouri Air Conservation Law Chapter 643.

3. Missouri Department of Natural Resources, Division 10, Chapter 6 of  
the Code of State Regulations as follows:

(1) 10 CSR 10-6.020, Definitions

(2) 10 CSR 10-6.080, Emission Standards for Hazardous Air  
Pollutants

(3) 10 CSR 10-6.230, Administrative Penalties

(4) Volume 18, Missouri Register, Page 44

(5) 10 CSR 10-6.250, Asbestos Abatement Projects - Certification,  
Accreditation, and Business Exemption Requirements

## 1.4 NOTIFICATIONS

1. Notifications meeting the requirements of Volume 18, Missouri Register, page 44,  
shall be completed and sent by the Contractor not less than ten (10) days before the  
intended starting date of the project. Send notification to the following:

1. Department of Natural Resources  
Air Pollution Control Program (Asbestos)  
P.O. Box 176  
Jefferson City, Missouri 65102

2. U.S. Environmental Protection Agency  
Region VII  
Air & Toxic Division, Air Branch  
ATTN: Air Compliance  
726 Minnesota Avenue  
Kansas City, Kansas 66101

3. Provide a copy to the Owner's Representative. Five (5) day notification to the  
Owner's Representative is required on jobs less than the reportable quantity.

4. If the project is under the jurisdiction of the Kansas City Air Quality Section, St. Louis County Air Pollution Control Branch, or the Springfield-Green County Air Pollution Control Authority, send notification directly to the appropriate agency.

## 1.5 SUBMITTALS

1. The following will be submitted by contractor prior to commencement of work for approval by the Owner's Certified Industrial Hygienist (one copy for the Owner's Representative). Owner's C.I.H. will return reviewed copies to contractor and Owner's Representative.

1. One copy of material safety data sheets (MSDS) for products to be used by the Contractor in the performance of his work. Contractor will also maintain copies of MSDS on site per OSHA.

2. One copy of the notifications to, or any correspondence with, the regulatory agencies. Submit a listing of all prior regulatory violations.

2. Friable Abatement:

1. Current Certificates of training and statement of qualifications for the project asbestos abatement supervisor and the Missouri Asbestos Occupational Certificates for all project personnel. List a summary of project personnel and contact phone numbers.

2. Name, address, and contact person's name of testing laboratory or laboratories to be utilized analyzing samples for bulk analysis or air samples.

3. Submit a detailed plan of the procedures proposed for use in complying with requirements of this specification and Volume 18, Missouri Register, page 44, and 29 CFR 1926.1101. Include in the plan the layout and location of barriers, decontamination units, route of ingress and egress for work area, methods used to assure safety of building occupants and visitors, methods used to isolate or closing out of HVAC system, personal air monitoring strategy, method of removal of material, and engineering controls utilized to prevent emissions from the work area.

4. Provide a disposal plan to detail type of disposal container, method of transportation to disposal site, waste hauler, and disposal site.

5. Copy of notifications required as part of the emergency notification plan.

3. Non-Friable Abatement:

1. Submit a detailed plan of the procedures proposed to minimize emissions and to prevent the material from becoming friable during removal.

2. Copy of emergency protection plan to be used if the nonfriable material should become friable during removal.

3. Current Certificates of training and statement of qualifications for the "Competent Person".

4. One copy of the Negative Initial Exposure Assessment.

4. Upon completion of the abatement work, the following information shall be submitted to the Owner's Representative.

1. Waste disposal receipts and waste shipment record on all asbestos waste removed from the project.

5. Upon completion of the abatement work, the following information shall be submitted by the Owner's C.I.H. to the Contractor.

1. Air sampling test results for personal (non-OSHA) and final clearance air samples taken under the supervision of Owner's Certified Industrial Hygienist. Results must be in writing in final report form.

2. Written certification from the Owner's Certified Industrial Hygienist.

## **PART 2 - PRODUCTS - NOT USED**

## **PART 3 - EXECUTION**

### **3.1 SUPERVISION OF ABATEMENT**

1. The Contractor shall designate a competent supervisor subject to the approval of the Owner's C.I.H. and the Owner's Representative. The supervisor shall be the Contractor's representative on the project and shall meet the requirements of all applicable regulations and perform the following minimum requirements.

1. Be Certified by the State of Missouri as an Asbestos Abatement Supervisor, a minimum of one year prior full time experience in asbestos abatement work and a minimum of two years experience as a supervisor, and be qualified as a Competent Person in accordance with OSHA regulation 1926.1101.

2. Be on site and supervise all abatement work in accordance with OSHA and Volume 18, Missouri Register, page 44.

3. Conduct all OSHA required air monitoring.

4. Maintain a daily log on the project documenting events, visitations, problems, equipment failures, accidents, and inspections.

5. Be responsible for implementation of first aid, safety training, respiratory protection, and ensuring all workers are trained in emergency procedures.



6. Be responsible for conducting a visual inspection of the work area prior to a visual inspection by the Owner's Certified Industrial Hygienist. Inspection shall be documented.

### **3.2 NEGATIVE INITIAL EXPOSURE ASSESSMENT**

1. The Contractor must conduct a Negative Initial Exposure Assessment (non-friable asbestos) prior to removal of the asbestos material. The Negative Initial Exposure Assessment shall be performed by a "Competent Person" to determine whether the material may be removed and maintained in a nonfriable condition. If the material cannot be removed without becoming friable then the contractor shall comply to the requirements in this specification at no additional cost to the Owner.

2. The method of removal is the Contractor's option. However, in the event of any of the following:

1. Visible emissions are observed
2. Sanding, grinding, cutting, or abrading of the material
3. Air samples exceed 0.1 f/cc

The contractor shall immediately stop work, implement corrective work practices, make any necessary notifications to all regulatory agencies of the changes in work practices and material conditions, and comply with the requirements as set forth in this specification.

### **3.3 WORKER PROTECTION & TRAINING**

1. The Contractor shall be responsible for providing his employees with proper respiratory protection, respiratory training, written respirator program, medical examinations, maintaining medical records, and protective clothing and equipment to comply with OSHA requirements.

2. The Contractor shall be responsible for all testing and costs incurred for complying with requirements of OSHA regulations for Personal Air Sampling.

3. All workers shall be trained in the dangers inherent in handling asbestos and breathing asbestos dust and in proper work procedures and personal and protective measures.

4. All workers shall hold valid diplomas as accredited Asbestos Abatement Workers as required by 10 CSR 10-6.250.

### **3.4 INDEPENDENT TESTING LABORATORY**

1. Testing Laboratories utilized by the Contractor for sample analysis during the project shall meet the following minimum requirements and be approved by the Owner's C.I.H. This information shall be submitted to the Owner's Representative for review.

1. All air monitoring samples shall be analyzed by a testing laboratory accredited by the American Industrial Hygiene Association (AIHA) or by an individual who is currently on the Asbestos Analyst Registry.
2. All bulk samples shall be analyzed by a testing laboratory accredited by the National Voluntary Laboratory Accreditation Program (NVLAP).

### **3.5 OWNER'S AIR SAMPLING PROFESSIONAL & CERTIFIED INDUSTRIAL HYGIENIST**

1. It will be the Owner's responsibility to hire an Air Sampling Professional & Certified Industrial Hygienist. The Air Sampling Professional & Industrial Hygienist will also be required to perform the following duties as a minimum:

1. Approval of the Contractor's work plan and methods of abatement to meet regulatory requirements and ensure the health and safety of University faculty, staff, and students.
2. Verify that the contractor is satisfactorily performing personal air monitoring as directed by OSHA regulations.
3. Visual inspection of the work area and final clearance air monitoring.
4. Certify in writing that the Contractor's procedures, methods and practices were, to the best of my knowledge and belief, in compliance with current EPA, OSHA, State and/or applicable local regulations and that the work areas meet the requirements for final clearance testing and account of any known deviations.
5. Issue final air clearance.

### **3.6 EMERGENCY PROTECTION PLAN**

1. The contractor shall be responsible for developing a written Emergency Protection Plan and shall maintain this plan on site. The plan shall include considerations of asbestos leakage from the site, fire, explosion, toxic atmospheres, electrical hazards, slips, falls, and heat related injury. All employees shall be instructed and trained in the procedures.
2. Emergency protection plan shall also include written notification of police, fire and medical personnel of the planned abatement activities, work schedule, and layout of work area, particularly barriers that may affect response capabilities.

### **3.7 LOCAL AREA PROTECTION & SITE SECURITY**

1. The contractor shall be responsible for all areas of the building used by him and/or subcontractors in the performance of the work. Contractor shall exert full control over the actions of all employees and other persons with respect to the use and preservation of the existing building, except such controls as may be specifically reserved to the owner.
2. Contractor has the right to exclude from the work area all persons who have no purpose related to the work or its inspection, and shall require all persons in the work area to observe the same regulations required of Contractor's employees.
3. The contractor shall have control of site security during abatement operations in order to protect work environment and equipment. Contractor shall have the owners assistance in notifying building occupants of impending activity and enforcement of restricted access by owners employees.
4. The contractor shall keep a minimum of two 10 lbs. type ABC fire extinguishers on site. One shall be maintained outside the work area and one inside the work area. The employees shall be trained in the operation of extinguishers.
5. Where areas cannot be isolated by existing walls and doors from employees, clients, or the public, barriers must be constructed of 1/2" plywood and 2"x4" framing 16" o.c. to isolate the area. The barriers must be installed in such a manner to prevent damage to existing walls, floors, or ceilings. Barrier may have a lockable door.
6. The contractor shall maintain the work area free from rubbish, debris, and dirt and keep a clean, safe working area.
7. The Contractor shall provide warning signage around the regulated area as required by OSHA.
8. The Contractor shall isolate any and all air supply and returns to the abatement space as required by OSHA. Contractor shall coordinate with the Owner's Representative.
9. The Contractor shall keep all areas where adhesive stripper is in use (such as mastic removal) under negative pressure and exhausted to the outside ambient air.

### **3.8 FINAL CLEARANCE REQUIREMENTS (FRIABLE ASBESTOS)**

1. Upon completion of the abatement work, the supervisor shall perform a visual inspection of the work area. If satisfactory, the supervisor shall then request the Owner's C.I.H. or the C.I.H.'s air sampling technician to perform a visual inspection. When the Owner's C.I.H. feels the area is ready based on the results of their visual inspection, the Contractor shall apply a lockdown encapsulant. Following application of lockdown encapsulant, the Owner's C.I.H. shall perform the final clearance sampling for airborne fiber concentrations.
2. The Owner's C.I.H. or designee will perform final clearance testing per the following requirements:

1. Aggressive sampling shall be required for all areas where removal has taken place with the exception of glove bag projects where nonaggressive sampling is permitted.
2. P.C.M. samples analyzed on site shall be counted by an accredited registered microscopist.
3. For areas specifically specified for clearance by Transmission Electron Microscopy, the method shall be NIOSH 7402.
3. Any work areas failing to meet the clearance requirements of this section shall be recleaned and retested at the contractor's expense until satisfactory levels are obtained.
4. The Owner's C.I.H. shall provide a written report of the air monitoring activities to the contractor within 7 days after the final clearance testing.

### **3.9 REESTABLISHMENT OF THE WORK AREA AND SYSTEMS**

1. Reestablishment of the work area shall only occur after the contractor has received final clearance in writing from the Owner's C.I.H.
2. All damage to finishes, equipment, and/or the area affected by the abatement shall be repaired by the contractor to equal or better condition as it was prior to the work, at no cost to the owner.

### **3.10 WASTE DISPOSAL**

1. All asbestos containing waste and/or asbestos contaminated debris shall as a minimum be double bagged in approved 6 mil. disposal bags. Each bag shall be tagged to meet requirements of NESHAPS with an asbestos caution label and a source identification label.
2. Transportation shall meet the requirements of all regulatory agencies for asbestos containing materials and shall be transported in an enclosed truck.
3. The waste disposal site shall be approved by the Missouri Department of Natural Resources for asbestos disposal. A chain of custody letter/waste shipment record and disposal receipts shall be provided to the owner for all materials disposed of.

### **3.11 DRAWINGS**

1. Drawings, when provided, are not intended to be used for anything but a "reference" to the work area. Information is not specific to quantities or to exact location of ACM unless explicitly noted. Contractor will be required to field verify the conditions and quantities.

### **3.12 REPORTS**

1. Reports, when provided, are intended to be used as a basis for the type and composition of the asbestos present for both bidding purposes and for the information required for the notifications to the governing agencies.

# UNIVERSITY *of* MISSOURI

ENVIRONMENTAL HEALTH AND SAFETY

**ASBESTOS SURVEY**  
**PROJECT CP210701**  
**UNIVERSITY OF MISSOURI TEACHING HOSPITAL**  
**2 WEST**  
**5/17/2021**

**TO:** Jeff Fleenor  
Planning, Design, and Construction

**FROM:** Pete Kohler  
Environmental Health and Safety

MU EHS has completed an asbestos survey of specific locations in 2 West at University Hospital. The survey is limited to material which will be disturbed by work described in the survey request of 4/2/2021.

The asbestos inspection was conducted to satisfy the requirements of 40CFR 61, subpart M, which stipulates that all buildings be “thoroughly inspected” for asbestos before the commencement of renovation or demolition activities. The asbestos inspection was conducted by Pete Kohler (MO Asbestos Inspector #10883, expires 11/05/2021). The survey was conducted in April and May, 2021 and the report was completed May 17, 2021.

The survey request states that the project involves an area that was demoed earlier, but that some ACM remains. The space will now be renovated using a new design.

MU EHS surveyed the area for the earlier demolition. The survey was done in four phases from 12/12/2018 through 4/18/2019, for Project CP150492. Some of the material identified in these surveys has been removed, but some of the ACM is still present.

I was able to utilize the data from the earlier surveys as I inspected the areas for this project. Additional samples were needed for locations that were not covered in the first surveys. Samples were also collected to insure that locations and quantities are accurate. I have included historical data samples in the report, as well as new samples. Taken together, the information covers the scope as described in the survey request.



Floor tile was analyzed by TEM. Other samples were analyzed by polarized light microscopy (PLM), with an additional step in the preparation of hard-to-analyze samples, like black adhesive mastic, or tar (PLM NOB).

As a result of the samples and analysis, asbestos-containing material was identified.

Transite ductwork contains asbestos.  
Some piping is insulated with asbestos-containing material.  
Some flooring systems contain asbestos.

## **FIELD OBSERVATIONS**

Part of the project scope falls outside the present construction area door on 2 West. Corridor 2W43 is carpet tile on concrete from the purple elevators to the construction door. The tee to the north from this corridor is the same carpet tile on concrete. The tee to the south from this corridor has 12" floor tile, light gray and dark gray in a checkerboard pattern, put down with blond mastic on concrete. The blond mastic is not suspect. The dark gray and light gray floor tiles were sampled and analyzed. They do not contain asbestos. Cove base is vinyl throughout and is not suspect.

The ceiling in this hall is a drop ceiling, with 2x2 acoustic tiles in a suspended metal grid. The ceiling tile was sampled and analyzed. It does not contain asbestos.

Above the ceiling of the main hallway the space is crowded with data cable, ductwork, conduit, and piping. There is no spray-on on the concrete deck above. Pipe insulation is old fiberglass and new neoprene. The fiberglass insulation has wide, black tape at some elbows and other fittings. This material was sampled inside the construction area, from the same pipes that run down this hallway. The black material is negative for asbestos.

The ductwork in this hall is old fiberglass, with no cover. There is tar at the seams and joints of the duct. The tar was sampled and analyzed. It does not contain asbestos.

The hallway to the south is less crowded. No suspect material was identified above the drop ceiling in this corridor.

The plans for the project show 2W05A and 2W05B as rest rooms on the main east-west corridor. These rooms are now offices. The floor is carpet tile on concrete. Above the drop ceiling, the space is typical, with fiberglass insulation. There is no spray-on. **In the southwest and southeast corners of the offices are chases, in which run ACM piping.** There are two asbestos pipes in each.

The wall which separated the two rest rooms has been removed. From above the drop ceiling, there is no evidence of the plumbing pipes which would have been in this wall, but it is possible that some remnant of these pipes will be found as the project progresses. **Any suspect pipe insulation that becomes uncovered is presumed to be asbestos-containing.**

Inside the construction door, most of the original walls have been removed, so room numbers are not useful. The space to the west was Histology and generally called 2W-20. The space to the north is called 2W-19 on current plans. It was Cytology and the Blood Bank, and had rooms numbered 2W-26 through 2W-30A, among others.

The floor of 2W-20 is 12" pink floor tile, put down with black mastic on concrete. Through several rounds of sampling, it can be generalized that the tile is negative for asbestos; the mastic is positive for asbestos. So **this flooring system is asbestos-containing material.**

The floor of 2W-19 is patchwork. A portion of this room, in the north and west quadrants, is 12" gray floor tile, put down with blond mastic. This system is negative for asbestos. However, there is much of the floor in this area which is positive for asbestos. Any place where a wall has been removed, there is a course of older flooring remaining, which contains asbestos.





Older red tile, at the south end of this wing has positive black mastic. There are areas with no tile, but which have black mastic exposed on the concrete. The mastic is positive for asbestos. To the northeast of the entry, there are areas with two or three layers of floor tile. Black mastic has been used in the application of the bottom, or middle and bottom layers of this floor. It is asbestos-containing. **All black mastic in this space contains asbestos.**

**Dark gray floor leveler in the southeast quadrant of 2W-19 contains asbestos.**

The northeast corner of the project area, now lies outside a new wall. The flooring found in 2W-19 continues under the construction wall and the ACM flooring system is found in the room numbered 2W-33 on the project plans.

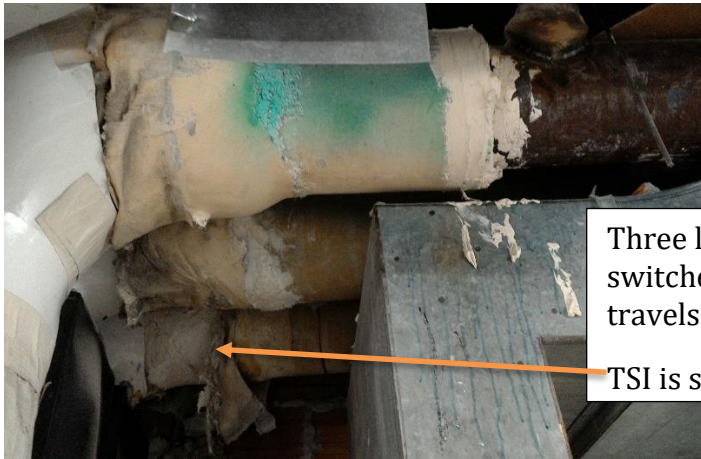
The entry area, just inside the construction door, on all sides of the elevator, and running south as far as the project scope extends, has 12" floor tile with black mastic. **The black mastic is positive for asbestos, wherever it appears.**

Rather than carve up this area with too fine a blade, trying to identify negative spaces, the most safe course seems to call this area positive, and to remove the floor tile and mastic as ACM, with the exception of the northwest quadrant of 2W-19, with 12" gray floor tile and blond mastic. I have included a floor plan, locating this negative flooring.

Around the perimeter of 2W-20 and 2W-19, and beside concrete columns within the rooms, there are pipe chases. Most of these chases contain asbestos-insulated pipes. Samples from the previous surveys show that much of the original insulation was ACM. Any insulation which is not clearly fiberglass or black neoprene is presumed positive for asbestos. In some cases, pipes come out of the top of the chase, turn 90° horizontal and travel along the ceiling. There is substantial ACM pipe on the ceiling of the east half of 2W-19.



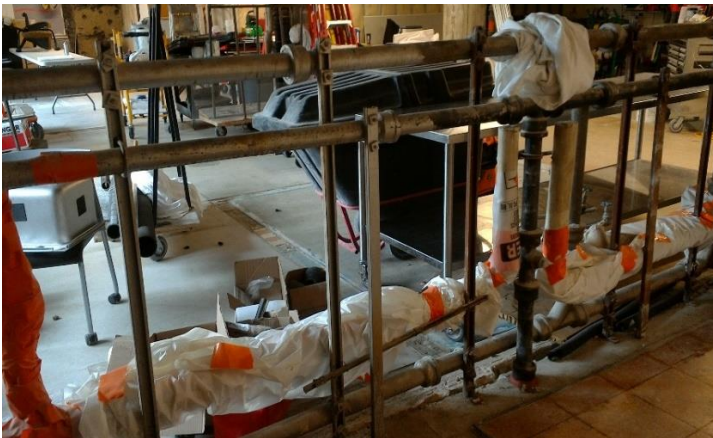
Behind Elevator 2, in the area where 2W-20 and 2W-19 meet, there are three large risers. Two of them come out of the floor as fiberglass pipes. The third is insulated with suspect material. A sample of this insulation was analyzed. At floor level and up to six feet, it does not contain asbestos. At a level close to the ceiling, all of these pipes' insulation turns to asbestos. Here the pipes turn horizontal and travel above ductwork. **The insulation is severely damaged.**



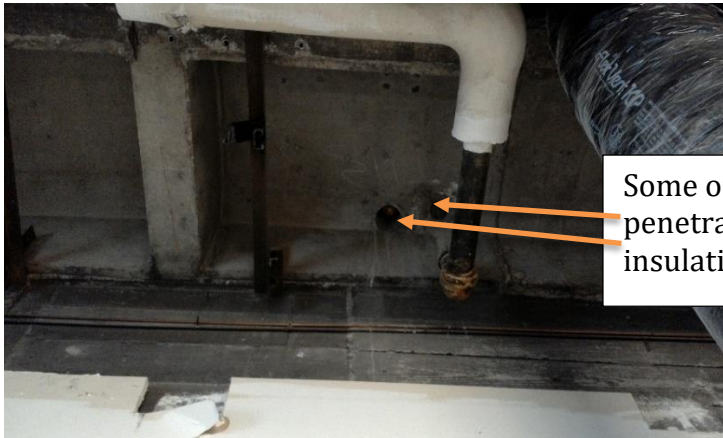
Three lines behind the elevator- TSI switches to asbestos close to ceiling, travels above ductwork.

TSI is severely damaged.

Just north of this location is the remnants of a bathroom wall, with plumbing for a row of sinks. The insulation on the pipes contains asbestos. Some of this insulation is damaged.



Some of the pipes that run in the chases have been stripped and cut off just below the penetrations where they go into the deck above. These penetrations still hold some old insulation. It is surely asbestos-containing. In some instances, the penetrations have been stuffed with rags. But the places where the pipes enter these rooms from below, and where they disappear into the space above, need attention.



Some of these ceiling penetrations still contain ACM insulation.

At the north end of 2W-19, a large fiberglass duct has tar on its seams. There is no skin on this duct, similar to a duct in Corridor 2W43, outside the construction door. The tar was sampled and analyzed. It does not contain asbestos.



Tar on ductwork  
Tar on wall  
Both of these applications occur throughout the area-  
negative for asbestos

Tar was used to coat the concrete wall behind Elevator 2. This tar was sampled and analyzed. It does not contain asbestos.

To the north of the entry, there is a large transite duct on a platform suspended from the ceiling. The duct contains asbestos. Joints in this duct are liable to be packed with asbestos rope.

Inside the construction door and to the south, just past Stairway 2W-0E, is another large transite duct that is suspended on a platform from the ceiling. This transite is cracked. This is technically outside the scope of this project, but it is worth noting the presence of the damaged duct.



Transite duct is cracked.

This is outside the scope of the project, but needs attention.

Most of the walls have been removed in the space inside the construction door. Some plaster and some sheet rock construction remain. Samples of both types of walls were analyzed. Neither the sheet rock joint compound nor the wall plaster contains asbestos.

Old fiberglass insulation has white material stuck to it at the height of the original ceiling, which is now gone. A sample of this material was analyzed. It does not contain asbestos.

Windows are new aluminum inserts that do not use window glazing compound.

<b>SAMPLE ID</b>	<b>LOCATION/DESCRIPTION</b>	<b>ANALYSIS</b>
210503-01	UMTH 2W-20, 12" pink floor tile	100% matrix material
210503-01A	Black mastic from floor tile above	<b>CONTAINS 1.2% CHRYSOTILE</b> , 98.8% matrix material
210503-02	UMTH 2W-19, 12" white floor tile	100% matrix material
210503-02A	Black mastic from floor tile above	<b>CONTAINS 3.2% CHRYSOTILE</b> , 96.8% matrix material
210503-03	2W-19, 12" gray floor tile, (blond mastic, no analysis)	100% matrix material
210504-01	2W, Corridor 2W-43 (E-W hallway), 2x2 ceiling tile, recessed	40% cellulose, 40% mineral wool, 15% perlite, 5% other
210504-02	2W-43 west, above ceiling tile, tar on old F/G duct	6.1% glass, 93.9% matrix material
210504-03	2W-43 by 2W-05, tar on old F/G duct	6.9% glass, 93.1% matrix material
210504-04	South of tee on E-W hallway, 12" gray floor tile (blond mastic, no analysis)	100% matrix material
210504-05	Same location, 12" light gray floor tile (blond mastic, no analysis)	100% matrix material
210504-06	South hallway, 2x2 ceiling tile, recessed	40% cellulose, 40% mineral wool, 15% perlite, 5% other

210504-07	No sample taken	
210504-08	2W-20, black tape on old F/G pipe at elbow	65% cellulose, 35% non-fibrous
210504-09	2W-20, TSI- large riser, bottom layer tarpaper	100% matrix material
210504-10	2W-20, TSI- large riser, top layer tarpaper	100% matrix material
210510-01	2W-19 North wall, tar on F/G duct	100% matrix material
210510-02	2W-19, 12" red floor tile	100% matrix material
210510-02A	Black mastic from floor tile above	<b>CONTAINS 1.4% CHRYSOTILE</b> , 98.6% matrix material
210510-03	2W-19 South end, 12" green floor tile (clear mastic- no analysis)	100% matrix material
210510-04	2W-20, white material stuck on old F/G pipe insulation, at ceiling	5% horse hair, 95% non-fibrous
210512-01	2W-19, SE corner, black mastic from 12" brown floor tile	<b>CONTAINS 3% CHRYSOTILE</b> , 97% non-fibrous
210512-02	2W-19, SE corner, dark gray leveler under red floor tile	<b>CONTAINS 5% CHRYSOTILE</b> , 95% non-fibrous

#### HISTORICAL DATA

#### ASBESTOS SURVEY- CP150492

12/12/2018 - 02/28/2019

Samples from material which has been removed have been omitted from this table.

SAMPLE ID	LOCATION/DESCRIPTION	ANALYSIS
181121-01	University Hospital 2W-20, duct tape	100% non-fibrous
181121-02	2W-20, above drop ceiling, brown caulk	100% non-fibrous

181121-03	2W-20, sheet rock joint compound	100% non-fibrous
181121-04	2W-20 north wall, sheet rock joint compound	100% non-fibrous
181121-05	2W-20, NE corner chase, TSI-3" straight	<b>CONTAINS 30% AMOSITE</b> , 40% cellulose, 30% non-fibrous
181121-06	2W-20, 12" pink floor tile	100% matrix material
181121-06A	Black mastic from floor tile	100% matrix material, SEE 181212-01 BELOW
181212-01	2W-20 black mastic from floor tile	<b>CONTAINS 3% CHRYSOTILE</b> , 3% cellulose, 94% non-fibrous
181127-01	2W-29 (This area is now 2W-19), 12" white floor tile (blond mastic-no analysis)	100% matrix material
181127-03	2W-29, (now 2W-19), NW corner, above drop ceiling, TSI-4" straight	<b>CONTAINS 40% AMOSITE</b> , 60% non-fibrous
181127-04	2W-29 (now 2W-19), above ceiling, gray fire stop caulk	100% non-fibrous
181127-05	2W-29 (now 2W-19), tar on F/G duct	4.5% glass, 1.1% cellulose, 94.4% matrix material
181127-06	Same location, tarpaper on F/G duct	6.9% glass, 93.1% matrix material
181127-07	2W-29 (now 2W-19), TSI-DRAIN PIPE- 6"straight	50% cellulose, 30% mineral wool, 15% perlite, 5% non-fibrous
181127-09	2W-30 (now 2W-19), tar from F/G ductwork	22.8% glass, 77.4% matrix material



181127-10	2W-30 (now 2W-19), 12" white floor tile (blond mastic no analysis)	100% matrix material
181127-11	2W-30A (now 2W-19), 12" white floor tile	100% matrix material
181127-11A	Black mastic from floor tile above	<b>CONTAINS 1.3% CHRYSOTILE, 98.7% matrix material</b>
181203-01	2W-29 (now 2W-19) sheet rock joint compound	100% non-fibrous
181203-02	2W-29 (now 2W-19) sheet rock joint compound	100% non-fibrous
181203-03	2W-29 (now 2W-19) sheet rock joint compound	100% non-fibrous
181203-04	2W-26 (now 2W-19) sheet rock joint compound	100% non-fibrous
181203-08	2W-29 (now 2W19) NW chase, TSI-4" straight	<b>CONTAINS 20% CHRYSOTILE, 10% AMOSITE, 70% non-fibrous</b>
181203-09	2W-30 (now 2W-19), west wall, tar on inside of construction blocks	100% matrix material
181203-10	2W-30 (now 2W19), NW chase, TSI-6" straight	<b>CONTAINS 40% AMOSITE, 60% non-fibrous</b>
181210-02	N-S hallway, north end, wall plaster	100% non-fibrous
181210-03	Main junction of halls, above ceiling tile, TSI-tarpaper wrap	100% matrix material
181210-04	Main junction of halls, above ceiling tile, TSI tape	40% cellulose, 5% glass, 55% non-fibrous
181210-07	E-W hall, west end north wall, wall plaster	5% quartz, 95% non-fibrous
190221-03	2W-46 (now 2W-33, NW corner of construction	100% matrix material

	area), 12" tan speckled floor tile	
190221-03A	Black mastic from floor tile above	<b>CONTAINS 5.2% CHRYSOTILE</b> , 94.8% matrix material
190221-04	2W-46 (same hallway, north of new wall in construction area) 12" orange floor tile	100% matrix material
190221-04A	Black mastic from floor tile above	<b>CONTAINS 7.2% CHRYSOTILE</b> , 92.8% matrix material

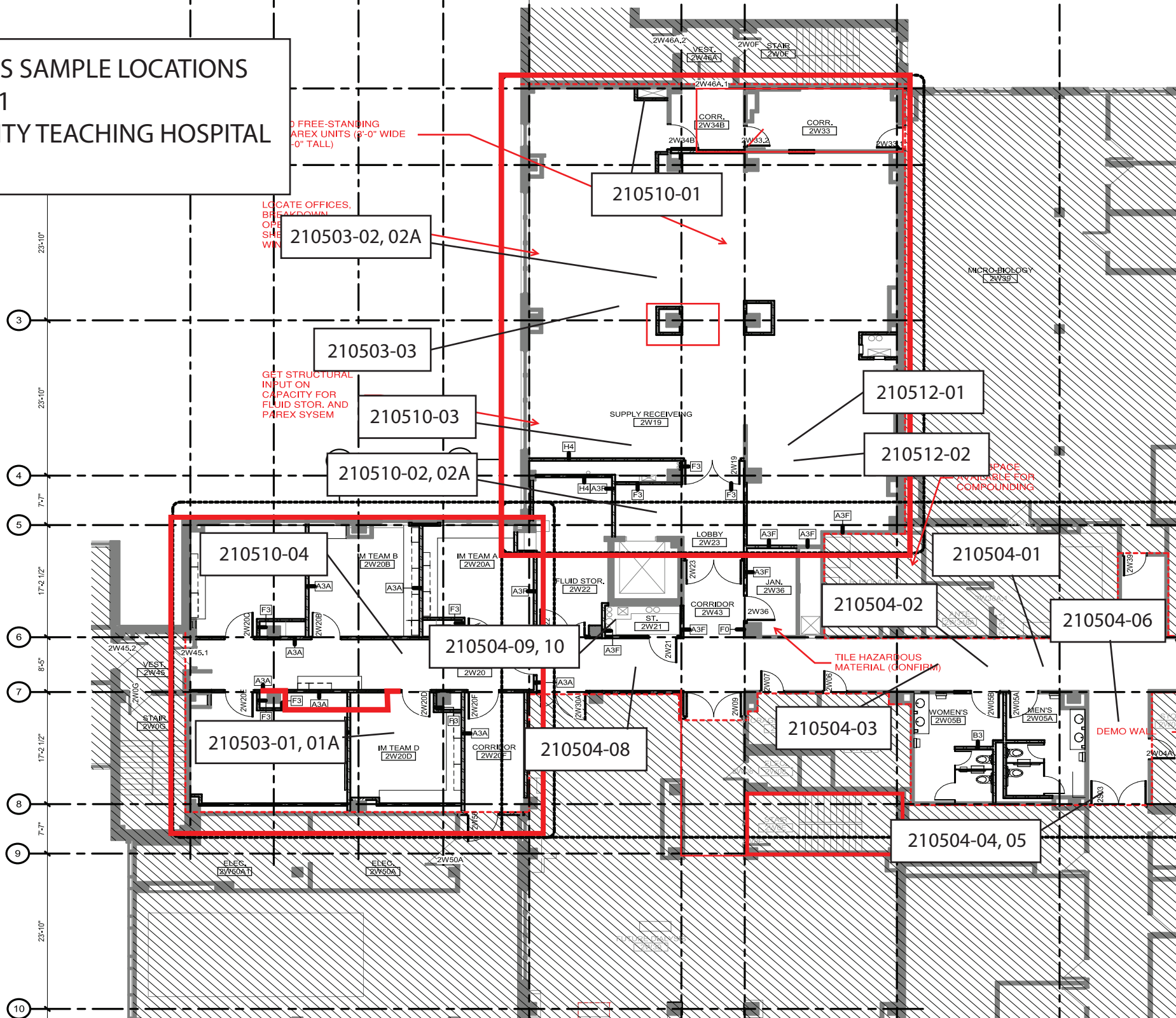
**ASBESTOS SUMMARY:**

The project area contains seven hundred twenty five (725) linear feet of asbestos-containing pipe insulation.

The project area contains four thousand eight hundred sixty (4,860) square feet of asbestos-containing flooring system, including floor tile, mastic, and floor leveler. Some of the flooring is two, or possibly three layers deep.

There is thirty (30) linear feet of transite duct running along the ceiling of 2W-19.

ASBESTOS SAMPLE LOCATIONS  
 CP210701  
 UNIVERSITY TEACHING HOSPITAL  
 2 WEST



FREE-STANDING PAREX UNITS (2'-0" WIDE 10" TALL)

LOCATE OFFICES, BREAKDOWN OPERABLE SHEET METAL WINDOW

GET STRUCTURAL INPUT ON CAPACITY FOR FLUID STOR. AND PAREX SYSTEM

SPACE AVAILABLE FOR COMPOUNDING

TILE HAZARDOUS MATERIAL (CONFIRM)

DEMO WALL

23'-10"  
 23'-10"  
 7'-7"  
 17'-2 1/2"  
 8'-5"  
 17'-2 1/2"  
 7'-7"  
 23'-10"

3  
 4  
 5  
 6  
 7  
 8  
 9  
 10

210510-01

210503-02, 02A

210503-03

210510-03

210510-02, 02A

210510-04

210504-09, 10

210503-01, 01A

210504-08

210504-03

210504-04, 05

210512-01

210512-02

210504-01

210504-02

210504-06

2W46A.2  
 VEST 2W46A.1  
 2W46A.1  
 CORR. 2W34B  
 2W34B  
 2W33A  
 CORR. 2W33  
 2W33

MICRO-BIOLOGY 2W30

SUPPLY RECEIVING 2W19

LOBBY 2W23

FLUID STOR. 2W22

CORRIDOR 2W43

JAN. 2W36

CORRIDOR 2W21

IM TEAM B 2W20B

IM TEAM A 2W20A

CORRIDOR 2W20F

IM TEAM D 2W20D

WOMEN'S 2W05B

MEN'S 2W05A

ELEC 2W50A.1

ELEC 2W50A

2W50A

MULTI-USE OFFICE 2W25

DEMO WALL 2W04A

CP210701  
UNIVERSITY HOSPITAL  
2 WEST FLOORS

NEGATIVE FLOORING-  
12" GRAY FLOOR TILE WITH  
BLOND MASTIC

ACM FLOORING SYSTEM

NEGATIVE FLOORING-  
12" GRAY CHECKERBOARD TILE  
WITH BLOND MASTIC

NEW CONSTRUCTION WALL

OLD WALLS HAVE BEEN REMOVED.  
THE EXPOSED FLOOR IS  
ACM, HAVING POSITIVE MASTIC.

TWO OR THREE LAYERS OF  
FLOOR TILE, W/POSITIVE MASTIC

POSITIVE GRAY LEVELER

NEGATIVE FLOORING-  
CARPET TILE ON CONCRETE

CERAMIC TILE FLOOR

80 FREE-STANDING  
PAREX UNITS (3'-0" WIDE  
6'-0" TALL)

OPEN METRO  
SHELVING TOWARD  
WINDOWS

GET STRUCTURAL  
INPUT ON  
CAPACITY FOR  
FLUID STOR. AND  
PAREX SYSTEM

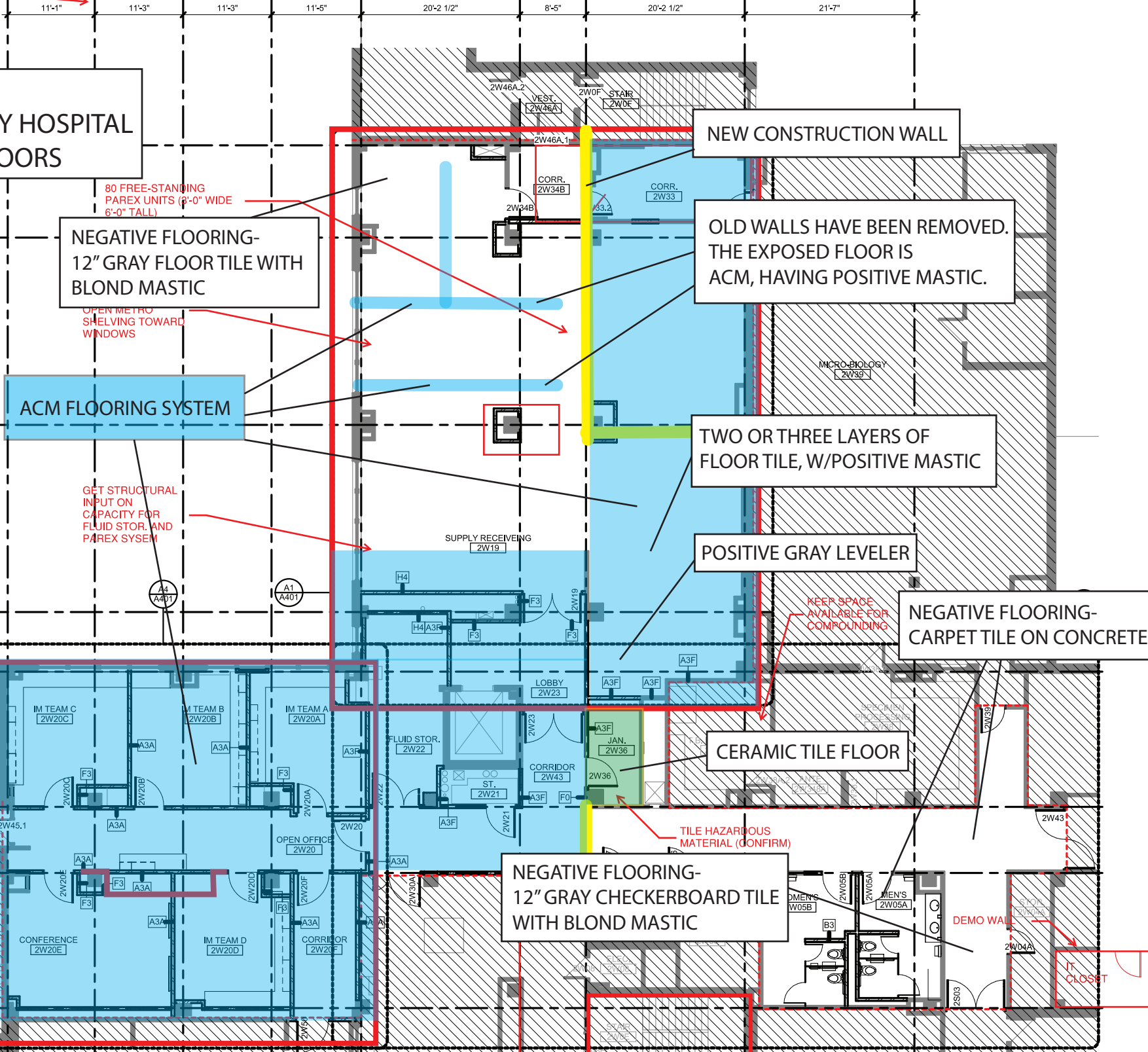
KEEP SPACE  
AVAILABLE FOR  
COMPOUNDING

TILE HAZARDOUS  
MATERIAL (CONFIRM)

DEMO WALL

IT CLOSET

1  
2  
3  
4  
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8  
9



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# UNIVERSITY *of* MISSOURI

ENVIRONMENTAL HEALTH AND SAFETY

**LEAD SURVEY**  
**UNIVERSITY HOSPITAL**  
**2 WEST, PHASE 1**  
**HP19023**  
**CP150492**  
**12/18/2018**

**TO:** Matt Thomas  
Planning, Design, and Construction

Katlyn Howard  
Healthcare Facilities, Plant Engineering

**FROM:** Pete Kohler  
Environmental Health and Safety

MU EHS has completed a lead survey of specific areas of 2 West in University Hospital, as designated by the survey request of 11/26/2018. The rooms surveyed are 2W-20, 2W-26, 2W-29, 2W-30, and 2W-30A. This is the first phase of a project which will eventually include the west wing of the 2<sup>nd</sup> floor.

These room numbers do not exactly match the room numbers on floor plans. These are the room numbers on the door jambs of the actual rooms.

The purpose of this survey is to identify lead paint that might represent a potential worker safety hazard and/or might require special handling and waste disposal prior to the demolition or renovation.

The EPA and the U.S. Department of Housing and Urban Development (HUD) consider lead-based paint as containing a lead concentration equal to or greater than 1.0 milligram per square centimeter (mg/cm<sup>2</sup>) or 0.5% lead by weight, as defined by Title X of the 1992 Housing and Community Development Act. The US



Consumer Product Safety Commission considers paint with up to 600 ppm of lead to be “Lead Free”.

Finished surfaces were tested for lead, using a Niton XRF analyzer. The XRF was checked before the survey and found to be in calibration. The survey was made by Pete Kohler (Missouri Lead Inspector #00783, expires 5/17/19.) The lead survey was conducted on December 18, 2018.

As a result of the survey, no finished surfaces were identified having lead in concentrations which reach the HUD standard.

OSHA has found that certain work, including aggressive disturbance of the painted surface, may result in lead levels exceeding the Action Level or the Permissible Exposure Limit (PEL)- even when the concentration is below 1 mg/cm<sup>2</sup>.

<b>LOCATION/DESCRIPTION</b>	<b>LEAD READINGS (mg/cm<sup>2</sup>)</b>
University Hospital 2W-20, 2W21, pink sheet rock walls	0.01, 0.01, 0.01, 0.01, 0.01, 0.01, 0.01, 0.01, 0.01, 0.01, 0.01, 0.01, 0.01, 0.01, 0.01, 0.01, 0.01, 0.02
2W-20, white sheet rock wall (north wall)	0.01, 0.01, 0.01, 0.01
2W-20, pink metal cabinets	0.01, 0.01, 0.01, 0.01, 0.01, 0.01
2W-20, varnished doors	0.01, 0.01, 0.01, 0.01
2W-20, tan metal door frames	0.01, 0.01, 0.01, 0.01

2W-20, 2W-21, black anodized aluminum windows	0.01, 0.01, 0.01, 0.01, 0.01, 0.01, 0.01
2W-20, white mini-blinds	0.01, 0.01, 0.01, 0.01
2W-26, blue metal door	0.01, 0.01
2W-26, blue metal door frame	0.01, 0.01
The sheet rock walls in 2W-26 are not painted. No readings were taken of the bare sheet rock.	
2W-29, lavender sheet rock walls	0.01, 0.01, 0.01, 0.01, 0.01, 0.01, 0.01, 0.01, 0.01, 0.01
2W-29, varnished door	0.01, 0.01
2W-29, lavender metal door frame	0.02, 0.03, 0.02
2W-29, black metal windows	0.01, 0.01, 0.01, 0.01
2W-29, white mini-blinds	0.02, 0.01, 0.03
2W-29, (NE corner chase) lavender sheet rock wall	0.18, 0.24, 0.16
2W-29, varnished cabinets	0.01, 0.01, 0.01, 0.01
2W-30, lavender sheet rock walls	0.01, 0.01, 0.01, 0.01, 0.01, 0.01
2W-30, varnished door	0.01, 0.01
2W-30, lavender metal door frame	0.01, 0.01
2W-30, black metal windows	0.01, 0.01, 0.01, 0.01
2W-30, white mini-blinds	0.01, 0.01, 0.01
2W-30, varnished cabinets	0.01, 0.01, 0.01
2W-30A, lavender sheet rock walls	0.01, 0.01, 0.01, 0.01
2W-30A, varnished door	0.01, 0.01
2W-30A, lavender metal door frame	0.01, 0.02
2W-30A, varnished cabinets	0.01, 0.01, 0.02, 0.02

**LEAD SUMMARY:** None of the surfaces checked for this survey have finishes which approach the HUD lead standard.



## **UNIVERSAL WASTE INVENTORY**

The following items will need to be removed from these rooms before the demolition begins:

Two (2) Exit signs

Four (4) Thermostats

Four (4) Door closers

One (1) Smoke detector

One (1) large light fixture in the ceiling of 2W-26, with its bulb

# UNIVERSITY *of* MISSOURI

ENVIRONMENTAL HEALTH AND SAFETY

**HAZARDOUS BUILDING MATERIALS SURVEY**  
**PROJECT CP150492, HP19023**  
**UNIVERSITY HOSPITAL 2 WEST PHASE 2**  
**2W38, 38A, 38B, 39, 39B, 39C, 39E**  
**02/06/2019**

**TO:** Matt Thomas  
Planning, Design, and Construction

Katlyn Howard  
Healthcare Facilities, Plant Engineering

**FROM:** Pete Kohler  
Environmental Health and Safety

MU EHS has completed a hazardous building material survey of specific parts of 2 West in University of Missouri Teaching Hospital (Building 42-083). The second phase of 2 West to be surveyed is the rooms which have been vacated for the upcoming renovation: 2W-38, 38A, 38B, 39, 39B, 39C, and 39E.

The survey includes an asbestos survey, a lead paint survey, and an inventory of universal waste.

The asbestos inspection was conducted to satisfy the requirements of 40CFR 61, subpart M, which stipulates that all buildings be “thoroughly inspected” for asbestos before the commencement of renovation or demolition activities. The asbestos inspection was conducted by Pete Kohler (Missouri Asbestos Inspector #10883, expires 11/16/2019). The survey was conducted in January and February of 2019, and the report was completed February 6, 2019.

Suspect materials that will be disturbed by the stated scope of the project were collected and analyzed. Floor tile was analyzed by TEM; other samples were analyzed by PLM, with an additional step in preparing the hard-to-analyze samples, such as black adhesive mastic from floor tile (PLM NOB).

As a result of the survey, asbestos-containing materials (ACM) were identified.



Fire doors are presumed to have asbestos cores.  
The fume hood in 2W-38 has an ACM transite interior.  
The flooring system of 2W-39, 2W-39B, and 2W-39C contains asbestos.  
Above the drop ceiling of 2W-38 is a plaster ceiling. Above the plaster ceiling, some of the pipes have asbestos insulation.  
Above the drop ceiling of 2W-39 is a sheet rock ceiling. Above the sheet rock, some of the pipes have asbestos insulation.

## **FIELD OBSERVATIONS**

The flooring of this area is mainly 12" white floor tile, with tan streaks. It is put down with black mastic on concrete. In 2W39B, the 12" white tile is covered with carpet squares. The tile has been stained and appears to be darker, but it is the same tile as in the main room, 2W39. The 12" white tile contains asbestos. The black mastic contains asbestos. Analysis of the white tile came back as <1%. Differences in concentration can vary within a room, and different tiles produce different numbers. The flooring system in 2W-39, 2W-39B and 2W-39C is ACM.

In 2W38A and 2W38B, there is carpet tile on top of 12" green floor tile, put down with black mastic. The green tile does not contain asbestos. The black mastic beneath the green tile does not contain asbestos.

In 2W38, there is 12" white floor tile, put down with dark mastic. It is possible that this mastic is blond that has got dirty, rather than black mastic. The white floor tile here does not contain asbestos. The mastic does not contain asbestos. Because I had doubt on this mastic, I collected another sample of the mastic in 2W-38, and analyzed it. It does not contain asbestos.

In 2W38, 38A, and 38B, the ceiling is 2x2 acoustic ceiling tiles in a suspended metal grid. The 2x2 ceiling tiles do not contain asbestos. Above the drop ceiling is a plaster ceiling on diamond lath. The ceiling plaster does not contain asbestos.

In the space between the ceiling tiles and the plaster, ductwork is sheet metal or fiberglass flex-duct. Pipe insulation is fiberglass. There is bare PVC. No suspect material was identified in this space.

The plaster ceiling hangs beneath a concrete deck. There is no spray-on present on the concrete. In the space between the plaster and the concrete, some pipe insulation is asbestos-containing material. Both the straights and the fittings on

some of the pipes are ACM. It is possible to see ACM pipes penetrating the wall into 2W-39, in the space below the concrete deck of that room.

The ceiling tiles in 2W39 are 2x4. These ceiling tiles do not contain asbestos. Above the drop ceiling here, there is sheet metal HVAC ductwork, fiberglass flex-duct, bare copper pipes, bare PVC pipes, bare cast iron drain pipes, and some fiberglass insulation. I did not identify any suspect pipe insulation in the space above the drop ceiling.

Above the ductwork, a ceiling has been built of sheet rock. In some areas the sheet rock has not been finished with sheet rock joint compound. There is old sheet rock tape at the joints. At other areas, sheet rock mud has been used at the joints. The sheet rock, the tape, and the sheet rock joint compound were sampled and analyzed. None of these materials contains asbestos.

ACM pipes from the space above 2W38 travel through the wall into the same space above 2W39. So there are ACM pipes in the topmost space of the big room also. The deck above the sheet rock is metal. There is no spray-on present.

Most of the walls around the perimeter of this space are plaster walls. Some interior walls are sheet rock. Samples of plaster and sheet rock joint compound were analyzed. Neither of these materials contains asbestos.

Fire-rated doors are presumed to have asbestos cores. If the doors are to be re-used, all hardware must stay in place. If the doors are to be disposed of, it must be done by asbestos-certified workers. There are five fire doors in the project area.

The fume hood in 2W38 has a transite interior. Transite contains asbestos. The removal of this hood must be done by asbestos-certified workers. The fume hood in 2W39 has a stainless steel interior. Both hoods have metal ducts.

The cold room, 2W39E, will stay intact. The floor and the ceiling are stainless steel. The walls are marlite panels. Neither of these materials is suspect for asbestos. I did not open any of the insulated panels and I did not collect any insulation samples from this unit. If it needs to be broken down, additional sampling may be needed. If the unit is to be removed, the compressor will have to be taken out of service by a trained worker.

Black laboratory counter tops and backsplashes were sampled and analyzed. Several styles of countertops, of different materials, were sampled and analyzed. None of the counters contains asbestos.

Access panels in the walls of 2W39 open to a chase with high positive pressure. Inside the chase are ducts that are fitted with windows. It is my understanding that this ductwork is outside the scope of the project. I did not open this ductwork and I did not collect any samples. If these need to be removed or altered, please call EHS and we can sample if needed.

<b>SAMPLE ID</b>	<b>LOCATION/DESCRIPTION</b>	<b>ANALYSIS</b>
190129-01	University Hospital 2W-38, 12" white floor tile, w/streaks	100% matrix material
190129-01A	Same location, black mastic from floor tile listed above	100% matrix material
190129-02	2W-38A, 12" green floor tile	100% matrix material
190129-02A	Same location, black mastic from floor tile listed above	100% matrix material
190129-03	2W-39, 12" white floor tile w/streaks	<1% <b>CHRYSOTILE</b> , 99% matrix material
190129-03A	Same location, black mastic from floor tile listed above	<b>4.3% CHRYSOTILE</b> , 95.7% matrix material
190129-04	2W-39, 12" white floor tile w/streaks	<1% <b>CHRYSOTILE</b> , 99% matrix material
190129-04A	Same location, black mastic from floor tile listed above	<b>3.1% CHRYSOTILE</b> , 96.9% matrix material
190129-05	2W-39, 2x4 ceiling tile, gray body	50% mineral wool, 30% cellulose, 15% perlite, 5% non-fibrous
190129-06	2W-39, 2x4 ceiling tile, gray body	50% mineral wool, 30% cellulose, 15% perlite, 5% non-fibrous

190129-07	2W-38, 2x2 ceiling tile, gray body	50% mineral wool, 30% cellulose, 15% perlite, 5% non-fibrous
190129-08 Finish coat	2W-38, above drop ceiling, ceiling plaster	100% non-fibrous
190129-08 Base coat	2W-38, above drop ceiling, ceiling plaster	20% quartz, 80% non-fibrous
190129-09	2W-38, above drop ceiling, plaster wall patch	10% perlite, 90% non-fibrous
190129-10 Finish coat	2W-39, wall plaster	100% non-fibrous
190129-10 Base coat	2W-39, wall plaster	20% quartz, 80% non-fibrous
190129-11	2W-38A, sheet rock joint compound	100% non-fibrous
190129-12	2W-38, sheet rock joint compound	100% non-fibrous
190129-13	2W-39B, sheet rock joint compound	100% non-fibrous
190129-14 Finish coat	2W-39, wall plaster	100% non-fibrous
190129-14 Base coat	2W-39, wall plaster	20% quartz, 80% non-fibrous
190129-15	2W-39, black laboratory counter top	80% cellulose, 20% non-fibrous
190129-16	2W-38, black laboratory counter top	100% non-fibrous
190129-17	2W-39, black laboratory backsplash	100% non-fibrous
190129-18 Finish coat	2W-39, above ceiling tile, wall plaster	100% non-fibrous
190129-18 Base coat	2W-39, above ceiling tile, wall plaster	20% quartz, 80% non-fibrous
190129-19	2W-39, above drop ceiling, sheet rock ceiling	20% cellulose, 2% glass, 70% gypsum, 8% non-fibrous

190129-20	2W-39, above drop ceiling, old sheet rock tape	50% glass, 50% non-fibrous
190129-21	2W-39, above drop ceiling, sheet rock joint compound	100% non-fibrous
190205-01	2W-38, dark mastic from beneath 12" white floor tile	100% non-fibrous

**ASBESTOS SUMMARY:** The fume hood in 2W-38 contains asbestos. 2W-39, 2W-39B, and 2W-39C contain 2,300 square feet of asbestos-containing flooring system. In the space directly below the concrete deck in the office area, and the metal deck in the lab area, some of the pipe insulation contains asbestos. There are 5 fire rated doors in the project area.

## **LEAD PAINT**

The purpose of the lead survey is to identify lead paint that might represent a potential worker safety hazard and/or might require special handling and waste disposal prior to the demolition or renovation.

The EPA and the U.S. Department of Housing and Urban Development (HUD) consider lead-based paint as containing a lead concentration equal to or greater than 1.0 milligram per square centimeter (mg/cm<sup>2</sup>) or 0.5% lead by weight, as defined by Title X of the 1992 Housing and Community Development Act. The US Consumer Product Safety Commission considers paint with up to 600 ppm of lead to be "Lead Free".

Finished surfaces were tested for lead, using a Niton XRF analyzer. The XRF was checked before the survey and found to be in calibration. The survey was made by Pete Kohler (Missouri Lead Inspector #00783, expires 5/17/19.) The lead survey was conducted on February 4, 2019.

As a result of the survey, no finished surfaces were identified having lead in concentrations which reach the HUD standard.
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OSHA has found that certain work, including aggressive disturbance of the painted surface, may result in lead levels exceeding the Action Level or the Permissible Exposure Limit (PEL)- even when the concentration is below 1 mg/cm<sup>2</sup>.

<b>LOCATION/DESCRIPTION</b>	<b>LEAD READINGS (mg/cm<sup>2</sup>)</b>
University Hospital 2W-38A, pale green plaster wall	0.03, 0.03, 0.03
2W-38A, varnished door	0.01, 0.01
2W-38A, blue metal door frame	0.01, 0.01
2W-38B, pale green sheet rock walls	0.03, 0.03, 0.04
2W-38B, varnished door	0.01, 0.01
2W-38B, blue metal door frame	0.01, 0.01
2W-38, white sheet rock walls	0.01, 0.01, 0.01, 0.01
2W-38 varnished door	0.01, 0.01
2W-38, blue metal door frame	0.01, 0.01
2W-39, south wall, light green plaster wall	0.01, 0.01, 0.01, 0.01
2W-39, west wall, tan plaster wall	0.01, 0.01, 0.01, 0.01, 0.01
2W-39, west wall, varnished doors	0.01, 0.01, 0.01, 0.01
2W-39, west walls, blue metal door frames	0.01, 0.01, 0.01, 0.01
2W-39, north wall, green plaster wall	0.01, 0.01



2W-39, north wall, black anodized aluminum windows	0.01, 0.01, 0.01
2W-39, east wall, tan plaster wall	0.01, 0.01, 0.01, 0.01, 0.01
2W-39, east wall, varnished doors	0.01, 0.01, 0.01
2W-39, east wall, blue metal door frames	0.01, 0.01, 0.01, 0.01
2W-39B, tan plaster walls	0.01, 0.01, 0.01
2W-39B, black anodized aluminum windows	0.01, 0.01, 0.01
2W-39C, white sheet rock walls	0.01, 0.01, 0.01
2W-39C, varnished door	0.01, 0.01
2W-39C, brown metal door frame	0.01, 0.01
2W-39, SE corner, entry door, varnished	0.01, 0.01
2W-39, SE corner, blue metal door frame	0.01, 0.0
2W-39, SE corner, tan sheet rock wall	0.01 0.01

**LEAD SUMMARY:** None of the surfaces tested for lead contain lead in concentrations which approach the HUD standard.

## **UNIVERSAL WASTE**

If the demolition removes the following objects, they should be collected and saved for pick-up by MU EHS. Resource Recovery Center (882-3736) will help with this.

- Five (5) door closers
- One (1) exit sign
- Two (2) window air conditioners
- One (1) compressor in walk-in refrigerator (Room 2W39E)
- Fifty five (55) 4 foot fluorescent light fixtures, with their bulbs
- One (1) 2 foot fluorescent light fixture, with its bulbs
- Four (4) thermostats

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## SECTION 055000 - METAL FABRICATIONS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Steel framing and supports as designated on Construction Documents.
  - 2. Structural framing and supports as designated on Construction Documents.
  - 3. Shelf angles.
  - 4. Structural-steel door frames.
  - 5. Miscellaneous steel trim
- B. Products furnished, but not installed, under this Section include the following:
  - 1. Loose steel lintels.
  - 2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

#### 1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
  - 1. Fasteners.
  - 2. Shop primers.
  - 3. Shrinkage-resisting grout.
- B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items
- C. Samples for Verification: For each type and finish of exposed material.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer's experience with providing delegated-design engineering services of the kind indicated, including documentation that engineer is licensed in the jurisdiction in which Project is located.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Research Reports: For post-installed anchors.

## 1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel in accordance with 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."

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

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

### 2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- C. Stainless Steel Sheet, Strip, and Plate: ASTM A240/A240M or ASTM A666, Type 304.
- D. Stainless Steel Bars and Shapes: ASTM A276/A276M, Type 304.
- E. Rolled-Stainless Steel Floor Plate: ASTM A793.
- F. Steel Tubing: ASTM A500/A500M, cold-formed steel tubing.
- G. Steel Pipe: ASTM A53/A53M, Standard Weight (Schedule 40) unless otherwise indicated.
- H. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.

1. Size of Channels: As indicated.
- I. Cast Iron: Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M, unless otherwise indicated.
- J. Aluminum Plate and Sheet: ASTM B209 (ASTM B209M), Alloy 6061-T6.
- K. Aluminum Extrusions: ASTM B221 (ASTM B221M), Alloy 6063-T6.
- L. Aluminum-Alloy Rolled Tread Plate: ASTM B632/B632M, Alloy 6061-T6.
- M. Aluminum Castings: ASTM B26/B26M, Alloy 443.0-F.
- N. Bronze Extrusions: ASTM B455, Alloy UNS No. C38500 (extruded architectural bronze).
- O. Bronze Castings: ASTM B584, Alloy UNS No. C83600 (lead red brass) or UNS No. C84400 (lead semired brass).
- P. Nickel Silver Extrusions: ASTM B151/B151M, Alloy UNS No. C74500.
- Q. Nickel Silver Castings: ASTM B584, Alloy UNS No. C97600 (20 percent lead nickel bronze).

## 2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
  1. Provide stainless steel fasteners for fastening aluminum, stainless steel or nickel silver.
  2. Provide bronze fasteners for fastening bronze.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A (ASTM F568M, Property Class 4.6); with hex nuts, ASTM A563 (ASTM A563M); and, where indicated, flat washers.
- C. Stainless Steel Bolts and Nuts: Regular hexagon-head annealed stainless steel bolts, ASTM F593 (ASTM F738M); with hex nuts, ASTM F594 (ASTM F836M); and, where indicated, flat washers; Alloy Group 1 (A1).
- D. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563 (ASTM A563M); and, where indicated, flat washers.
  1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- E. Anchors, General: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing in accordance with ASTM E488/E488M, conducted by a qualified independent testing agency.
- F. Cast-in-Place Anchors in Concrete: Either threaded or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47/A47M malleable iron or ASTM A27/A27M cast

steel. Provide bolts, washers, and shims as needed, all hot dip galvanized per ASTM F2329/F2329M.

G. Post-Installed Anchors:

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.

H. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches (41 by 22 mm) by length indicated with anchor straps or studs not less than 3 inches (75 mm) long at not more than 8 inches (200 mm) o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B633, Class Fe/Zn 5, as needed for fastening to inserts.

## 2.4 MISCELLANEOUS MATERIALS

A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

B. Water-Based Primer: Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel, complying with MPI#107 and compatible with topcoat.

C. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

D. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

E. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

G. Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

## 2.5 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated, coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
- J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches (3.2 by 38 mm), with a minimum 6-inch (150-mm) embedment and 2-inch (50-mm) hook, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c., unless otherwise indicated.

## 2.6 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
  - 1. Fabricate units from slotted channel framing where indicated.
  - 2. Furnish inserts for units installed after concrete is placed.
- C. Galvanize miscellaneous framing and supports where indicated.
- D. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

## 2.7 SHELF ANGLES

- A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch (19-mm) bolts, spaced not more than 6



inches (150 mm) from ends and 24 inches (600 mm) o.c., unless otherwise indicated.

1. Provide mitered and welded units at corners.
2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches (50 mm) larger than expansion or control joint.

B. Galvanize and prime shelf angles located in exterior walls.

## 2.8 STRUCTURAL-STEEL DOOR FRAMES

A. Fabricate structural-steel door frames from steel shapes, plates, and bars of size and to dimensions indicated, fully welded together, with 5/8-by-1-1/2-inch (16-by-38-mm) steel channel stops, unless otherwise indicated. Plug-weld built-up members and continuously weld exposed joints. Secure removable stops to frame with countersunk machine screws, uniformly spaced at not more than 10 inches (250 mm) o.c. Reinforce frames and drill and tap as necessary to accept finish hardware.

1. Provide with integrally welded steel strap anchors for securing door frames into adjoining concrete or masonry.

B. Extend bottom of frames to floor elevation indicated with steel angle clips welded to frames for anchoring frame to floor with expansion shields and bolts.

C. Galvanize and prime steel frames.

## 2.9 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

C. Galvanize and prime miscellaneous steel trim.

D. Prime miscellaneous steel trim with zinc-rich primer.

## 2.10 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

## 2.11 GENERAL FINISH REQUIREMENTS

A. Finish metal fabrications after assembly.

- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

#### 2.12 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.
- B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean galvanized surfaces of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.
- C. Shop prime iron and steel items unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
- D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

#### 2.13 ALUMINUM FINISHES

- A. As-Fabricated Finish: AA-M12.
- B. Clear Anodic Finish: AAMA 611, Class I, AA-M12C22A41.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal

fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
  - 1. Cast Aluminum: Heavy coat of bituminous paint.
  - 2. Extruded Aluminum: Two coats of clear lacquer.

### 3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor shelf angles securely to existing construction.

### 3.3 REPAIRS

- A. Touchup Painting:
  - 1. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 055000

## SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Framing with dimension lumber.
  - 2. Rooftop equipment bases and support curbs.
  - 3. Wood blocking cants, and nailers.
  - 4. Wood furring and grounds.
  - 5. Plywood backing panels.

#### 1.3 DEFINITIONS

- A. Boards or Strips: Lumber of less than 2 inches nominal (38 mm actual) size in least dimension.
- B. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) or greater size but less than 5 inches nominal (114 mm actual) size in least dimension.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
  - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
  - 2. 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, 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 D5664.
  - 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.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:

1. Preservative-treated wood.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.
4. Post-installed anchors.
5. Metal framing anchors.

#### 1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

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

### PART 2 - PRODUCTS

#### 2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
  1. Factory mark each piece of lumber with grade stamp of grading agency.
  2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
- B. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal (38-mm actual) thickness or less, 19 percent for more than 2-inch nominal (38-mm actual) thickness unless otherwise indicated.

#### 2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWWA U1; Use Category UC2 .
- 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 all miscellaneous carpentry unless otherwise indicated.

### 2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, 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. Treatment shall not promote corrosion of metal fasteners.
  - 2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D3201 at 92 percent relative humidity. Use where exterior type is not indicated.
  - 3. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D5664, and design value adjustment factors shall be calculated according to ASTM D6841.
- C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- E. Application: Treat all miscellaneous carpentry unless otherwise indicated.

### 2.4 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
  - 1. Blocking.
  - 2. Nailers.
  - 3. Rooftop equipment bases and support curbs.
  - 4. Cants.
  - 5. Furring.
  - 6. Grounds.
  - 7. Utility shelving.
- B. Dimension Lumber Items: Construction or No. 2
- C. Concealed Boards: 15 percent maximum moisture content.
- 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.

- F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

## 2.5 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: Plywood, DOC PS 1, fire-retardant treated, in thickness indicated or, if not indicated, not less than **1/2-inch (13-mm)** nominal thickness.

## 2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
- B. Nails, Brads, and Staples: ASTM F1667.
- C. Screws for Fastening to Metal Framing: ASTM C1002, length as recommended by screw manufacturer for material being fastened.
- D. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- E. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 as appropriate for the substrate.
  - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B633, Class Fe/Zn 5.
  - 2. Material: Stainless steel with bolts and nuts complying with ASTM F593 and ASTM F594, Alloy Group 1 or 2 (ASTM F738M and ASTM F836M, Grade A1 or A4).

## 2.7 METAL FRAMING ANCHORS

- A. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 (Z180) coating designation.
  - 1. Use for interior locations unless otherwise indicated.
- B. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A653/A653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 (Z550) coating designation; and not less than 0.036 inch (0.9 mm) thick.
  - 1. Use for wood-preserved-treated lumber and where indicated.

## 2.8 MISCELLANEOUS MATERIALS

- A. Adhesives for Gluing to Concrete or Masonry: Formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.
- B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin

to produce an overall thickness of not less than 0.025 inch (0.6 mm).

### PART 3 - EXECUTION

#### 3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.
- D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- E. Do not splice structural members between supports unless otherwise indicated.
- F. 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 (406 mm) o.c.
- G. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
  - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches (2438 mm) o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
  - 2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches (2438 mm) o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal (38-mm actual) thickness.
  - 3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. (9.3 sq. m) and to solidly fill space below partitions.
- H. Sort and select lumber so that natural characteristics do 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.
- I. Comply with AWWA 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.
  2. Use copper naphthenate for items not continuously protected from liquid water.
- J. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- K. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
  2. ICC-ES evaluation report for fastener.
- L. 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 INSTALLATION OF WOOD BLOCKING AND NAILER

- 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 INSTALLATION OF WOOD FURRING

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal- (19-by-63- mm actual-) size furring.

END OF SECTION 061053

## SECTION 064116 - PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Plastic-laminate-clad architectural cabinets.
  - 2. Cabinet hardware and accessories.
  - 3. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-clad architectural cabinets that are not concealed within other construction.

#### 1.3 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded cabinets.
- B. Hardware Coordination: Distribute copies of approved hardware schedule specified in construction documents to manufacturer of architectural cabinets; coordinate Shop Drawings and fabrication with hardware requirements.

#### 1.4 PREINSTALLATION MEETINGS

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

#### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- B. Shop Drawings:
  - 1. Include plans, elevations, sections, and attachment details.
  - 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
  - 3. Show locations and sizes of cutouts and holes for items installed in plastic-laminate architectural cabinets.

4. Apply AWI Quality Certification Program label to Shop Drawings.

C. Samples for verification: For each exposed product and for each color and texture specified, in manufacturer's or manufacturer's standard size.

1. Exposed Cabinet Hardware and Accessories: One full-size unit for each type and finish.

#### **1.6 INFORMATIONAL SUBMITTALS**

A. Qualification Data: For manufacturer and Installer.

B. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

#### **1.7 CLOSEOUT SUBMITTALS**

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

#### **1.8 QUALITY ASSURANCE**

A. Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

1. Manufacturer's Certification: Licensed participant in AWI's Quality Certification Program.

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

#### **1.9 DELIVERY, STORAGE, AND HANDLING**

A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

#### **1.10 FIELD CONDITIONS**

A. Environmental Limitations with Humidity Control: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 25 and 55 percent during the remainder of the construction period.

B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

## PART 2 - PRODUCTS

### 2.1 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

- A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of cabinets indicated for construction, finishes, installation, and other requirements.
1. Provide labels and certificates from AWI certification program indicating that woodwork and installation complies with requirements of grades specified.
- B. Architectural Woodwork Standards Grade: Custom.
- C. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by quality standard.
- D. Laminate Cladding for Exposed Surfaces:
1. Horizontal Surfaces: Grade HGS.
  2. Postformed Surfaces: Grade HGP.
  3. Vertical Surfaces: Grade HGS.
- E. Materials for Semiexposed Surfaces:
1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade VGS.
  2. Drawer Sides and Backs: Solid-hardwood lumber.
  3. Drawer Bottoms: Hardwood plywood.
- F. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.
- G. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

### 2.2 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
- B. Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise

indicated.

### 2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use materials that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
1. Use treated materials that comply with requirements of referenced quality standard. Do not use materials that are warped, discolored, or otherwise defective.
  2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
  3. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.
- B. Fire-Retardant-Treated Lumber and Plywood: Products with a flame-spread index of 25 or less when tested according to ASTM E84, 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. Kiln-dry lumber and plywood after treatment to a maximum moisture content of 19 and 15 percent, respectively.
- C. Fire-Retardant Particleboard: Made from softwood particles and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 25 or less per ASTM E84.
1. For panels 3/4 inch (19 mm) thick and less, comply with ANSI A208.1 for Grade M-2 except for the following minimum properties: modulus of rupture, 1600 psi (11 MPa); modulus of elasticity, 300,000 psi (2070 MPa); internal bond, 80 psi (550 kPa); and screw-holding capacity on face and edge, 250 and 225 lbf (1100 and 1000 N), respectively.

### 2.4 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets per construction drawings.
- B. Adjustable Shelf Standards and Supports: ANSI/BHMA A156.9, B04071; with shelf rests, B04081.
- C. Drawer Slides: ANSI/BHMA A156.9.
1. Grade 1 and Grade 2: Side mounted and extending under bottom edge of drawer.
    - a. Type: Full extension.
    - b. Material: Zinc-plated steel with polymer rollers.
  2. For drawers not more than 3 inches (75 mm) high and not more than 24 inches (600 mm)

- wide, provide Grade 2.
  - 3. For drawers more than 3 inches (75 mm) high, but not more than 6 inches (150 mm) high and not more than 24 inches (600 mm) wide, provide Grade 1.
  - 4. For drawers more than 6 inches (150 mm) high or more than 24 inches (600 mm) wide, provide Grade 1HD-100.
  - 5. For computer keyboard shelves, provide Grade 1HD-100.
  - 6. For trash bins not more than 20 inches (500 mm) high and 16 inches (400 mm) wide, provide Grade 1HD-200.
- D. Door Locks: ANSI/BHMA A156.11, E07121.
- E. Door and Drawer Silencers: Per construction drawings ANSI/BHMA A156.16, L03011.
- F. Grommets for Cable Passage: Per construction drawings. molded-plastic grommets and matching plastic caps with slot for wire passage.
- G. Exposed Hardware Finishes: Per construction drawings for exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for ANSI/BHMA finish number indicated.
- H. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

## 2.5 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln-dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

## 2.6 FABRICATION

- A. Fabricate architectural cabinets to dimensions, profiles, and details indicated on construction drawings and Div 01 guidelines.
- B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
  - 1. Notify Architect seven days in advance of the dates and times architectural cabinet fabrication will be complete.
- C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

#### 3.2 INSTALLATION

- A. Architectural Woodwork Standards Grade: Install cabinets to comply with quality standard grade of item to be installed.
- B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.
- C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.
- D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm) using concealed shims.
  - 1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
  - 2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

#### 3.3 FIELD QUALITY CONTROL

- A. Inspections: Provide inspection of installed Work through AWI's Quality Certification Program certifying that woodwork, including installation, complies with requirements of the Architectural Woodwork Standards for the specified grade.

#### 3.4 ADJUSTING AND CLEANING

- A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects. Where not possible to repair, replace architectural cabinets. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean cabinets on exposed and semiexposed surfaces.
- D.

END OF SECTION 064116

## SECTION 078100 - APPLIED FIRE PROTECTION

### 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. Sprayed fire-resistive materials.

#### 1.3 DEFINITIONS

- A. SFRM: Sprayed fire-resistive materials.

#### 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review products, design ratings, restrained and unrestrained conditions, densities, thicknesses, bond strengths, and other performance requirements.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: For the following:
  - 1. Sprayed fire-resistive material.
  - 2. Substrate primers.
  - 3. Bonding agent.
  - 4. Metal lath.
  - 5. Reinforcing fabric.
  - 6. Reinforcing mesh.
  - 7. Sealer.
  - 8. Topcoat.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and testing agency.
- B. Product Certificates: For each type of sprayed fire-resistive material.



- C. Evaluation Reports: For sprayed fire-resistive material, from ICC-ES.
- D. Preconstruction Test Reports: For fire protection.
- E. Field quality-control reports.

#### 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by sprayed fire-resistive material manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements.

#### 1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply fire protection when ambient or substrate temperature is **44 deg F (7 deg C)** or lower unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.
- B. Ventilation: Ventilate building spaces during and after application of fire protection, providing complete air exchanges according to manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fire protection dries thoroughly.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Assemblies: Provide fire protection, including auxiliary materials, according to requirements of each fire-resistance design and manufacturer's written instructions.
- B. Source Limitations: Obtain fire protection from single source.
- C. Fire-Resistance Design: Indicated on Drawings, tested according to **ASTM E119 or UL 263**; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Steel members are to be considered unrestrained unless specifically noted otherwise.
- D. Asbestos: Provide products containing no detectable asbestos.

#### 2.2 SPRAYED FIRE-RESISTIVE MATERIALS

- A. Sprayed Fire-Resistive Material: Manufacturer's standard, factory-mixed, lightweight, dry formulation, complying with indicated fire-resistance design.
  - 1.
  - 2. Bond Strength: Minimum **150-lbf/sq. ft.** cohesive and adhesive strength based on field testing according to ASTM E736.
  - 3. Density: Not less than density specified in the approved fire-resistance design, according

- to ASTM E605.
4. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design or ASTM E605, whichever is thicker, but not less than **0.375 inch (9 mm)**.
  5. Combustion Characteristics: ASTM E136.
  6. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
    - a. Flame-Spread Index: 10 or less.
    - b. Smoke-Developed Index: 10 or less.
  7. Corrosion Resistance: No evidence of corrosion according to ASTM E937.
  8. Deflection: No cracking, spalling, or delamination according to ASTM E759.
  9. Air Erosion: Maximum weight loss of **0.025 g/sq. ft.** in 24 hours according to ASTM E859.
  10. Fungal Resistance: Treat products with manufacturer's standard antimicrobial formulation to result in no growth on specimens per ASTM G21.
  11. Sound Absorption: NRC or SAA]of not less than 0.60 according to ASTM C423 for Type A mounting according to ASTM E795.

### 2.3 AUXILIARY MATERIALS

- A. Provide auxiliary materials that are compatible with sprayed fire-resistive material and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.
- B. Substrate Primers: Primers approved by sprayed fire-resistive material manufacturer and complying with one or both of the following requirements:
  1. Primer and substrate are identical to those tested in required fire-resistance design by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
  2. Primer's bond strength in required fire-resistance design complies with specified bond strength for sprayed fire-resistive material and with requirements in UL's "Fire Resistance Directory" or in the listings of another qualified testing agency acceptable to authorities having jurisdiction, based on a series of bond tests according to ASTM E736.
- C. Bonding Agent: Product approved by sprayed fire-resistive material manufacturer and complying with requirements in UL's "Fire Resistance Directory" or in the listings of another qualified testing agency acceptable to authorities having jurisdiction.
- D. Reinforcing Fabric: Glass- or carbon-fiber fabric of type, weight, and form required to comply with fire-resistance designs indicated; approved and provided by sprayed fire-resistive material manufacturer.
- E. Reinforcing Mesh: Metallic mesh reinforcement of type, weight, and form required to comply with fire-resistance design indicated; approved and provided by sprayed fire-resistive material manufacturer. Include pins and attachment.
- F. Sealer: Transparent-drying, water-dispersible, tinted protective coating recommended in writing by sprayed fire-resistive material manufacturer for each fire-resistance design.
- G. Topcoat: Suitable for application over sprayed fire-resistive material; of type recommended in writing by sprayed fire-resistive material manufacturer for each fire-resistance design.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and according to each fire-resistance design.
  - 1. Verify that substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulants, or other foreign substances capable of impairing bond of fire protection with substrates under conditions of normal use or fire exposure.
  - 2. Verify that objects penetrating fire protection, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
  - 3. Verify that substrates receiving fire protection are not obstructed by ducts, piping, equipment, or other suspended construction that will interfere with fire protection application.
- B. Conduct tests according to sprayed fire-resistive material manufacturer's written instructions to verify that substrates are free of substances capable of interfering with bond.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Cover other work subject to damage from fallout or overspray of fire protection materials during application.
- B. Clean substrates of substances that could impair bond of fire protection.
- C. Prime substrates where included in fire-resistance design and where recommended in writing by sprayed fire-resistive material manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fire protection.

### 3.3 APPLICATION

- A. Construct fire protection assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, sealers, topcoats, finishing, and other materials and procedures affecting fire protection Work.
- B. Comply with sprayed fire-resistive material manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fire protection; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.
- C. Coordinate application of fire protection with other construction to minimize need to cut or remove fire protection.

1. Do not begin applying fire protection until clips, hangers, supports, sleeves, and other items penetrating fire protection are in place.
2. Defer installing ducts, piping, and other items that would interfere with applying fire protection until application of fire protection is completed.

D. Metal Decks:

1. Do not apply fire protection to underside of metal deck substrates until concrete topping, if any, is completed.
2. Do not apply fire protection to underside of metal roof deck until roofing is completed; prohibit roof traffic during application and drying of fire protection.

E. Install auxiliary materials as required, as detailed, and according to fire-resistance design and sprayed fire-resistive material manufacturer's written instructions for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by sprayed fire-resistive material manufacturer.

F. Spray apply fire protection to maximum extent possible. After the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by sprayed fire-resistive material manufacturer.

G. Extend fire protection in full thickness over entire area of each substrate to be protected.

H. Install body of fire protection in a single course unless otherwise recommended in writing by sprayed fire-resistive material manufacturer.

I. For applications over encapsulant materials, including lockdown (post-removal) encapsulants, apply fire protection that differs in color from that of encapsulant over which it is applied.

J. Where sealers are used, apply products that are tinted to differentiate them from fire protection over which they are applied.

K. Provide a uniform finish complying with description indicated for each type of fire protection material and matching finish approved for required mockups.

L. Cure fire protection according to sprayed fire-resistive material manufacturer's written instructions.

M. Do not install enclosing or concealing construction until after fire protection has been applied, inspected, and tested and corrections have been made to deficient applications.

### 3.4 FIELD QUALITY CONTROL

A. Perform the tests and inspections of completed Work in successive stages. Do not proceed with application of fire protection for the next area until test results for previously completed applications of fire protection show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire-resistance design.

B. Fire protection will be considered defective if it does not pass tests and inspections.

1. Remove and replace fire protection that does not pass tests and inspections, and retest.
2. Apply additional fire protection, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest.

- C. Prepare test and inspection reports.

### 3.5 CLEANING

- A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

### 3.6 PROTECTION

- A. Protect fire protection, according to advice of manufacturer and Installer, from damage resulting from construction operations or other causes, so fire protection is without damage or deterioration at time of Substantial Completion.

### 3.7 REPAIRS

- A. As installation of other construction proceeds, inspect fire protection and repair damaged areas and fire protection removed due to work of other trades.
- B. Repair fire protection damaged by other work before concealing it with other construction.
- C. Repair fire protection by reapplying it using same method as original installation or using manufacturer's recommended trowel-applied product.

END OF SECTION 078100

## SECTION 078123 - INTUMESCENT FIRE PROTECTION

### 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. Mastic and intumescent fire-resistive coatings.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For the following:
  - 1. Mastic and intumescent fire-resistive coatings.
  - 2. Substrate primers.
  - 3. Reinforcing fabric.
  - 4. Reinforcing mesh.
  - 5. Topcoat.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For **Installer and testing agency**.
- B. Product Certificates: For each type of mastic and intumescent fire-resistive coating.
- C. Evaluation Reports: For mastic and intumescent fire-resistive coating, from ICC-ES.
- D. Field quality-control reports.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by mastic and intumescent fire-resistive coating manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements.

#### 1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply fire protection when ambient or substrate temperature is **50 deg F (10 deg C)** lower unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.

- B. Ventilation: Ventilate building spaces during and after application of fire protection, providing complete air exchanges according to manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fire protection dries thoroughly.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Assemblies: Provide fire protection, including auxiliary materials, according to requirements of each fire-resistance design and manufacturer's written instructions.
- B. Source Limitations: Obtain fire protection from single source.
- C. Fire-Resistance Design: Indicated on Drawings, tested according to ASTM E119 or UL 263; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Steel members are to be considered unrestrained unless specifically noted otherwise.
- D. Asbestos: Provide products containing no detectable asbestos.

### 2.2 MASTIC AND INTUMESCENT FIRE-RESISTIVE COATINGS

- A. Mastic and Intumescent Fire-Resistive Coating: Manufacturer's standard and complying with indicated fire-resistance design.
  - 1. Application: Designated for "interior general purpose" and "conditioned interior space purpose" use by a qualified testing agency acceptable to authorities having jurisdiction.
  - 2. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design.
  - 3. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
    - a. Flame-Spread Index: 25 or less.
    - b. Smoke-Developed Index: 50 or less.
  - 4. Hardness: Not less than 45, Type D durometer, according to ASTM D2240.

### 2.3 AUXILIARY MATERIALS

- A. Provide auxiliary materials that are compatible with mastic and intumescent fire-resistive coating and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.
- B. Substrate Primers: Primers approved by mastic and intumescent fire-resistive coating manufacturer and complying with required fire-resistance design by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
- C. Reinforcing Fabric: Glass- or carbon-fiber fabric of type, weight, and form required to comply with fire-resistance designs indicated; approved and provided by mastic and intumescent fire-resistive coating manufacturer.

- D. Reinforcing Mesh: Metallic mesh reinforcement of type, weight, and form required to comply with fire-resistance design indicated; approved and provided by mastic and intumescent fire-resistive coating manufacturer. Include pins and attachment.
- E. Topcoat: Suitable for application over mastic and intumescent fire-resistive coating; of type recommended in writing by mastic and intumescent fire-resistive coating manufacturer for each fire-resistance design.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and according to each fire-resistance design.
  - 1. Verify that substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulants, or other foreign substances capable of impairing bond of fire protection with substrates under conditions of normal use or fire exposure.
  - 2. Verify that objects penetrating fire protection, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
  - 3. Verify that substrates receiving fire protection are not obstructed by ducts, piping, equipment, or other suspended construction that will interfere with fire protection application.
- B. Conduct tests according to mastic and intumescent fire-resistive coating manufacturer's written instructions to verify that substrates are free of substances capable of interfering with bond.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Cover other work subject to damage from fallout or overspray of fire protection materials during application.
- B. Clean substrates of substances that could impair bond of fire protection.
- C. Prime substrates where included in fire-resistance design and where recommended in writing by mastic and intumescent fire-resistive coating manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fire protection.

#### 3.3 APPLICATION

- A. Construct fire protection assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, topcoats, finishing, and other materials and procedures affecting fire protection Work.



- B. Comply with mastic and intumescent fire-resistive coating manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fire protection; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.
- C. Coordinate application of fire protection with other construction to minimize need to cut or remove fire protection.
  - 1. Do not begin applying fire protection until clips, hangers, supports, sleeves, and other items penetrating fire protection are in place.
  - 2. Defer installing ducts, piping, and other items that would interfere with applying fire protection until application of fire protection is completed.
- D. Install auxiliary materials as required, as detailed, and according to fire-resistance design and mastic and intumescent fire-resistive coating manufacturer's written instructions for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by mastic and intumescent fire-resistive coating manufacturer.
- E. Spray apply fire protection to maximum extent possible. After the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by mastic and intumescent fire-resistive coating manufacturer.
- F. Extend fire protection in full thickness over entire area of each substrate to be protected.
- G. Install body of fire protection in a single course unless otherwise recommended in writing by mastic and intumescent fire-resistive coating manufacturer.
- H. Provide a uniform finish complying with description indicated for each type of fire protection material and matching finish approved for required mockups.
- I. Cure fire protection according to mastic and intumescent fire-resistive coating manufacturer's written instructions.
- J. Do not install enclosing or concealing construction until after fire protection has been applied, inspected, and tested and corrections have been made to deficient applications.

### 3.4 FIELD QUALITY CONTROL

- A. Perform the tests and inspections of completed Work in successive stages. Do not proceed with application of fire protection for the next area until test results for previously completed applications of fire protection show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire-resistance design.
- B. Fire protection will be considered defective if it does not pass tests and inspections.
  - 1. Remove and replace fire protection that does not pass tests and inspections, and retest.
  - 2. Apply additional fire protection, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest.
- C. Prepare test and inspection reports.

### 3.5 CLEANING

- A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

### 3.6 PROTECTION

- A. Protect fire protection, according to advice of manufacturer and Installer, from damage resulting from construction operations or other causes, so fire protection is without damage or deterioration at time of Substantial Completion.

### 3.7 REPAIRS

- A. As installation of other construction proceeds, inspect fire protection and repair damaged areas and fire protection removed due to work of other trades.
- B. Repair fire protection damaged by other work before concealing it with other construction.
- C. Repair fire protection by reapplying it using same method as original installation or using manufacturer's recommended trowel-applied product.

END OF SECTION 078123

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## SECTION 078413 - PENETRATION FIRESTOPPING

### 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. Penetration firestopping systems for the following applications:
  - a. Penetrations in fire-resistance-rated walls.
  - b. Penetrations in horizontal assemblies.
  - c. Penetrations in smoke barriers.

#### 1.3 PREINSTALLATION MEETINGS

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

#### 1.4 ACTION SUBMITTALS

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

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

#### 1.6 CLOSEOUT SUBMITTALS

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

#### 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Approval according to FM Approval 4991, "Approval Standard for Firestop Contractors," or been evaluated by UL and found

to comply with its "Qualified Firestop Contractor Program Requirements."

#### 1.8 PROJECT CONDITIONS

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

#### 1.9 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
  - 1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
    - a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.

#### 2.2 PENETRATION FIRESTOPPING SYSTEMS

- A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
  - 1. Provide product by one of the following or approved equal:
    - a. 3M
    - b. Hilti
    - c. STI
- B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of **0.01-inch wg (2.49 Pa)**.
- C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of **0.01-inch wg (2.49 Pa)**.

- D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of **0.30-inch wg (74.7 Pa)**.
- E. Manufactured Piping Penetration Firestopping System: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of **0.01-inch wg (2.49 Pa)**.
- F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.

### 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 sleeve lined with an intumescent strip, a 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 intumescent elastomeric sheet bonded to galvanized-steel sheet.
- E. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.
- 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.

### 2.4 MIXING

- A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system 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: Before installing penetration firestopping systems, clean out openings immediately 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 materials.
  - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
  - 3. Remove laitance and form-release agents from concrete.
- B. 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.

#### 3.3 INSTALLATION

- A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.
- 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.
  - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.
- C. Install fill materials by proven techniques to produce the following results:
  - 1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
  - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
  - 3. For fill materials that will remain exposed after completing the Work, finish to produce

smooth, uniform surfaces that are flush with adjoining finishes.

### 3.4 IDENTIFICATION

- A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than **3 inches (76 mm)** high and with minimum **0.375-inch (9.5-mm)** strokes.
  - 1. Locate in accessible concealed floor, floor-ceiling, or attic space at **15 feet (4.57 m)** from end of wall and at intervals not exceeding **30 feet (9.14 m)**.
- B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within **6 inches (150 mm)** of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
  - 1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
  - 2. Contractor's name, address, and phone number.
  - 3. Designation of applicable testing and inspecting agency.
  - 4. Date of installation.
  - 5. Manufacturer's name.
  - 6. Installer's name.

### 3.5 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E2174.
- B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

### 3.6 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 system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

### 3.7 PENETRATION FIRESTOPPING SYSTEM SCHEDULE



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

END OF SECTION 078413

## SECTION 078443 - JOINT FIRESTOPPING

### 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. Joints in or between fire-resistance-rated constructions.
2. Joints at exterior curtainwall/floor intersections.
3. Joints in smoke barriers.

#### 1.3 PREINSTALLATION MEETINGS

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

#### 1.4 ACTION SUBMITTALS

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

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each joint firestopping system, for tests performed by a qualified testing agency.

#### 1.6 CLOSEOUT SUBMITTALS

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

#### 1.7 QUALITY ASSURANCE

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

#### 1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install joint firestopping systems when ambient or substrate

temperatures are outside limits permitted by joint firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

- B. Install and cure joint firestopping systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

## 1.9 COORDINATION

- A. Coordinate construction of joints to ensure that joint firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of joints to accommodate joint firestopping systems.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

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

### 2.2 JOINT FIRESTOPPING SYSTEMS

- A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.
- B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E1966 or UL 2079.
  - 1. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.
- C. Joints in Smoke Barriers: Provide joint firestopping systems with ratings determined per UL 2079 based on testing at a positive pressure differential of 0.30-inch wg (74.7 Pa).
  - 1. L-Rating: Not exceeding 5.0 cfm/ft. (0.00775 cu. m/s x m) of joint at both ambient and elevated temperatures.
- D. Accessories: Provide components of joint firestopping systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use

only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

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

#### 3.2 PREPARATION

- A. Surface Cleaning: Before installing joint firestopping systems, clean joints immediately to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
  - 1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of elastomeric fill materials or compromise fire-resistive rating.
  - 2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with elastomeric fill materials. Remove loose particles remaining from cleaning operation.
  - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by joint firestopping system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

#### 3.3 INSTALLATION

- A. General: Install joint firestopping systems 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 elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
  - 1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.
- C. Install elastomeric fill materials for joint firestopping systems by proven techniques to produce the following results:
  - 1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
  - 2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
  - 3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### 3.4 IDENTIFICATION

- A. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within **6 inches (150 mm)** of joint edge so labels are visible to anyone seeking to remove or joint firestopping system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
1. The words "Warning - Joint Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
  2. Contractor's name, address, and phone number.
  3. Designation of applicable testing agency.
  4. Date of installation.
  5. Manufacturer's name.
  6. Installer's name.

### 3.5 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E2393.
- B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.
- C. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

### 3.6 CLEANING AND PROTECTION

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

### 3.7 JOINT FIRESTOPPING SYSTEM SCHEDULE

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

END OF SECTION 078443

## SECTION 079200 - JOINT SEALANTS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

1. Silicone joint sealants.
2. Nonstaining silicone joint sealants.
3. Urethane joint sealants.
4. Immersible joint sealants.
5. Silyl-terminated polyether joint sealants.
6. Mildew-resistant joint sealants.
7. Polysulfide joint sealants.
8. Butyl joint sealants.
9. Latex joint sealants.

#### 1.3 ACTION SUBMITTALS

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

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Product Test Reports: For each kind of joint sealant, for tests performed by manufacturer and witnessed by a qualified testing agency.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. Product Testing: Test joint sealants using a qualified testing agency.

1. Testing Agency Qualifications: Qualified according to ASTM C1021 to conduct the testing indicated.

## 1.6 FIELD CONDITIONS

### A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
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.

## 1.7 WARRANTY

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

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

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

1. Warranty Period: Five years from date of Substantial Completion.

### C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

## PART 2 - PRODUCTS

### 2.1 JOINT SEALANTS, GENERAL

#### A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

### 2.2 SILICONE JOINT SEALANTS

- A. Silicone, S, NS, 100/50, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Use NT.

## 2.3 NONSTAINING SILICONE JOINT SEALANTS

- A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C1248.

## 2.4 URETHANE JOINT SEALANTS

- A. Urethane, S, NS, 25, NT: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.

## 2.5 SILYL-TERMINATED POLYETHER (STPE) JOINT SEALANTS

- A. STPE, S, NS, 50, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, silyl-terminated polyether joint sealant; ASTM C920, Type S, Grade NS, Class 50, Use NT.
- B. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

## 2.6 POLYSULFIDE JOINT SEALANTS

- A. Polysulfide, S, NS, 25, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, polysulfide joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.

## 2.7 BUTYL JOINT SEALANTS

- A. Butyl-Rubber-Based Joint Sealants: ASTM C1311.

## 2.8 LATEX JOINT SEALANTS

- A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.

## 2.9 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

## 2.10 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of



sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
  - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
  - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air.
  - 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.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

### 3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C1193 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 sealants using proven techniques that comply with the following and at the same time backings are installed:
  - 1. Place sealants so they directly contact and fully wet joint substrates.
  - 2. Completely fill recesses in each joint configuration.
  - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
  - 1. Remove excess sealant from surfaces adjacent to joints.
  - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.

### 3.4 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates.
  - 1. Extent of Testing: Test completed, and cured sealant joints as follows:
    - a. Perform 3 tests for the first 1000 feet (300 m) of joint length for each kind of sealant and joint substrate.
    - b. Perform one test for each 1000 feet (300 m) of joint length thereafter or one test per each floor per elevation.
  - 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.
    - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
  - 3. Inspect tested joints and report on the following:

- a. Whether sealants filled joint cavities and are free of voids.
  - b. Whether sealant dimensions and configurations comply with specified requirements.
  - c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.
4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions.
  5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
- B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

### 3.5 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

### 3.6 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079200

## SECTION 079219 - ACOUSTICAL JOINT SEALANTS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes acoustical joint sealants.
- B. Related Requirements:
  - 1. Section 079200 "Joint Sealants" for elastomeric, latex, and butyl-rubber-based joint sealants for nonacoustical applications.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each acoustical joint sealant.
- B. Samples for Verification: For each kind and color of acoustical joint sealant required, provide Samples with joint sealants in **1/2-inch- (13-mm-)** wide joints formed between two **6-inch- (150-mm-)** long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- C. Acoustical-Joint-Sealant Schedule: Include the following information:
  - 1. Joint-sealant application, joint location, and designation.
  - 2. Joint-sealant manufacturer and product name.
  - 3. Joint-sealant formulation.
  - 4. Joint-sealant color.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each kind of acoustical joint sealant, for tests performed by manufacturer and witnessed by a qualified testing agency

#### 1.5 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace acoustical joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Two (2) years from date of Substantial Completion.

- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish acoustical joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Two (2) years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Provide acoustical joint-sealant products that effectively reduce airborne sound transmission through perimeter joints and openings in building construction, as demonstrated by testing representative assemblies according to ASTM E90.

### 2.2 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex acoustical sealant complying with ASTM C834.
  - 1. Colors of Exposed Acoustical Joint Sealants: **As selected by Architect from manufacturer's full range of colors.**

### 2.3 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by acoustical-joint-sealant manufacturer where required for adhesion of sealant to joint substrates.
- 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 acoustical joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing acoustical joint sealants

to comply with joint-sealant manufacturer's written instructions.

- B. **Joint Priming:** Prime joint substrates where recommended by acoustical-joint-sealant manufacturer. 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 ACOUSTICAL JOINT SEALANTS

- A. Comply with acoustical joint-sealant manufacturer's written installation instructions unless more stringent requirements apply.
- B. **STC-Rated Assemblies:** Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical joint sealant. Install acoustical joint sealants at both faces of partitions, at perimeters, and through penetrations. Comply with ASTM C919, ASTM C1193, and manufacturer's written recommendations for closing off sound-flanking paths around or through assemblies, including sealing partitions to underside of floor slabs above acoustical ceilings.
- C. **Acoustical Ceiling Areas:** Apply acoustical joint sealant at perimeter edge moldings of acoustical ceiling areas in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.

### 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 acoustical joint sealants and of products in which joints occur.

### 3.5 PROTECTION

- A. Protect acoustical joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated acoustical joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079219

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## **EXPANSION AND SEISMIC JOINT COVER SPECIFICATIONS**

### **Section 07 95 13**

#### **PART 1 — GENERAL**

##### **1.01 Summary**

- A. This section includes the following:
  - 1. Expansion and seismic joint systems for building interiors

##### **1.02 Related Work**

- A. Related work that is specified elsewhere
  - 1. Section 03300: Cast-In-Place Concrete

##### **1.03 Definitions**

- A. Nominal Joint Width: The width of the expansion joint opening as specified in the project documents, at which the expansion joint will be constructed and the cover will be installed
- B. Maximum Joint Width: The widest expansion joint width which the joint cover is required to accommodate without damage to its components
- C. Minimum Joint Width: The narrowest expansion joint width which the joint cover is required to accommodate without damage to its components
- D. Movement Capability: The amount of movement in a single direction (open or close), given as a percentage of the nominal joint width, that the joint cover is required to accommodate without damage to its components
- E. Lateral Shear: Movement horizontally and parallel to the expansion joint
- F. Vertical Shear: Movement vertically and parallel to the expansion joint

##### **1.04 Submittals**

- A. Submittals shall contain the following as required for each specified system
  - 1. Shop Drawings showing complete fabrication details for all joint covers, including required anchorage to surrounding construction, recesses, blocking, backing, and connections between similar and dissimilar joint cover assemblies
  - 2. Manufacturer's product data including product details, installation instructions, maintenance and cleaning instructions, Safety Data Sheets, and LEED documentation
  - 3. Certificates, copies of independent test reports, or research reports showing compliance with fire resistance rating and other specified performance requirements
  - 4. Two (2) complete sets of color chips representing manufacturer's full range of available colors and patterns
  - 5. Three (3) 6" (152mm) samples of the specified systems

##### **1.05 Quality Assurance**

- A. Manufacturer: Obtain joint cover assemblies through one source from a single manufacturer.
  - 1. Manufacturer shall have a third party certified ISO 9001 quality management system.
    - a. The manufacturer shall have documented management and control of the processes that influence the quality of its products
    - b. The manufacturer shall have documented management and control of the processes that influence the quality of its customer service.
  - 2. Manufacturer shall have a minimum of ten (10) years of experience in the fabrication of joint cover assemblies.



- B.** Installer: All products listed in this section shall be installed by a single installer with demonstrated experience in installing products of the same type and scope as specified. Installer shall be insured and licensed as required by agencies within the project's jurisdiction.

#### **1.06 Coordination**

- A.** Submittals shall be completed and approved prior to fabrication and shipment of material to the jobsite.
- B.** Schedule for the work of this section shall be planned to allow sufficient time for manufacturer's production and delivery scheduling.
- C.** Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful and proper installation.
- D.** Coordinate installation of exterior joint assemblies to ensure that transitions are watertight.
- E.** Verify product types, quantities, dimensions, and attachment methods shown on shop drawings against field conditions prior to releasing materials for fabrication by the manufacturer.
- F.** Communicate necessary changes on the manufacturer's shop drawings

#### **1.07 Delivery, Storage, and Handling**

- A.** Provide temporary protective cover on anodized aluminum, stainless steel, and bronze finished surfaces.
- B.** Deliver joint covers to jobsite in clean, unopened crates of sufficient size and strength to protect materials during transit.
- C.** Store components in original containers in a clean, dry location.

#### **1.08 Warranty**

- A.** Submit manufacturer's warranty that materials furnished will perform as specified for a period of not less than one (1) year when installed in accordance with manufacturer's recommendations.

### **PART 2 — Products**

#### **2.01 Manufacturers**

- A.** Furnish and install as noted in specifications and as indicated on drawings as manufactured by Balco, Inc., PO Box 17249, 2626 S. Sheridan, Wichita, KS 67217; phone: 800-767-0082 or (316) 945-0789.
- B.** Substitutions: Submit proposed substitutions in writing to the architect not less than 10 days before bids are due. Submit samples and product data to demonstrate acceptability of proposed substitute. Acceptance will be by addendum.

#### **2.02 Expansion and Seismic Joint Systems**

- A.** Interior Expansion and Seismic Joint Systems

#### **2.03 Materials**

- A.** Metals
  1. Aluminum extrusions: ASTM B221, alloys 6063-T5, 6005A-T6, 6061-T6
  2. Aluminum plate and sheet: ASTM B209, alloys 6061-T6, 5052-H32
  3. Steel: ASTM A36 Plate
  4. Stainless steel: ASTM A666, type 304
  5. Bronze extrusions: ASTM B455, alloy C38500

- 6. Bronze sheet and plate: ASTM B36, C28000 Muntz metal
- B.** PVC Vinyl: 90 Shore A, ASTM D2240
- C.** Silicone: ASTM D 2000 4GE 709 M
- D.** Santoprene
  - 1. 75 shore A durometer, 15 sec, ISO 868
  - 2. Face seals to be installed in exterior conditions shall be UV resistant.
- E.** Abrasive: Two (2) part Epoxy combined with aluminum oxide grit
- F.** Water Barrier: Flexible EPDM, Class I, ASTM D4637, 45 mils thick (minimum)
- G.** Fire Barriers: Designed for indicated or required dynamic structural movement without material degradation or fatigue when tested according to ASTM E 1399. Tested in maximum joint width condition with a field splice as a component of an expansion joint cover by an independent, nationally recognized testing entity in accordance with UL 2079, or ASTM E1966, including hose stream test, where applicable, at the full rated period. Assemblies shall be listed with an independent, nationally recognized testing and listing entity.
- H.** Standard fasteners required for assembly and installation shall be included
- I.** All surfaces in contact with masonry or concrete shall be protected by a factory-applied coating.

## 2.04 Finishes

- A.** Aluminum
  - 1. Floors:
    - a. Mill finish extrusions, AA-M10 (As fabricated, unspecified)
    - b. Mill finish plate, AA-M30 (Directional textured finish, unspecified)
  - 2. Interior Walls and Ceilings:
    - a. Clear anodized, Class II, AA-M12 C22 A31
    - b. Color anodized, Class II, AA-M12 C22 A34
    - c. Factory prime painted for finish paint in field
    - d. Other [\[Specify\]](#)
  - 3. Exterior Walls and Roofs:
    - a. AA-M10 (As fabricated, unspecified)
    - b. High-Performance Organic Coating (Kynar or Trinar)
    - c. Other [\[Specify\]](#)
  - 4. All surfaces in contact with masonry or concrete shall be protected by a factory-applied coating
- B.** Steel
  - 1. Galvanized steel plate shall meet ASTM 123
  - 2. Galvanized sheet metal shall meet ASTM A65 G90
  - 3. All surfaces in contact with masonry or concrete shall be protected by a factory-applied coating
- C.** Bronze
  - 1. Floors: Clear coated directional textured finish
  - 2. Interior walls: #2 Cold rolled mill finish
  - 3. All surfaces in contact with masonry or concrete shall be protected by a factory-applied coating
- D.** Stainless Steel
  - 1. Floors: Directional textured finish
  - 2. Interior walls: #3 Finish
  - 3. Exterior walls: #3 Finish

4. All surfaces in contact with masonry or concrete shall be protected by a factory-applied coating
- E. Elastomeric Seals:
  1. Color as selected and approved from manufacturer's samples
- F. Foam seals with silicone face:
  1. Color as selected and approved from manufacturer's samples

## **PART 3 — Execution**

### **3.01 Examination**

- A. Installer shall examine conditions under which work is to be performed and shall notify the contractor in writing of unsatisfactory conditions. Installer shall not proceed until all unsatisfactory conditions have been corrected in a manner acceptable to the installer.

### **3.02 Preparation**

- A. Prepare surfaces using methods recommended by the manufacturer for achieving the required results within project conditions.
- B. Corner blockouts should be square, level, free of spalling or laitance, and meet the dimensions shown on shop drawings. Repairs should be made using appropriate materials as recommended by concrete repair material manufacturer, based on project-specific conditions.
- C. Concrete repair material must be applied and allowed to cure in accordance to the manufacturer of the product recommendations and instructions.
- D. Clean dirt, debris, and other contaminants from both the blockout and joint opening
- E. Mask areas adjacent to the joint as required to achieve neat, clean joint lines. Remove masking prior to the curing process.

### **3.03 Installation**

- A. Install expansion and seismic joint covers in accordance with the manufacturer's instructions.
- B. Centering bars shall be fully engaged with base members.
- C. Locate fasteners at interval recommended by manufacturer as shown on shop drawings.
- D. Floor systems: Where shimming is required, provide continuous support for base members to prevent vertical deflection when in service.
- E. Heavy-duty floor systems: Repair or grout blockouts as required for continuous frame support. Bring base members to proper level; shimming is not allowed.
- F. Fire-rated joint covers: Install fire rated covers in accordance with requirements of applicable fire rated product. Install fire barriers and flame sealant as shown on shop drawings and in accordance with installation instructions.
- G. Water barrier: Install water barriers at exterior joints and where called for on shop drawings. Provide drainage fittings where called for on shop drawings.

### **3.04 Protection and Cleaning**

- A. Protect the installation from damage by work of other sections.
- B. Where required, remove and store cover plates and install temporary protection over joints and re-install cover plates prior to substantial completion of work.
- C. Do not remove protective coverings until finish work in adjacent areas is complete.
- D. Prior to project closeout, clean exposed surfaces with a suitable cleaner as recommended by manufacturer.

## 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 standard steel frames.
- B. Related Requirements:
  - 1. Section 087100 "Door Hardware" for door hardware for hollow-metal doors.

### 1.3 DEFINITIONS

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

### 1.4 COORDINATION

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.
- B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

### 1.5 PREINSTALLATION MEETINGS

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

### 1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, core descriptions, fire-resistance ratings and finishes.
- B. Shop Drawings: Include the following:

1. Elevations of each frame type.
2. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
3. Locations of reinforcement and preparations for hardware.
4. Details of each different wall opening condition.
5. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of moldings, removable stops, and glazing.

C. Samples for Verification:

1. Finishes: For each type of exposed finish required, prepared on Samples of not less than **3 by 5 inches (75 by 127 mm)**.

D. Product Schedule: For hollow-metal frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

## 1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For door inspector.

1. Fire-Rated Door Inspector: Submit documentation of compliance with NFPA 80, Section 5.2.3.1.
2. Egress Door Inspector: Submit documentation of compliance with NFPA 101, Section 7.2.1.15.4.

B. Product Test Reports: For each type of fire-rated hollow-metal door and frame assembly for tests performed by a qualified testing agency indicating compliance with performance requirements.

C. Field quality control reports.

## 1.8 CLOSEOUT SUBMITTALS

A. Record Documents: For fire-rated assemblies coordinate with Wood Doors to provide, list of door numbers and applicable room name and number to which door accesses.

## 1.9 QUALITY ASSURANCE

A. Fire-Rated Door Inspector Qualifications: Inspector for field quality control inspections of fire-rated door assemblies shall meet the qualifications set forth in NFPA 80, section 5.2.3.1 and the following:

1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.

- B. Egress Door Inspector Qualifications: Inspector for field quality control inspections of egress door assemblies shall meet the qualifications set forth in NFPA 101, Section 7.2.1.15.4 and the following:
  - 1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.

#### 1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
  - 1. Provide additional protection to prevent damage to factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow-metal frames vertically under cover at Project site with head up. Place on minimum **4-inch- (102-mm-)** high wood blocking. Provide minimum **1/4-inch (6-mm)** space between each stacked door to permit air circulation.

### 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. Ceco Door; ASSA ABLOY.
  - 2. Curries Company; ASSA ABLOY.
  - 3. MPI Group, LLC (The).
  - 4. Premier Products, Inc.

#### 2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated on Drawings, based on testing at positive pressure according to NFPA 252 or UL 10C.
  - 1. Smoke- and Draft-Control Door Assemblies: 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 NFPA 105.
  - 2. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.

## 2.3 INTERIOR STANDARD STEEL FRAMES

- A. Construct hollow-metal frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Standard-Duty Frames: ANSI/SDI A250.8, Level 1; ANSI/SDI A250.4, Level C. At locations indicated in the Door and Frame Schedule.
  - 1. Frames:
    - a. Materials: Uncoated steel sheet, minimum thickness of **0.042 inch (1.0 mm)**.
    - b. Construction: Full profile welded.
  - 2. Exposed Finish: Prime.
- C. Heavy-Duty Frames: ANSI/SDI A250.8, Level 2; ANSI/SDI A250.4, Level B. At locations indicated in the Door and Frame Schedule.
  - 1. Frames:
    - a. Materials: Uncoated steel sheet, minimum thickness of **0.053 inch (1.3 mm)**.
    - b. Construction: Full profile welded.
  - 2. Exposed Finish: Prime.

## 2.4 FRAME ANCHORS

- A. Jamb Anchors:
  - 1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
  - 2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each **24 inches (610 mm)** of frame height above **7 feet (2.1 m)**.
  - 3. Postinstalled Expansion Anchor: Minimum **3/8-inch- (9.5-mm-)** diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.
- B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.
- C. Floor Anchors for Concrete Slabs with Underlayment: Adjustable-type anchors with extension clips, allowing not less than **2-inch (51-mm)** height adjustment. Terminate bottom of frames at top of underlayment.
- D. Material: ASTM A879/A879M, Commercial Steel (CS), **04Z (12G)** coating designation; mill phosphatized.
  - 1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot-dip galvanized according to ASTM A153/A153M, Class B.

## 2.5 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B.
- D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A153/A153M.
- E. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- F. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.
- G. Glazing: Comply with requirements in Section 088000 "Glazing."

## 2.6 FABRICATION

- A. Door 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 (19 mm)** beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.
- B. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
  - 1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
  - 2. Door Silencers: drill stops to receive door silencers as follows. Keep holes clear during construction.
    - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
    - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
  - 3. Terminated Stops (Hospital Stops): Where designated on drawings, terminate stops **6 inches (152 mm)** above finish floor with a 45 degree angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded-steel fillerplate, with welds ground smooth and flush with frame.
- C. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping according to ANSI/SDI A250.6, the Door Hardware Schedule, and templates.



1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

## 2.7 STEEL FINISHES

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

## PART 3 - EXECUTION

### 3.1 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. Touch up factory-applied finishes where spreaders are removed.
- B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

### 3.2 INSTALLATION

- A. Install hollow-metal frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.
- B. Hollow-Metal Frames: Comply with ANSI/SDI A250.11.
  1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.
    - a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
    - b. Install frames with removable stops located on secure side of opening.
  2. Fire-Rated Openings: Install frames according to NFPA 80.
  3. Floor Anchors: Secure with postinstalled expansion anchors.
    - a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
  4. Solidly pack mineral-fiber insulation inside frames.

### 3.3 FIELD QUALITY CONTROL

- A. Inspection Agency: Engage a qualified inspector to perform inspections and to furnish reports to Architect.
- B. Inspections:
  - 1. Fire-Rated Door Inspections: Inspect each fire-rated door according to NFPA 80, Section 5.2.
  - 2. Egress Door Inspections: Inspect each door equipped with panic hardware, each door equipped with fire exit hardware, each door located in an exit enclosure, each electrically controlled egress door, and each door equipped with special locking arrangements according to NFPA 101, Section 7.2.1.15.
- C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.
- E. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 80 and NFPA 101.

### 3.4 REPAIR

- A. 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.
- B. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081113

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## SECTION 081416 - FLUSH WOOD DOORS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

1. Five-ply flush wood veneer-faced doors for transparent finish.
2. Factory finishing flush wood doors.

- B. Related Requirements:

1. Section 088000 "Glazing" for glass view panels in flush wood doors.

#### 1.3 PREINSTALLATION MEETINGS

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

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product, including the following:

1. Door core materials and construction.
2. Door edge construction
3. Door face type and characteristics.
4. Factory-machining criteria.
5. Factory-finishing specifications.

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

1. Door schedule indicating door location, type, size, fire protection rating, and swing.
2. Door elevations, dimension and locations of hardware.
3. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
4. Dimensions and locations of blocking for hardware attachment.
5. Dimensions and locations of mortises and holes for hardware.
6. Clearances and undercuts.
7. Requirements for veneer matching.
8. Doors to be factory finished and application requirements.
9. Apply AWI Quality Certification Program label to Shop Drawings.

- C. Samples for Verification:
  - 1. Corner sections of doors, approximately **8 by 10 inches (200 by 250 mm)**, with door faces and edges representing actual materials to be used.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For door inspector.
  - 1. Fire-Rated Door Inspector: Submit documentation of compliance with NFPA 80, Section 5.2.3.1.
  - 2. Egress Door Inspector: Submit documentation of compliance with NFPA 101, Section 7.2.1.15.4.
  - 3. Submit copy of DHI's Fire and Egress Door Assembly Inspector (FDAI) certificate.
- B. Field quality-control reports.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Special warranties.
- B. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.
- C. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

#### 1.7 QUALITY ASSURANCE

- A. Manufacturer's Certification: Licensed participant in AWI's Quality Certification Program.
- B. Fire-Rated Door Inspector Qualifications: Inspector for field quality-control inspections of fire-rated door assemblies shall comply with qualifications set forth in NFPA 80, Section 5.2.3.1 and the following:
  - 1. DHI's Fire and Egress Door Assembly Inspector (FDAI) certification.
- C. Egress Door Inspector Qualifications: Inspector for field quality-control inspections of egress door assemblies shall comply with qualifications set forth in NFPA 101, Section 7.2.1.15.4 and the following:
  - 1. DHI's Fire and Egress Door Assembly Inspector (FDAI) certification.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in plastic bags or cardboard cartons.
- C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

## 1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until building is enclosed and weathertight, wet work is complete, and HVAC system is operating and maintaining temperature between **60 and 90 deg F (16 and 32 deg C)** and relative humidity between **25 and 55** percent during remainder of construction period.

## 1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
    - a. Delamination of veneer.
    - b. Warping (bow, cup, or twist) more than **1/4 inch (6.4 mm)** in a **42-by-84-inch (1067-by-2134-mm)** section.
    - c. Telegraphing of core construction in face veneers exceeding **0.01 inch in a 3-inch (0.25 mm in a 76.2-mm)** span.
  2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
  3. Warranty Period for Solid-Core Interior Doors: Life of installation.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Source Limitations: Obtain flush wood doors from single manufacturer.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Wood Door and Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated on Drawings, based on testing at positive pressure in accordance with **UL 10C or NFPA 252**.
1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
- B. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing in accordance with UL 1784 and installed in compliance with NFPA 105.

2.3 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with AWI/AWMAC/WI's "Architectural Woodwork Standards."

1. Provide labels and certificates from AWI certification program indicating that doors comply with requirements of grades specified.

2.4 SOLID-CORE FIVE-PLY FLUSH WOOD VENEER-FACED DOORS FOR TRANSPARENT FINISH

- A. Interior Doors:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
  - a. Eggers Industries.
2. Performance Grade: ANSI/WDMA I.S. 1A as indicated on Drawings.
3. Performance Grade:
  - a. ANSI/WDMA I.S. 1A Heavy Duty unless otherwise indicated on Drawings.
  - b. ANSI/WDMA I.S. 1A Extra Heavy Duty: where indicated on Drawings.
4. Architectural Woodwork Standards Grade: Premium.
5. Faces: Single-ply wood veneer not less than **1/50 inch (0.508 mm)** thick.
  - a. Species: Red oak .
  - b. Grain: Plain sliced vertical
  - c. 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 (3 m)** or more.
6. Exposed Vertical and Top Edges: Same species as faces or a compatible species - Architectural Woodwork Standards edge Type A
  - a. Fire-Rated Single Doors: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed vertical edges.
  - b. Fire-Rated Pairs of Doors: 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.
  - c. Fire-Rated Pairs of Doors: Provide formed-steel edges and astragals with intumescent seals.
    - 1) Finish steel edges and astragals to match door hardware (locksets or exit devices).

- d. Mineral-Core Doors: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.
  - 1) Screw-Holding Capability: 550 lbf (2440 N) in accordance with WDMA T.M. 10.
7. Core for Non-Fire-Rated Doors:
  - a. ANSI A208.1, Grade LD-1 particleboard.
    - 1) Provide doors with glued-wood-stave or WDMA I.S. 10 structural-composite-lumber cores instead of particleboard cores for doors scheduled to receive exit devices in Section 087100 "Door Hardware."
  - b. Glued wood stave.
  - c. WDMA I.S. 10 structural composite lumber.
    - 1) Screw Withdrawal, Door Face: 550 lbf (2440 N).
    - 2) Screw Withdrawal, Vertical Door Edge: 550 lbf (2440 N).
  - d. Either glued wood stave or WDMA I.S. 10 structural composite lumber.
8. Core for Fire-Rated Doors: As required to achieve fire-protection rating indicated on Drawings.
  - a. Blocking for Mineral-Core Doors: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated on Drawings as needed to eliminate through-bolting hardware.
9. Construction: Five plies, hot-pressed bonded (vertical and horizontal edging is bonded to core), with entire unit abrasive planed before veneering.

## 2.5 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated.
  1. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
  2. Comply with NFPA 80 requirements for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied.
  1. Comply with final hardware schedules, door frame Shop Drawings, ANSI/BHMA-156.115-W, and hardware templates.
  2. Coordinate with hardware mortises in metal frames, to verify dimensions and alignment before factory machining.
  3. For doors scheduled to receive electrified locksets, provide factory-installed raceway and wiring to accommodate specified hardware.
  4. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.



- C. Openings: Factory cut and trim openings through doors.
  - 1. Light Openings: Trim openings with moldings of material and profile indicated.
  - 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."

## 2.6 FACTORY FINISHING

- A. Comply with referenced quality standard for factory finishing.
  - 1. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
  - 2. Finish faces, all four edges, edges of cutouts, and mortises.
  - 3. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.
- B. Factory finish doors that are indicated on Drawings to receive transparent finish.
- C. Transparent Finish:
  - 1. Architectural Woodwork Standards Grade: Premium Custom.
  - 2. Finish: Architectural Woodwork Standards System-9, UV Curable, Acrylated Epoxy, Polyester or Urethane.
  - 3. Staining: Match Facility Standard.
  - 4. Sheen: Semigloss.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
  - 1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
  - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Hardware: For installation, see Section 087100 "Door Hardware."
- B. Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
- C. Job-Fitted Doors:
  - 1. Align and fit doors in frames with uniform clearances and bevels as indicated below.

- a. Do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors.
  2. Machine doors for hardware.
  3. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
  4. Clearances:
    - a. Provide **1/8 inch (3.2 mm)** at heads, jambs, and between pairs of doors.
    - b. Provide **1/8 inch (3.2 mm)** from bottom of door to top of decorative floor finish or covering unless otherwise indicated on Drawings.
    - c. Where threshold is shown or scheduled, provide **1/4 inch (6.4 mm)** from bottom of door to top of threshold unless otherwise indicated.
    - d. Comply with NFPA 80 for fire-rated doors.
  5. Bevel non-fire-rated doors **1/8 inch in 2 inches (3-1/2 degrees)** at lock and hinge edges.
- D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

### 3.3 FIELD QUALITY CONTROL

- A. Inspection Agency: Engage a qualified inspector to perform inspections and to furnish reports to Architect.
- B. Inspections:
  1. Provide inspection of installed Work through AWI's Quality Certification Program, certifying that wood doors and frames, including installation, comply with requirements of AWI/AWMCA/WI's "Architectural Woodwork Standards" for the specified grade.
  2. Fire-Rated Door Inspections: Inspect each fire-rated door in accordance with NFPA 80, Section 5.2.
  3. Egress Door Inspections: Inspect each door equipped with panic hardware, each door equipped with fire exit hardware, each door located in an exit enclosure, each electrically controlled egress door, and each door equipped with special locking arrangements in accordance with NFPA 101, Section 7.2.1.15.
- C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.
- E. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 80 and NFPA 101.

### 3.4 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.

- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

## SECTION 08 3483

### ELEVATOR SMOKE CONTAINMENT SYSTEM

#### **PART 1 - GENERAL**

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.
2. SUMMARY
  - A. Section Includes: smoke containment screen and control system designed to provide a tight-fitting, smoke- and draft-control assembly.
  - B. Products Supplied But Not Installed Under This Section:
    1. End-of-line diode (3.9V, 2W). Installed at smoke detector to monitor the circuit.
3. REFERENCES
  - A. ASTM A240/240M – Standard Specification for Heat Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels.
  - B. ICC Evaluation Service ES AC77 – Acceptance Criteria for Smoke-Containment Systems Used With Fire-Resistive Doors and Frames.
  - C. ICC Evaluation Service report ESR-3322
  - D. NFPA Codes and Standards:
    1. 70 – National Electrical Code.
    2. 105 – Recommended Practice for the Installation of Smoke-Control Door Assemblies.
    3. 72– National Fire Alarm Code
  - E. International Building Code
    1. 2003
    2. 2006
    3. 2009
    4. 2012
  - F. UL Standards:
    1. 268 – Smoke Detectors for Fire Protective Signaling Systems.
    2. 864 – Control Units for Fire Protective Signaling Systems.
    3. 1784 – Air Leakage Tests for Door Assemblies.
    4. 10D – Fire protective Smoke Curtain.
4. SUBMITTALS

- A. Reference Section 01 3300–Submittal Procedures; submit following items:
    - 1. Product Data.
    - 2. Shop Drawings: Include door width and height, jamb width, jamb and head projection, screen width, mounting height, and housing width. Show and identify related work performed under other sections of the specifications.
    - 3. Quality Assurance/Control Submittals:
      - a. Qualifications:
        - 1) Proof of manufacturer qualifications.
        - 2) Proof of Installer qualifications.
      - b. Certifications: Copy of specified items.
      - c. Manufacturer’s installation instructions and testing procedures
5. CLOSEOUT SUBMITTALS
- A. Comply Section 01 7700–Closeout Submittals; submit following items:
    - 1. Operation and Maintenance Manual
    - 2. Manufacturer’s Warranty
6. QUALITY ASSURANCE
- A. Overall Standards:
    - 1. Manufacturer shall maintain a quality control program for follow up service in accordance with ICC-ES Acceptance Criteria 77.
  - B. Qualifications:
    - 1. Manufacturer Qualifications: Minimum seven years experience in producing smoke containment systems of the type specified.
    - 2. Installer Qualifications: Factory trained by manufacturer.
  - C. Certifications and Required Test Reports:
    - 1. Manufacturer’s ICC Evaluation Service report ESR-3322 Legend Report showing compliance with:
      - a. ICC-ES AC77, including:
        - 1) Approved opening force
        - 2) Cyclic force
        - 3) Expansion characteristics
      - b. UL Standard 1784
    - 2. ASTM E84 Test Report
    - 3. ASTM 136 Test Report
    - 4. NFPA 701 Test Report
    - 5. NFPA 105
    - 6. UL 10D Listed for (1) hour minimum fire rating
    - 7. UL 864 Listed
    - 8. IAS (IAS is a trademark of International Accreditation Service) Accredited Testing Laboratory Labels for UL Standard 1784
    - 9. IAS (IAS is a trademark of International Accreditation Service) Accredited Testing Laboratory Labels for UL Standard 864
    - 10. California Department of Forestry and Fire Protection and Office of the State Fire Marshal Listing.
    - 11. OSHPD Anchorage Pre-Approval No. OPA-2855-10
  - D. Pre-Installation Meeting:

1. Schedule and convene a pre-installation meeting prior to commencement of field operations with representatives of the following in attendance: Owner, Architect, General Contractor, smoke containment system sub-contractor, painting sub-contractor, and electrical sub-contractor.
2. Review substrate conditions, requirements of related work, installation instructions, storage and handling procedures, and protection measures.
3. Keep minutes of meeting including responsibilities of various parties and deviations from specifications and installation instructions.

7. DELIVERY, STORAGE, AND HANDLING

- A. Reference Section 01 6600–Product Storage and Handling Requirements.
- B. Follow manufacturer’s instructions.

8. WARRANTY

- A. Provide manufacturer’s standard one year warranty.
- B. Maintenance and Testing:
  1. Perform minimum semi-annual maintenance and testing on each smoke containment system as required by the manufacturer’s warranty, code agency evaluation reports, and as required by local authority having jurisdiction.
  2. Provide test documentation.

**2.PRODUCTS**

2.1. MANUFACTURER

- A. Basis of Design: Model -U.S. Smoke & Fire™ SD60GS
- B. Manufacturer:
  1. U.S. Smoke & Fire  
<http://www.ussmokeandfirecurtain.com>  
(888) 917-8777 Ext 102
- C. Label each smoke containment system with following information:
  1. Manufacturer’s name.
  2. Maximum leakage rating at specified pressure and temperature conditions.
  3. UL label , Listed Classified and Marked per UL 10D
  4. Intertek Label not acceptable

2.2. PERFORMANCE REQUIREMENTS

- A. Air Leakage: Not to exceed 3 cfm (0.001416 m<sup>3</sup>/s) per sf of door opening at 0.1 in (25 Pa) water pressure differential at ambient temperature and 400 degrees F (204 degrees C) tested per IBC 2006, 2009, and 2012.

2.3. COMPONENTS

- A. Screen:
  1. Film: Minimum 1 mil (0.025 mm) thick transparent polymer coating

encapsulating an opaque glass-fiber fabric in a Panama weave.

- B. Housing: 18 gage primed or powder coated (optional ferritic stainless steel) cold rolled galvanized steel container with dust cover and door with concealed fasteners. Housings are custom in length. No junction box required.
  - 1. Housing bottom may be exposed and flush with adjacent ceiling, or recessed above ceiling system and concealed.
- C. Auxiliary Rails:
  - 1. Material: Galvanized structural steel, any stainless steel per ASTM A 240/240M.
  - 2. Size: 3-7/8 inches (100 mm) wide; min. 1-7/8 inches (50 mm) deep, depth as required to project beyond face of door frame, as shown in Shop Drawings.
  - 3. When field applied painting is required, it shall match color of the frame unless otherwise specified. Field applied paint must be heat resistant to 300 degrees Fahrenheit and be spray applied, maximum 5 mils thick including primer.
- D. Rewind Motor: NFPA 70, 24v DC.
- E. Release Mechanism: Comply with UL Standard No. 864.
- F. Screen Rewind Switch: Include switch to rewind screen into housing.

### **3.EXECUTION**

#### **3.1. EXAMINATION**

- A. Examine substrates upon which work will be installed.
  - 1. Verify related work performed under other sections is complete and in accordance with Shop Drawings.
  - 2. Verify wall surfaces and door frames are acceptable for installation of smoke containment system components.
  - 3. Verify existing field painted door frames to be used for screen adherence have been repainted in accordance with smoke containment system manufacturer's instructions or they have the original factory paint.
- B. Coordinate with responsible entity to perform corrective work on unsatisfactory substrates.
- C. Commencement of work by installer is acceptance of substrate.

#### **3.2. INSTALLATION**

- A. Install smoke containment system components in accordance with manufacturer's installation instructions.

#### **3.3. FIELD QUALITY CONTROL**

- A. Field Test: Follow manufacturer's cycle test procedures.
  - 1. Notify Owner's Representative, local Fire Marshal, alarm sub-contractor and [sub-contractor] [service company] minimum one week in advance of scheduled testing.
  - 2. Complete maintenance service record.

3.4. DEMONSTRATION

- A. Demonstrate required testing and maintenance procedures to Owner's Representative.
- B. Maintenance and Testing:
  - 1. Perform minimum semi-annual maintenance and testing on each smoke containment system as required by the manufacturer's warranty, code agency evaluation reports, and as required by local authority having jurisdiction.
  - 2. Retain permanent record of tests.
- C. Future Painting: Paint door frame and/or auxiliary rails in accordance with Operation and Maintenance Manual.
- D. Qualified U.S. Smoke & Fire Inspector assesses unit(s) after exposure to a fire event.

END OF SECTION 08 3483



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## SECTION 08 71 11 – DOOR HARDWARE

### 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 finish hardware for the proper operation and control of all doors in the Project. Prior to bidding, notify Architect of any doors that do not have hardware meeting this intention.
- B. Hardware supplier will be responsible to furnish and install hardware on labeled doors to satisfy State and Local Building Codes.
- C. Related Sections include the following:
  - 1. Division 8 Section "Hollow Metal Doors and Frames."
  - 2. Division 8 Section "Flush Wood Doors."

#### 1.3 SUBMITTALS

- A. Product Data: For each product and material indicated, submit manufacturer's technical product data. Include information necessary to show compliance with requirements, installation instructions and maintenance instructions.
- B. Hardware Schedule: Submit a hardware schedule organized into sets, including the information below. Designations for door numbers and hardware sets shall match those used in the construction documents.
  - 1. Opening Number
  - 2. Door Type and Size
  - 3. Frame Type and Size
  - 4. Frame Anchoring Method
  - 5. Hardware Set
  - 6. Assembly Rating
- C. Hardware Schedule shall be coordinated with the doors, frames and related work to ensure proper size, thickness, hand function and finish of door hardware

#### 1.4 QUALITY ASSURANCE

- A. Supplier Qualifications: A recognized Architectural Finish Hardware Supplier, with warehousing facilities, who has been furnishing hardware in the Project's vicinity for a period of not less than two (2) years. Supplier shall be or employ an experienced Architectural Hardware Consultant (AHC) who is certified by and member of the Door and Hardware Institute. The Architectural hardware Consultant shall be available, at reasonable times during the course of the work, for consultation about Project's hardware requirements, to Owner, Architect and Contractor.

- B. Fire-Rated Openings: Provide hardware for fire-rated openings in compliance with NFPA Standard No. 80, No. 101 and local building code requirements. Provide only hardware, which has been tested and listed, by UL, FM or Warnock Hersey for types and sizes of doors required and complies with requirements of door and door frame labels.
  
- C. Standards: Comply with the requirements of the latest edition of the following standards unless indicated otherwise:
  - 1. American National Standards Institute Publications:
    - a. A115 Series – Door and Frame Preparation
    - b. A156 Series – Hardware
  - 2. Builders Hardware Manufacturer’s Association Publications:
    - a. 1201 – Auxiliary Hardware
    - b. 1301 – Materials and Finishes
  - 3. Door and Hardware Institute Publications:
    - a. Keying – Procedures, Systems and Nomenclature
    - b. Abbreviations and Symbols
    - c. Hardware for Labeled Fire Doors
    - d. Recommended Locations for Builder’s Hardware for Standard and Custom Steel Doors and Frames
    - e. Wood Door Standards W1, W2, WDHS-2, WDHS-3
  - 4. National Fire Protection Association Publications
    - a. NFPA 80 – Standards for Fire Doors and Windows
    - b. NFPA 101 – Life Safety Code
  - 5. International Building Code – 2015 Edition
  - 6. American with Disabilities Act.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Package each hardware item in separate containers with all screws, wrenches, installation instructions and installation templates. Mark each box with hardware heading and door number according to approved hardware schedule.
  
- B. Deliver individually packaged hardware items at the proper times to the proper locations (shop or project site) for installation: Provide a complete packing list showing items, door numbers and hardware headings with each shipment.
  
- C. Store hardware in shipping cartons above ground and under cover to prevent damage. Provide secure lockup for door hardware delivered to the Project, but not yet installed. Control handling and installation of hardware items that are not immediately replaceable -so that completion of the Work will not be delayed by hardware losses both before and after installation.

#### 1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with delivery and/or installation when ambient and substrate temperature conditions are outside limits permitted by material manufacturers.

### PART 2 - PRODUCTS

#### 2.1 HARDWARE GENERAL

- A. Provide the materials of products indicated by trade names, manufacturer's name, or catalog number. Substitutions will not be permitted except as described in Division 1.
- B. Provide manufacturer's standard products meeting the design intent of this Specification, free of imperfections affecting appearance or serviceability.
  - 1. Provide hardware complete with all fasteners, anchors, instructions, layout templates, and any specialized tools as required for satisfactory installation and adjustment.
  - 2. Hand of Door: Drawings show direction of slide, swing or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.
  - 3. Furnish screws for installation with each hardware item. Provide Phillips flat head screws except as otherwise indicated or approved. Finish screws exposed under any condition to match hardware finish, or, if exposed in surface of other work, to match finish of such other work as closely as possible. Use machine screws for metal connections and wood screws for connections to wood. Use manufacturer's screws to secure hardware.
  - 4. Provide concealed fasteners for hardware unit with care exposed when door is closed, except to extent no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt, head or nut on opposite face is exposed in other work, except where indicated otherwise or where it is not feasible to adequately reinforce the work. In such cases, provide sleeves for each thru-bolt or use sex screw fasteners.
  - 5. Special Tools: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance and removal and replacement of finish hardware.
- C. Hardware is specified in the hardware schedule by set, type and functions, which have been selected as best meeting the application requirements. Acceptable products for each category are specified in Paragraph 2.5 "Hardware Products".

## 2.2 SPECIAL REQUIREMENTS

- A. General:
  - 1. Where new doors and hardware are scheduled to be installed in existing frames, contractor to coordinate hinge sizes and locations, lockset backsets, strikes, hardware mounting heights, etc with existing frames to ensure new door and hardware fits and functions properly in existing frame.
- B. Hinges:
  - 1. Use heavy weight hinges for all doors.
- C. Locksets:
  - 1. All locksets to be grade 1 heavy duty cylindrical or as specified.
- D. Closers:
  - 1. Comply with manufacturer's recommendations for unit size based on door size and usage.
  - 2. Provide parallel arms for all overhead closers, except as otherwise indicated.
  - 3. All closers UL Listed Certified to be in compliance with UBC 7.2 and UL 10C.

4. Closers with Pressure Relief Valves will not be acceptable.
5. Supplier to provide any brackets or plates required for proper installation of door closers.

E. Exit Devices:

1. All latchbolts to be deadlatching type.
2. All touchbars to be stainless steel.

2.3 KEYING

- A. Contractor to turn all cylinders over to MU key shop for keying.

2.4 FINISHES

- A. Standard: Comply with BHMA A156.18
1. All door hardware to be US26D throughout project.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the application units of hardware.
- C. Protect finishes on exposed surfaces from any damage by applying a strippable temporary protective covering before shipping.
- D. BHMA Designations: Comply with base material and finish requirements indicated by BHMA standards.

2.5 HARDWARE PRODUCTS

ITEM	SPECIFIED	APPROVED EQUAL
Hinges	Ives	Stanley
Locksets	Schlage	Best, Corbin Russwin
Cylinders	Best	No Substitution
<del>Closers</del>	<del>LCN</del>	<del>No Substitution</del>
Panic Devices	Von Duprin	Sargent, Yale
Flatgoods	Ives	Burns, Rockwood
Stops	Ives	Burns, Rockwood
Overhead Stops	Glynn Johnson	Rixson
Gasket	Zero	NGP, Reese
Electric Strikes	Adams Rite	No Substitution
Prox Card Readers	HIDR	No Substitution
Auto Operators	Horton	No Substitution

**PART 3 - EXECUTION**

3.1 EXAMINATION

- A. Examine doors and frames with installer present for compliance with the requirements, for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Examine rough-in for electrical source power to verify actual locations of wiring

connections before electrified door hardware installation.

- C. Notify Architect of any discrepancies or conflicts between the door schedule, door types, frame types, drawings, scheduled hardware and built condition.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Steel Frames: Comply with ANSI/DHI A115 Series
- B. Wood Doors: Comply with ANSI/DHI A115-W Series.

### 3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights indicated in the following applicable publications, or as required to comply with governing regulations:
  - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
  - 2. Custom Steel Doors and Frames: DHI's "Recommended Locations for Builder's Hardware for Custom Steel Doors and Frames."
  - 3. Wood Doors: DHI WDHS.2 "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to complete with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage and reinstallation of surface protective trim units to with finishing work. Do not install surface mounted items until finishes have been completed on substrates involved.

### 3.4 FIELD QUALITY CONTROL

- A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in written report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

### 3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating items of door hardware and each door to ensure proper operation of function of every unit. Replace units that cannot be adjusted to operate as intended and/or required. Adjust door control devices to compensation for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

### 3.6 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper finish, and provide final protection and maintain condition that ensure door hardware is without damage or deterioration at time of owner occupancy.

### 3.7 DEMONSTRATION AND TRAINING

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate and maintain door hardware and door hardware finishes.

3.8 DOOR HARDWARE SETS

HARDWARE SET: 01

FOR USE ON DOOR #(S):

2W44

PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW X SIZE AS REQ'D	652	IVE
2	EA	POWER TRANSFER	EPT10	689	VON
1	EA	SFIC	OWNER PROVIDED	626	BES
1	EA	ELEC PANIC HARDWARE	RX-LC-QEL-9927-EO-LBR-CON 24 VDC	626	VON
1	EA	ELEC PANIC HARDWARE	RX-LC-QEL-9927-L-LBR-17-CON 24 VDC	626	VON
1	EA	SFIC RIM HOUSING	80-129	626	SCH
1	EA	AUTO OPERATOR	4100LE (PAIR)	689	HOR
1	EA	TOUCHLESS ACTUATOR	10MS08U-620	BLK	BEA
1	EA	SAFETY SENSOR	EAGLE	BLK	BEA
2	EA	ARMOR PLATE	8400 34" X 1" LDW B-CS	630	IVE
2	EA	WALL STOP	WS406/407CCV	626	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	ASTRAGAL (SET)	8193AA	AA	ZER
4	EA	WIRE HARNESS	CON X LENGTH REQ'D		SCH
2	EA	DOOR CONTACT	679-05 HM/WD AS REQ'D	BLK	SCE
1	EA	POWER SUPPLY	PS904 900-4RL-FA 120/240 VAC	LGR	SCE
1	EA	WIRING DIAGRAMS	BY SECURITY CONTRACTOR		
1	EA	CARD ACCESS	BY SECURITY CONTRACTOR		

OPERATION: DOORS NORMALLY CLOSED AND LOCKED. ENTRY BY CARD READER, RETRACTING DEVICE LATCHES AND INITIATING AUTO OPERATOR CYCLE. ALWAYS FREE EGRESS BY INSIDE PUSH PADS, OR BY WALL MOUNT TOUCHLESS ACTUATOR. TOUCHLESS ACTUATOR FIRST RETRACTS DEVICE LATCHES, THEN INITIATES AUTO OPERATOR CYCLE.

HARDWARE SET: 01A  
 FOR USE ON DOOR #(S):  
 2W33

PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW X SIZE AS REQ'D	652	IVE
2	EA	POWER TRANSFER	EPT10	689	VON
1	EA	SFIC	OWNER PROVIDED	626	BES
1	EA	ELEC PANIC HARDWARE	RX-LC-QEL-9927-EO-LBR-CON 24 VDC	626	VON
1	EA	ELEC PANIC HARDWARE	RX-LC-QEL-9927-L-LBR-17-CON 24 VDC	626	VON
1	EA	SFIC RIM HOUSING	80-129	626	SCH
1	EA	AUTO OPERATOR	4100LE (PAIR)	689	HOR
1	EA	TOUCHLESS ACTUATOR	10MS08U-620	BLK	BEA
1	EA	SAFETY SENSOR	EAGLE	BLK	BEA
2	EA	ARMOR PLATE	8400 34" X 1" LDW B-CS	630	IVE
2	EA	WALL STOP	WS406/407CCV	626	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	ASTRAGAL (SET)	8193AA	AA	ZER
2	EA	DOOR BOTTOM	365AA	AA	ZER
4	EA	WIRE HARNESS	CON X LENGTH REQ'D		SCH
2	EA	DOOR CONTACT	679-05 HM/WD AS REQ'D	BLK	SCE
1	EA	POWER SUPPLY	PS904 900-4RL-FA 120/240 VAC	LGR	SCE
1	EA	WIRING DIAGRAMS	BY SECURITY CONTRACTOR		
1	EA	CARD ACCESS	BY SECURITY CONTRACTOR		

OPERATION: DOORS NORMALLY CLOSED AND LOCKED. ENTRY BY CARD READER, RETRACTING DEVICE LATCHES AND INITIATING AUTO OPERATOR CYCLE. ALWAYS FREE EGRESS BY INSIDE PUSH PADS, OR BY WALL MOUNT TOUCHLESS ACTUATOR. TOUCHLESS ACTUATOR FIRST RETRACTS DEVICE LATCHES, THEN INITIATES AUTO OPERATOR CYCLE.

HARDWARE SET: 02  
 FOR USE ON DOOR #(S):  
 2W43

PROVIDE EACH DE DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW X SIZE AS REQ'D	652	IVE
2	EA	FIRE EXIT HARDWARE	9927-EO-F-LBR-499F	626	VON
2	EA	<del>SURFACE CLOSER</del>	<del>4040XP REG OR PA AS REQ</del>	<del>689</del>	<del>LCN</del>
2	EA	<del>FIRE/LIFE WALL MAG</del>	<del>SEM7850 AS REQ (12/24/120V- AC/DC TRI-VOLT)</del>	<del>689</del>	<del>LCN</del>
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	ASTRAGAL (SET)	8193AA	AA	ZER

HARDWARE SET: 03 - Not Used



HARDWARE SET: 04  
FOR USE ON DOOR #(S):

2S03

PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW X SIZE AS REQ'D	652	IVE
1	EA	SFIC	OWNER PROVIDED	626	BES
1	EA	FIRE EXIT HARDWARE	9927-EO-F-LBR-499F	626	VON
2	EA	FIRE EXIT HARDWARE	9927-L-F-LBR-17-499F	626	VON
1	EA	SFIC RIM HOUSING	80-129	626	SCH
2	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ	689	LCN
2	EA	ARMOR PLATE	8400 34" X 1" LDW B-CS	630	IVE
2	EA	WALL STOP	WS406/407CCV	626	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	ASTRAGAL (SET)	8193AA	AA	ZER

HARDWARE SET: 05  
FOR USE ON DOOR #(S):

2W45

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW X SIZE AS REQ'D	652	IVE
1	EA	SFIC	OWNER PROVIDED	626	BES
1	EA	FIRE EXIT HARDWARE	99-L-F-17	626	VON
1	EA	SFIC RIM HOUSING	80-129	626	SCH
1	EA	SURFACE CLOSER	4040XP CUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER

HARDWARE SET: 06 - Not Used

HARDWARE SET: 07  
 FOR USE ON DOOR #(S):

2W21

PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW X SIZE AS REQ'D	652	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	MANUAL FLUSH BOLT	FB358/FB458 AS REQ'D	626	IVE
1	EA	DUST PROOF STRIKE	DP1/DP2 AS REQ'D	626	IVE
1	EA	SFIC	OWNER PROVIDED	626	BES
1	EA	STOREROOM LOCK	ND80BD SPA	626	SCH
1	EA	ELECTRIC STRIKE	7400 SERIES	630	ADA
4	EA	<del>SURFACE CLOSER</del>	<del>4040XP REG OR PA AS REQ</del>	<del>689</del>	<del>LCN</del>
			(ACTIVE LEAF)		
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	WALL STOP	WS406/407CCV	626	IVE
1	EA	ASTRAGAL (SET)	8193AA	AA	ZER
2	EA	SILENCER	SR64	GRY	IVE
2	EA	DOOR CONTACT	679-05 HM/WD AS REQ'D	BLK	SCE
1	EA	MOTION SENSOR	SCANII 12/24 VDC	BLK	SCE
1	EA	POWER SUPPLY	BY SECURITY CONTRACTOR		
1	EA	WIRING DIAGRAMS	BY SECURITY CONTRACTOR		
1	EA	CARD ACCESS	BY SECURITY CONTRACTOR		

OPERATION: DOORS NORMALLY CLOSED AND LOCKED. ENTRY BY CARD READER, RELEASING ELECTRIC STRIKE. ALWAYS FREE EGRESS BY INSIDE LEVER.

HARDWARE SET: 08  
 FOR USE ON DOOR #(S):

2W01                      2W26                      2W27                      2W39                      2W40

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW X SIZE AS REQ'D	652	IVE
1	EA	SFIC	OWNER PROVIDED	626	BES
1	EA	STOREROOM LOCK	ND80BD SPA	626	SCH
1	EA	ELECTRIC STRIKE	7200 SERIES	630	ADA
4	EA	<del>SURFACE CLOSER</del>	<del>4040XP REG OR PA AS REQ</del>	<del>689</del>	<del>LCN</del>
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	626	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER
			(AT RATED DOORS)		
3	EA	SILENCER	SR64	GRY	IVE
			(AT NON-RATED DOORS)		
1	EA	DOOR CONTACT	679-05 HM/WD AS REQ'D	BLK	SCE
1	EA	MOTION SENSOR	SCANII 12/24 VDC	BLK	SCE
1	EA	POWER SUPPLY	BY SECURITY CONTRACTOR		
1	EA	WIRING DIAGRAMS	BY SECURITY CONTRACTOR		
1	EA	CARD ACCESS	BY SECURITY CONTRACTOR		

OPERATION: DOOR NORMALLY CLOSED AND LOCKED. ENTRY BY CARD READER, MOMENTARILY RELEASING ELECTRIC STRIKE. INSIDE LEVER ALWAYS FREE EGRESS.

HARDWARE SET: 09  
 FOR USE ON DOOR #(S):

2W22            2W23            2W24            2W25  
 PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW X SIZE AS REQ'D	652	IVE
1	EA	SFIC	OWNER PROVIDED	626	BES
1	EA	STOREROOM LOCK	ND80BD SPA	626	SCH
1	EA	ELECTRIC STRIKE	7200 SERIES	630	ADA
1	EA	OH STOP	90S	630	GLY
4	<del>EA</del>	<del>SURFACE CLOSER</del>	<del>4040XP REG OR PA AS REQ</del>	<del>689</del>	<del>LCN</del>
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER
			(AT RATED DOORS)		
3	EA	SILENCER	SR64	GRY	IVE
			(AT NON-RATED DOORS)		
1	EA	DOOR CONTACT	679-05 HM/WD AS REQ'D	BLK	SCE
1	EA	MOTION SENSOR	SCANII 12/24 VDC	BLK	SCE
1	EA	POWER SUPPLY	BY SECURITY CONTRACTOR		
1	EA	WIRING DIAGRAMS	BY SECURITY CONTRACTOR		
1	EA	CARD ACCESS	BY SECURITY CONTRACTOR		

OPERATION: DOOR NORMALLY CLOSED AND LOCKED. ENTRY BY CARD READER, MOMENTARILY RELEASING ELECTRIC STRIKE. INSIDE LEVER ALWAYS FREE EGRESS.

HARDWARE SET: 10  
 FOR USE ON DOOR #(S):

2W07  
 PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW X SIZE AS REQ'D	652	IVE
1	EA	SFIC	OWNER PROVIDED	626	BES
1	EA	STOREROOM LOCK	ND80BD SPA	626	SCH
1	EA	ELECTRIC STRIKE	7200 SERIES	630	ADA
4	<del>EA</del>	<del>SURFACE CLOSER</del>	<del>4040XP CUSH</del>	<del>689</del>	<del>LCN</del>
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER
			(AT RATED DOORS)		
3	EA	SILENCER	SR64	GRY	IVE
			(AT NON-RATED DOORS)		
1	EA	DOOR CONTACT	679-05 HM/WD AS REQ'D	BLK	SCE
1	EA	MOTION SENSOR	SCANII 12/24 VDC	BLK	SCE
1	EA	POWER SUPPLY	BY SECURITY CONTRACTOR		
1	EA	WIRING DIAGRAMS	BY SECURITY CONTRACTOR		
1	EA	CARD ACCESS	BY SECURITY CONTRACTOR		

OPERATION: DOOR NORMALLY CLOSED AND LOCKED. ENTRY BY CARD READER, MOMENTARILY RELEASING ELECTRIC STRIKE. INSIDE LEVER ALWAYS FREE EGRESS.

**\*\*NOTE: CARD READER AND ELECTRIC STRIKE FOR THIS DOOR ARE TO BE RE-USED FROM SALVAGED DOOR\*\***

HARDWARE SET: 10A  
 FOR USE ON DOOR #(S):

2W06

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW X SIZE AS REQ'D	652	IVE
1	EA	SFIC	OWNER PROVIDED	626	BES
1	EA	STOREROOM LOCK	ND80BD SPA	626	SCH
1	EA	ELECTRIC STRIKE	SALVAGED FROM EXISTING DOOR		
4	<del>EA</del>	<del>SURFACE CLOSER</del>	<del>4040XP CUSH</del>	<del>689</del>	<del>LCN</del>
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	488SBK PSA (AT RATED DOORS)	BK	ZER
3	EA	SILENCER	SR64 (AT NON-RATED DOORS)	GRY	IVE
1	EA	DOOR CONTACT	679-05 HM/WD AS REQ'D	BLK	SCE
1	EA	MOTION SENSOR	SCANII 12/24 VDC	BLK	SCE
1	EA	POWER SUPPLY	BY SECURITY CONTRACTOR		
1	EA	WIRING DIAGRAMS	BY SECURITY CONTRACTOR		
1	EA	CARD ACCESS	BY SECURITY CONTRACTOR		

OPERATION: DOOR NORMALLY CLOSED AND LOCKED. ENTRY BY CARD READER, MOMENTARILY RELEASING ELECTRIC STRIKE. INSIDE LEVER ALWAYS FREE EGRESS.

**\*\*NOTE: CARD READER AND ELECTRIC STRIKE FOR THIS DOOR ARE TO BE RE-USED FROM SALVAGED DOOR\*\***

HARDWARE SET: 11  
 FOR USE ON DOOR #(S):

2W01A            2W31

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW X SIZE AS REQ'D	652	IVE
1	EA	SFIC	OWNER PROVIDED	626	BES
1	EA	STOREROOM LOCK	ND80BD SPA	626	SCH
4	EA	<del>SURFACE CLOSER</del>	<del>4040XP REG OR PA AS REQ</del>	<del>689</del>	<del>LCN</del>
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	626	IVE
1	EA	GASKETING	488SBK PSA (AT RATED DOORS)	BK	ZER
3	EA	SILENCER	SR64 (AT NON-RATED DOORS)	GRY	IVE

HARDWARE SET: 12  
 FOR USE ON DOOR #(S):  
 2W28

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW X SIZE AS REQ'D	652	IVE
1	EA	SFIC	OWNER PROVIDED	626	BES
1	EA	STOREROOM LOCK	ND80BD SPA	626	SCH
4	EA	<del>SURFACE CLOSER</del>	<del>4040XP CUSH</del>	<del>689</del>	<del>LCN</del>
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	488SBK PSA (AT RATED DOORS)	BK	ZER
3	EA	SILENCER	SR64 (AT NON-RATED DOORS)	GRY	IVE

HARDWARE SET: 13  
 FOR USE ON DOOR #(S):  
 2W04A 2W37

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW X SIZE AS REQ'D	652	IVE
1	EA	SFIC	OWNER PROVIDED	626	BES
1	EA	STOREROOM LOCK	ND80BD SPA	626	SCH
1	EA	OH STOP	90S	630	GLY
4	EA	<del>SURFACE CLOSER</del>	<del>4040XP REG OR PA AS REQ</del>	<del>689</del>	<del>LCN</del>
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	488SBK PSA (AT RATED DOORS)	BK	ZER
3	EA	SILENCER	SR64 (AT NON-RATED DOORS)	GRY	IVE

HARDWARE SET: 14  
 FOR USE ON DOOR #(S):  
 2W32

PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW X SIZE AS REQ'D	652	IVE
2	EA	MANUAL FLUSH BOLT	FB358/FB458 AS REQ'D	626	IVE
1	EA	DUST PROOF STRIKE	DP1/DP2 AS REQ'D	626	IVE
1	EA	SFIC	OWNER PROVIDED	626	BES
1	EA	STOREROOM LOCK	ND80BD SPA	626	SCH
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	WALL STOP	WS406/407CCV	626	IVE
1	EA	ASTRAGAL (SET)	8193AA	AA	ZER
2	EA	SILENCER	SR64 (AT NON-RATED DOORS)	GRY	IVE

HARDWARE SET: 15 - Not Used

HARDWARE SET: 16 - Not Used

HARDWARE SET: 16A - Not Used

HARDWARE SET: 17 - Not Used

HARDWARE SET: 18 - Not Used

HARDWARE SET: 19

FOR USE ON DOOR #(S):

2W05A            2W05B

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW X SIZE AS REQ'D	652	IVE
1	EA	PUSH PLATE	8200 4" X 16"	630	IVE
1	EA	PULL PLATE	8303 10" 4" X 16"	630	IVE
4	<del>EA</del>	<del>SURFACE CLOSER</del>	<del>4040XP REG OR PA AS REQ</del>	<del>689</del>	<del>LCN</del>
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

**END OF SECTION 08 71 11**

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## SECTION 088000 - GLAZING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Clear fully tempered float Glass products.
  - 2. Glazing sealants.
  - 3. Glazing tapes.
  - 4. Miscellaneous glazing materials.

#### 1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters in accordance with ASTM C1036.
- C. IBC: International Building Code.
- D. Interspace: Space between lites of an insulating-glass unit.

#### 1.4 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances to achieve proper safety margins for glazing retention under each design load case, load case combination, and service condition.

#### 1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  - 2. Review temporary protection requirements for glazing during and after installation.



#### 1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Glass Samples: For each type of glass product other than clear monolithic vision glass; **12 inches (300 mm)** square.
- C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

#### 1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer
- B. Product Certificates: For glass.

#### 1.8 QUALITY ASSURANCE

- A. Fabricated-Glass Manufacturer Qualifications: A qualified manufacturer of fabricated glass units who is approved and certified by primary glass manufacturer.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials in accordance with manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

#### 1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Source Limitations for Glass: Obtain glass from single source from single manufacturer.
- B. Source Limitations for Glazing Accessories: For each product and installation method, obtain from single source from single manufacturer.

## 2.2 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated.

## 2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations unless more stringent requirements are indicated.
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Thickness: Where glass thickness is indicated, it is a minimum.
- D. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass. Where fully tempered float glass is indicated, provide fully tempered float glass.

## 2.4 GLASS PRODUCTS

- A. Clear Annealed Float Glass: ASTM C1036, Type I, Class 1 (clear), Quality-Q3.
- B. Fully Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
- C. Heat-Strengthened Float Glass: ASTM C1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

## 2.5 GLAZING SEALANTS

- A. General:
  - 1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates,

under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.

- B. Neutral-Curing Silicone Glazing Sealant, Class 100/50: Complying with ASTM C920, Type S, Grade NS, Use NT.
- C. Neutral-Curing Silicone Glazing Sealant, Class 25: Complying with ASTM C920, Type S, Grade NS, Use NT.

## 2.6 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, recommended in writing by 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:
  - 1. Type recommended in writing by sealant or glass manufacturer.
- D. Spacers:
  - 1. Type recommended in writing by sealant or glass manufacturer.
- E. Edge Blocks:
  - 1. Type recommended in writing by sealant or glass manufacturer.

## 2.7 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
  - 1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
- C. Grind smooth and polish exposed glass edges and corners.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
  - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
  - 2. Presence and functioning of weep systems.
  - 3. Minimum required face and edge clearances.
  - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

### 3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than **50 inches (1270 mm)**.
  - 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-~~ (3-mm-) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and in accordance with requirements in referenced glazing publications.
- H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended in writing by gasket manufacturer.

### 3.4 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openingsexactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints withsealant recommended in writing by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

### 3.5 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.

### 3.6 CLEANING AND PROTECTION

- A. Immediately after installation, remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
  - 1. If, despite such protection, contaminating substances do contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. Remove and replace glass that is damaged during construction period.
- D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 088000

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## SECTION 088813 - FIRE-RATED GLAZING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Fire-protection-rated glazing.
  - 2. Fire-resistance-rated glazing.

#### 1.3 DEFINITIONS

- A. Fire-Protection-Rated Glazing: Glazing in rated doors and openings up to 45 minutes, limited in size, and not capable of blocking radiant heat.
- B. Fire-Resistance-Rated Glazing: Glazing that prevents spread of fire and smoke and radiant heat; used in rated wall and door applications 60 minutes and above without size limitations.
- C. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- D. Glass Thicknesses: Indicated by thickness designations in millimeters in accordance with ASTM C1036.

#### 1.4 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Glass Samples: For each type of glass product; 12 inches (300 mm) square.
- C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.



1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For **Installer and glass testing agency**.
- B. Product Certificates: For each type of glass and glazing product.
- C. Sample Warranties: For special warranties.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the NGA's Certified Glass Installer Program.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials in accordance with manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install fire-resistant glazing until spaces are enclosed and weathertight and temporary HVAC system is operating and maintaining ambient temperature conditions at occupancy levels during remainder of construction period.

1.10 WARRANTY

- A. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: **10** years from date of Substantial Completion.

- B. Manufacturer's Special Warranty for Tempered Glazing Units with Clear Intumescent Interlayer: Manufacturer agrees to replace units that deteriorate within specified warranty period. Deterioration of tempered glazing units with clear intumescent interlayer is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning glass contrary to manufacturer's written instructions. Evidence of failure is air bubbles within units, or obstruction of vision by contamination or deterioration of intumescent interlayer.

1. Warranty Period: **10** years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Source Limitations for Glass: For each glass type, obtain from single source from single manufacturer.
- B. Source Limitations for Glazing Accessories: For each product and installation method, obtain from single source from single manufacturer.

### 2.2 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and impact loads (where applicable) without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or installation; deterioration of glazing materials; or other defects in construction.

### 2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organization below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
  - 1. NGA Publications: "Glazing Manual."
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, glass thickness, and safety glazing standard with which glass complies.

### 2.4 GLASS PRODUCTS

- A. Float Glass: ASTM C1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.
- B. Ultraclear Float Glass: ASTM C1036, Type I, Quality-Q3, Class I (clear), with visible light transmission not less than 91 percent.
- C. Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class I (clear) unless otherwise indicated, Quality-Q3.
  - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
- D. Laminated Glass: ASTM C1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
  - 1. Construction: Laminate glass with polyvinyl butyral interlayer unless fire-protection or fire-resistance rating is based on another product.

2. Interlayer Thickness: Provide thickness as needed to comply with requirements.
3. Interlayer Color: Clear unless otherwise indicated.

## 2.5 FIRE-PROTECTION-RATED GLAZING

- A. Fire-Protection-Rated Glazing: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on positive-pressure testing in accordance with NFPA 257 or UL 9, including hose-stream test, and shall comply with NFPA 80.
  1. Fire-protection-rated glazing required to have a fire-protection rating of 20 minutes shall be exempt from hose-stream test.
- B. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name; test standard; whether glazing is permitted to be used in doors or openings; if permitted in openings, whether glazing has passed hose-stream test; whether glazing meets **450 deg F (250 deg C)** temperature-rise limitation; and fire-resistance rating in minutes.
- C. Fire-Protection-Rated Tempered Glass: 6-mm thickness; fire-protection-rated tempered glass; complying with 16 CFR 1201, Category II.
  1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. [SAFTI FIRST Fire Rated Glazing Solutions.](#)
    - b. [Technical Glass Products.](#)
    - c. [Vetrotech Saint-Gobain.](#)
- D. Fire-Protection-Rated Monolithic Glass for Doors and Protected Openings: 19-mm thickness; ultraclear fire-protection-rated glass; complying with 16 CFR 1201, Category II. UL listed and tested in accordance with NFPA 252 for fire-rated doors and NFPA 257 for protected openings with hose-stream testing.
  1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. [SAFTI FIRST Fire Rated Glazing Solutions.](#)
    - b. [Schott North America, Inc.](#)
- E. Fire-Protection-Rated Monolithic Glass for Doors Only: 19-mm thickness; clear, fire-protection glass; complying with 16 CFR 1201, Category II. UL listed and tested in accordance with NFPA 252 for fire-rated doors with hose-stream testing.
  1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

- a. [SAFTI FIRST Fire Rated Glazing Solutions.](#)
- F. Fire-Protection-Rated Laminated Glass with Intumescent Interlayer: Laminated glass made from multiple plies of uncoated, clear float glass; with intumescent interlayers; complying with 16 CFR 1201, Category II.
1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. [Pilkington North America.](#)
    - b. [Technical Glass Products.](#)
    - c. [Vetrotech Saint-Gobain.](#)
- G. Fire-Protection-Rated Tempered Glazing Units with Clear Intumescent Interlayer: Double glazing units made from two or more lites of uncoated, fully tempered, clear float glass; with a perimeter edge seal enclosing a cavity filled with optically clear, semi-solid, intumescent polymer; complying with 16 CFR 1201, Category II.
1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. [SAFTI FIRST Fire Rated Glazing Solutions.](#)

## 2.6 FIRE-RESISTANCE-RATED GLAZING

- A. Fire-Resistance-Rated Glazing: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-resistance ratings indicated, based on testing in accordance with ASTM E119 or UL 263.
- B. Fire-Resistance-Rated Glazing Labeling: Permanently mark fire-resistance-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, that glazing is approved for use in walls, and fire-resistance rating in minutes.
- C. Fire-Resistance-Rated Framing and Doors: Fire-resistance-rated glazing with 60-, 90-, and 120-minute ratings requires framing and doors from glass supplier, tested as an assembly complying with ASTM E119 or UL 263.
- D. Fire-Resistance-Rated Tempered Glazing Units with Clear Intumescent Interlayer: Glazing units made from two or more lites of uncoated, fully tempered, clear float glass; with a perimeter edge seal enclosing a cavity filled with optically clear, intumescent polymer; complying with 16 CFR 1201, Category II.
  1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. [SAFTI FIRST Fire Rated Glazing Solutions.](#)

## 2.7 GLAZING ACCESSORIES

- A. Provide glazing gaskets, glazing sealants, glazing tapes, setting blocks, spacers, edge blocks, and other glazing accessories that are compatible with glazing products and each other and are approved by testing agencies that listed and labeled fire-resistant glazing products with which products are used for applications and fire-protection ratings indicated.
- B. Glazing Sealants for Fire-Rated Glazing Products: Neutral-curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 50, Use NT. Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated.
  - 1. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range of industry colors.
- C. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:
  - 1. AAMA 804.3 tape, where indicated.
  - 2. AGAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
  - 3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- D. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
  - 1. AAMA 810.1, Type 1, for glazing applications in which tape acts as primary sealant.
  - 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

## 2.8 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, recommended in writing by manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
- C. Perimeter Insulation for Fire-Resistance-Rated Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

## 2.9 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with manufacturing and installation tolerances, including those for size, squareness, and offsets at corners, and for compliance with minimum required face and edge clearances.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate fire side and protected side. Label or mark units as needed so that fire side and protected side are readily identifiable. Do not use materials that leave visible marks in the completed Work.

### 3.3 GLAZING, GENERAL

- A. Use methods approved by testing agencies that listed and labeled fire-resistant glazing products.
- B. 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.
- 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 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 (1270 mm)**.
  - 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- (3-mm-)** 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 in accordance with requirements in referenced glazing publications.
- I. Set glass lites with proper orientation so that coatings face fire side or protected side as specified.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended in writing by gasket manufacturer.

#### 3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first 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 right before each glazing unit is installed.
- 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. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop, so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- 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. 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 washaway from glass.

### 3.7 CLEANING AND PROTECTION

- A. Immediately after installation, remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
  - 1. If, despite such protection, contaminating substances do contact with glass, remove substances immediately as recommended in writing by glass manufacturer.
- C. Remove and replace glass that is damaged during construction period.
- D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 088813



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## SECTION 092216 - NON-STRUCTURAL METAL FRAMING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

- 1. Non-load-bearing steel framing systems for interior partitions.
- 2. Suspension systems for interior ceilings and soffits.
- 3. Grid suspension systems for gypsum board ceilings.

- B. Related Requirements:

- 1. Section 054000 "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; and roof rafters and ceiling joists.

#### 1.3 ACTION SUBMITTALS

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

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of code-compliance certification for studs and tracks.
- B. Evaluation Reports: For embossed, high-strength steel studs and tracks, firestop tracks post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

#### 1.5 QUALITY ASSURANCE

- A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.
- C. Horizontal Deflection: For non-composite wall assemblies, limited to 1/240 of the wall height based on horizontal loading of 5 lbf/sq. ft. (239 Pa).

### 2.2 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C754 for conditions indicated.
  - 1. Steel Sheet Components: Comply with ASTM C645 requirements for steel unless otherwise indicated.
  - 2. Protective Coating: ASTM A653/A653M, G40 (Z120), hot-dip galvanized unless otherwise indicated.
- B. Studs and Tracks: ASTM C645. Use either conventional steel studs and tracks or embossed, high-strength steel studs and tracks. Refer to Construction drawings for designations.
  - 1. Steel Studs and Tracks:
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:
      - 1) CEMCO; California Expanded Metal Products Co.
      - 2) ClarkDietrich.
      - 3) SCAFCO Steel Stud Company.
    - b. Minimum Base-Steel Thickness: 20 gauge
    - c. Depth: As indicated on Drawings
  - 2. Embossed, High Strength Steel Studs and Tracks: Roll-formed and embossed with surface deformations to stiffen the framing members so that they are structurally comparable to conventional ASTM C645 steel studs and tracks.
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
      - 1) CEMCO; California Expanded Metal Products Co.
      - 2) ClarkDietrich.
      - 3) SCAFCO Steel Stud Company.

- b. Minimum Base-Steel Thickness: 20 gauge
  - c. Depth: As indicated on Drawings
- C. Slip-Type Head Joints: Where indicated, provide one of the following:
- 1. Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing **1-1/2-inch (38-mm)** minimum vertical movement.
    - a. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following, or approved equal:
      - 1) [CEMCO; California Expanded Metal Products Co.](#)
      - 2) [ClarkDietrich.](#)
      - 3) [SCAFCO Steel Stud Company.](#)
      - 4) [Super Stud Building Products Inc.](#)
- D. Firestop Tracks: Top track manufactured to allow partition heads to expand and contract with movement of 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. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following, or approved equal:
    - a. [CEMCO; California Expanded Metal Products Co.](#)
    - b. [ClarkDietrich.](#)
    - c. [SCAFCO Steel Stud Company.](#)
- E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
- 1. Minimum Base-Steel Thickness: As indicated on Drawings.
- F. Cold-Rolled Channel Bridging: Steel, **0.0538-inch (1.367-mm)** minimum base-steel thickness, with minimum **1/2-inch- (13-mm-)** wide flanges.
- 1. Depth: As indicated on Drawings
  - 2. Clip Angle: Not less than **1-1/2 by 1-1/2 inches (38 by 38 mm)**, **0.068-inch- (1.72-mm-)** thick, galvanized steel.
- G. Hat-Shaped, Rigid Furring Channels: ASTM C645.
- 1. Minimum Base-Steel Thickness: As indicated on Drawings
  - 2. Depth: As indicated on Drawings.
- H. Resilient Furring Channels: **1/2-inch- (13-mm-)** deep, steel sheet members designed to reduce sound transmission.
- 1. Configuration: Asymmetrical or hat shaped.
- I. Cold-Rolled Furring Channels: **0.053-inch (1.34-mm)** uncoated-steel thickness, with minimum **1/2-inch- (13-mm-)** wide flanges.
- 1. Depth: As indicated on Drawings

2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of **0.0329 inch (0.8 mm)**.
3. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, **0.062-inch- (1.59-mm-)** diameter wire, or double strand of **0.048-inch- (1.21-mm-)** diameter wire.

### 2.3 SUSPENSION SYSTEMS

- A. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, **0.062-inch- (1.59-mm-)** diameter wire, or double strand of **0.048-inch- (1.21-mm-)** diameter wire.
- B. Hanger Attachments to Concrete:
  1. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, AC193 or AC308 as appropriate for the substrate.
    - a. Uses: Securing hangers to structure.
    - b. Type: Torque-controlled, expansion anchor.
    - c. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or **ASTM F1941 (ASTM F1941M)**, Class Fe/Zn 5, unless otherwise indicated.
  2. Power-Actuated Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- C. Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, **0.16 inch (4.12 mm)** in diameter.
- D. Flat Hangers: Steel sheet, in size indicated on Drawings.
- E. Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-steel thickness of **0.0538 inch (1.367 mm)** and minimum **1/2-inch- (13-mm-)** wide flanges.
  1. Depth: As indicated on Drawings.
- F. Furring Channels (Furring Members):
  1. Cold-Rolled Channels: **0.0538-inch (1.367-mm)** uncoated-steel thickness, with minimum **1/2-inch- (13-mm-)** wide flanges, **3/4 inch (19 mm)** deep.
  2. Steel Studs and Tracks: ASTM C645.
    - a. Minimum Base-Steel Thickness: As indicated on Drawings
    - b. Depth: As indicated on Drawings.
  3. Embossed, High-Strength Steel Studs and Tracks: ASTM C645.
    - a. Minimum Base-Steel Thickness: As indicated on Drawings.
    - b. Depth: As indicated on Drawings.

## 2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
  - 1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide one of the following:
  - 1. Asphalt-Saturated Organic Felt: ASTM D226/D226M, Type I (No. 15 asphalt felt), nonperforated.
  - 2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, **1/8 inch (3.2 mm)** thick, in width to suit steel stud size.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
  - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.
- B. Coordination with Sprayed Fire-Resistive Materials:
  - 1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling tracks to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than **24 inches (610 mm)** o.c.
  - 2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that are required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

### 3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C754.
  - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.
- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

### 3.4 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
  - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
  - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.
    - a. Install two studs at each jamb unless otherwise indicated.
    - b. Install cripple studs at head adjacent to each jamb stud, with a minimum **1/2-inch (13-mm)** clearance from jamb stud to allow for installation of control joint in finished assembly.
    - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure. Refer to Construction drawings for locations.
  - 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
  - 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

- a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
  5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
- E. Direct Furring:
1. Screw to wood framing.
  2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced **24 inches (610 mm)** o.c.
- F. Z-Shaped Furring Members:
1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in place with Z-shaped furring members spaced **24 inches (610 mm)** o.c.
  2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced **24 inches (610 mm)** o.c.
  3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than **12 inches (305 mm)** from corner and cut insulation to fit.
- G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than **1/8 inch (3 mm)** from the plane formed by faces of adjacent framing.

### 3.5 INSTALLING CEILING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
1. Hangers: **48 inches (1219 mm)** o.c.
  2. Carrying Channels (Main Runners): **48 inches (1219 mm)** o.c.
  3. Furring Channels (Furring Members): **16 inches (406 mm)** o.c.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
    - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.



- a. Size supplemental suspension members and hangers to support ceiling loads.
  3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
  4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
  5. Do not attach hangers to steel roof deck.
  6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
  7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
  8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.
- F. 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.
- G. Installation Tolerances: Install suspension systems that are level to within **1/8 inch in 12 feet (3 mm in 3.6 m)** measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

## SECTION 092900 - GYPSUM BOARD

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

- 1. Interior gypsum board.
- 2. Tile backing panels.

- B. Related Requirements:

- 1. Section 079219 "Acoustical Joint Sealants" for acoustical joint sealants installed in gypsum board assemblies.
- 2. Section 092216 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For the following:

- 1. Gypsum board, Type X.
- 2. Fire Rated Wood Framing
- 3. Impact-resistant gypsum board.
- 4. Cementitious backer units.
- 5. Interior trim.
- 6. Aluminum trim.
- 7. Joint treatment materials.
- 8. Sound-attenuation blankets.
- 9. Acoustical sealant.

- B. Samples for Verification: For the following products:

- 1. Trim Accessories: Full-size Sample in **12-inch- (300-mm-)** long length for each trim accessory indicated.

#### 1.4 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

## 1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, 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.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 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 E90 and classified according to ASTM E413 by an independent testing agency.

### 2.2 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

### 2.3 INTERIOR GYPSUM BOARD

- A. Gypsum Board, Type X: ASTM C1396/C1396M.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. American Gypsum.
    - b. National Gypsum Company.
    - c. USG Corporation.
  - 2. Thickness: **5/8 inch (15.9 mm)**.
  - 3. Long Edges: Tapered and featured (rounded or beveled) for prefilling.
- B. Impact-Resistant Gypsum Board: ASTM C1396/C1396M gypsum board, tested according to ASTM C1629/C1629M.

1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
  - a. [American Gypsum.](#)
  - b. [National Gypsum Company.](#)
  - c. [USG Corporation.](#)
2. Core: **5/8 inch (15.9 mm), Type X.**
3. Surface Abrasion: ASTM C1629/C1629M, meets or exceeds **Level 2** requirements.
4. Indentation: ASTM C1629/C1629M, meets or exceeds **Level 2** requirements.
5. Long Edges: Tapered.
6. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

#### 2.4 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9 and ASTM C1288 or ASTM C1325, with manufacturer's standard edges.
  1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
    - a. [CertainTeed LLC; Saint-Gobain North America.](#)
    - b. [National Gypsum Company.](#)
    - c. [USG Corporation.](#)
  2. Thickness: **5/8 inch (15.9 mm).**
  3. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

#### 2.5 TRIM ACCESSORIES

- A. Interior Trim: ASTM C1047.
  1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.
  2. Shapes:
    - a. Cornerbead.
    - b. Bullnose bead.
    - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
    - d. L-Bead: L-shaped; exposed long flange receives joint compound.
    - e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
    - f. Expansion (control) joint.
    - g. Curved-Edge Cornerbead: With notched or flexible flanges.

#### 2.6 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C475/C475M.

- B. Joint Tape:
  - 1. Interior Gypsum Board: Paper.
  - 2. Exterior Gypsum Soffit Board: Paper.
  - 3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
  - 4. Tile Backing Panels: As recommended by panel manufacturer.
  
- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
  - 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
  - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
    - a. Use setting-type compound for installing paper-faced metal trim accessories.
  - 3. Fill Coat: For second coat, use drying-type, all-purpose compound.
  - 4. Finish Coat: For third coat, use drying-type, all-purpose compound.
  
- D. Joint Compound for Tile Backing Panels:
  - 1. Cementitious Backer Units: As recommended by backer unit manufacturer.

## 2.7 AUXILIARY MATERIALS

- A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
  
- B. Steel Drill Screws: ASTM C1002 unless otherwise indicated.
  - 1. Use screws complying with ASTM C954 for fastening panels to steel members from **0.033 to 0.112 inch** (0.84 to 2.84 mm) thick.
  - 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
  
- C. Sound-Attenuation Blankets: ASTM C665, 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.
  
- D. Acoustical Sealant: As specified in Section 079219 "Acoustical Joint Sealants."

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION AND FINISHING OF PANELS, GENERAL

- A. Comply with ASTM C840.
- 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 (1.5 mm)** 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 smokeratings, coverage may be accomplished with scraps of not less than **8 sq. ft. (0.7 sq. m)** 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- (6.4- to 9.5-mm-)** wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide **1/4- to 1/2-inch- (6.4- to 12.7-mm-)** wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- 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. Wood Framing: **Only allowed at framing of ICU/CCU sliding door entrances**, Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.
- J. 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 C919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

- K. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

### 3.3 INSTALLATION OF INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
  - 1. Type X: Vertical surfaces unless otherwise indicated.
  - 2. Impact-Resistant Type: **At all headwall of both enclosed and open bays.**
- B. Single-Layer Application:
  - 1. 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.
  - 2. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- C. Multilayer Application:
  - 1. 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.
  - 2. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

### 3.4 INSTALLATION OF TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A108.11, at locations indicated to receive tile.

### 3.5 INSTALLATION OF TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints at locations indicated on Drawings.
- C. Interior Trim: Install in the following locations:
  - 1. Cornerbead: Use at outside corners unless otherwise indicated.
  - 2. Bullnose Bead: Use where indicated.
  - 3. LC-Bead: Use at exposed panel edges.

4. L-Bead: Use where indicated.
5. U-Bead: Use where indicated.

D. Aluminum Trim: Install in locations indicated on Drawings.

### 3.6 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:
  1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
  2. Level 2: Panels that are substrate for tile.
  3. Level 3: Where indicated on Drawings.
  4. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
    - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."
- E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

### 3.7 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
  1. Indications that panels are wet, or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900



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## SECTION 093013 - CERAMIC TILING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Porcelain tile.
  - 2. Crack isolation membrane.
  - 3. Metal edge strips.
- B. Related Requirements:
  - 1. Section 079200 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
  - 2. Section 092900 "Gypsum Board" 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. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile."
- C. Face Size: Actual tile size, excluding spacer lugs.
- D. Module Size: Actual tile size plus joint width indicated.

#### 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

#### 1.5 ACTION SUBMITTALS

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

B. Samples for Verification:

1. Full-size units of each type and composition of tile and for each color and finish required
2. Full-size units of each type of trim and accessory
3. Metal edge strips in 6-inch (150-mm) lengths.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For each type of product.
- C. Product Test Reports: For tile-setting and -grouting products and certified porcelain tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  1. Tile and Trim Units: Furnish quantity of full-size units equal to 10 percent of amount installed for each type, composition, color, pattern, and size indicated.
  2. Grout: Furnish quantity of grout equal to 10 percent of amount installed for each type, composition, and color indicated.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications:
  1. Installer employs only installers recognized by the U.S. Department of Labor as Journeyman Tile Layers for Project.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained, and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.

## 1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Source Limitations for Tile: Obtain tile of each type and color or finish from single source or producer.
  - 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
  - 2. Product selections per Finish Schedule and Legend.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.
  - 1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.
  - 2. Obtain waterproof membrane and crack isolation membrane, except for sheet products, from manufacturer of setting and grouting materials.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer:
  - 1. Waterproof membrane.
  - 2. Crack isolation membrane.
  - 3. Cementitious backer units.
  - 4. Metal edge strips.

### 2.2 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
  - 1. Provide tile complying with Standard grade requirements unless otherwise indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.
  - 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.

## 2.3 TILE PRODUCTS

- A. Ceramic Tile Type porcelain tile.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. American Olean; a division of Dal-Tile Corporation.
    - b. Crossville, Inc.
  - 2. Certification: Tile certified by the Porcelain Tile Certification Agency.
  - 3. Face Size and Thickness: Per Finish Schedule and Legend
  - 4. Face Size Variation: Rectified.
  - 5. Tile Color, Glaze, and Pattern: Per Finish Schedule and Legend
  - 6. Grout Color: Per Finish Schedule and Legend.
  - 7. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

## 2.4 WATERPROOF MEMBRANE

- A. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. PVC Sheet: PVC heat-fused on both sides to facings of nonwoven polyester.
  - 1. Nominal Thickness: **0.025 inch (0.6 mm)**.
  - 2. Nominal Thickness: **0.040 inch (1 mm)**.
- C. Polyethylene Sheet: Polyethylene faced on both sides with fleece webbing; **0.008-inch (0.2- mm)** nominal thickness.
- D. Waterproofing and Tile-Setting Adhesive: One-part, fluid-applied product intended for use as both waterproofing and tile-setting adhesive in a two-step process.

## 2.5 CRACK ISOLATION MEMBRANE

- A. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.12 for high performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. PVC Sheet: PVC heat-fused on both sides to facings of nonwoven polyester; **0.040-inch (1-mm)** nominal thickness.
- C. Polyethylene Sheet: Polyethylene faced on both sides with fleece webbing; **0.008-inch (0.2- mm)** nominal thickness.
- D. Latex-Portland Cement Crack-Resistant Mortar: Flexible mortar consisting of cement-based mix and latex additive.
- E. Crack Isolation Membrane and Tile-Setting Adhesive: One-part, fluid-applied product intended for use as both a crack isolation membrane and tile-setting adhesive in a two-step process.

## 2.6 SETTING MATERIALS

- A. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.
  - 1. Cleavage Membrane: Asphalt felt, ASTM D226/D226M, Type I (No. 15); or polyethylene sheeting, ASTM D4397, **4.0 mils (0.1 mm)** thick.
  - 2. Latex Additive: Manufacturer's standard water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement and aggregate mortar bed.
- B. Standard Dry-Set Mortar (Thinset): ANSI A118.1.
  - 1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
    - a. [Bostik, Inc.](#)
    - b. [Laticrete International, Inc.](#)
    - c. [MAPEI Corporation.](#)
    - d. [Summitville Tiles, Inc.](#)
  - 2. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.1.
- C. Modified Dry-Set Mortar (Thinset): ANSI A118.4.
  - 1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
    - a. [Laticrete International, Inc.](#)
    - b. [MAPEI Corporation.](#)
    - c. [Summitville Tiles, Inc.](#)

2. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

## 2.7 GROUT MATERIALS

- A. Sand-Portland Cement Grout: ANSI A108.10, consisting of white or gray cement and white or colored aggregate as required to produce color indicated.
- B. Standard Cement Grout: ANSI A118.6.
- C. High-Performance Tile Grout: ANSI A118.7.
- D. Water-Cleanable Epoxy Grout: ANSI A118.3, with a VOC content of 65 g/L or less.
- E. Grout for Pregrouted Tile Sheets: Same product used in factory to pregrout tile sheets.

## 2.8 MISCELLANEOUS MATERIALS

- A. Metal Edge Strips: Angle or L-shaped, height to match tile and setting-bed thickness, metallic per Finish Schedule and Legend.
- B. Floor Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.

## 2.9 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
  1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.

2. Verify that concrete substrates for tile floors installed with adhesives, bonded mortar bed or thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
    - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
    - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
  3. 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.
  4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with **adhesives or thinset mortar** with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproof membrane by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped **1/4 inch per foot (1:50)** toward drains.
- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

### 3.3 INSTALLATION OF CERAMIC TILE

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
  1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:
    - a. Tile floors in wet areas.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for



straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.
- F. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
  - 1. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
  - 2. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- G. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
  - 1. Porcelain Tile: **1/4 inch (6.4 mm)**
- H. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- I. Metal Edge Strips: Install at locations indicated.
- J. Floor Sealer: Apply floor sealer to cementitious grout joints according to floor-sealer manufacturer's written instructions. As soon as floor sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

### 3.4 INSTALLATION OF TILE BACKING PANEL

- A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use modified dry-set mortar for bonding material unless otherwise directed in manufacturer's written instructions.

### 3.5 INSTALLATION OF WATERPROOF MEMBRANE

- A. Install waterproof membrane to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.
- B. Allow waterproof membrane to cure and verify by testing that it is watertight before installing tile or setting materials over it.

### 3.6 INSTALLATION OF CRACK ISOLATION MEMBRANE

- A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.

- B. Allow crack isolation membrane to cure before installing tile or setting materials over it.

### 3.7 ADJUSTING AND CLEANING

- A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.
- B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
  - 1. Remove grout residue from tile as soon as possible.
  - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

### 3.8 PROTECTION

- A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

END OF SECTION 093013

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## SECTION 095123 - ACOUSTICAL TILE CEILINGS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Acoustical tiles for interior ceilings.
- B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

#### 1.3 PREINSTALLATION MEETINGS

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

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:
  - 1. Acoustical Tiles: Set of full-size Samples of each type, color, pattern, and texture.
  - 2. Seismic Clips: Full size.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
  - 1. Ceiling suspension-system members.
  - 2. Structural members to which suspension systems will be attached.
  - 3. Method of attaching hangers to building structure.
    - a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.

4. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.
5. Size and location of initial access modules for acoustical tile.
6. Items penetrating finished ceiling and ceiling-mounted items including the following:
  - a. Lighting fixtures.
  - b. Diffusers.
  - c. Grilles.
  - d. Speakers.
  - e. Sprinklers.
  - f. Access panels.
  - g. Curtain and IV track

- B. Qualification Data: For testing agency.
- C. Product Test Reports: For each acoustical tile ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency.
- D. Evaluation Reports: For each acoustical tile ceiling suspension system and anchor and fastener type, from ICC-ES.
- E. Field quality-control reports.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

#### 1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, 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. Acoustical Ceiling Units: Full-size tiles equal to 10 percent of quantity installed.
  2. Suspension-System Components: Quantity of each concealed grid and exposed component equal to 10 percent of quantity installed.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical tiles, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical tiles, permit them to reach room temperature and a stabilized moisture content.

## 1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
  - 1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical tile ceiling installation.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Source Limitations:
  - 1. Suspended Acoustical Tile Ceilings: Obtain each type of acoustical ceiling tile and its suspension system from single source from single manufacturer.
  - 2. Refer to Finish Schedule and Legend for product specified.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Suspended ceilings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- B. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame-Spread Index: Class **A** according to ASTM E1264.
  - 2. Smoke-Developed Index: **50** or less.
- C. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Indicate design designations from UL or from the listings of another qualified testing agency.

### 2.3 ACOUSTICAL TILES

- A. Refer to Finish Schedule and Legend for product specified.
- B. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E1264 classifications as designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.
- C. Classification: Provide tiles as follows:

1. Type and Form: Type III, mineral base with painted finish.
  2. Pattern: As indicated on Finish Legend and Schedule.
- D. Color: White
- E. Light Reflectance (LR): Not less than LR indicated in a schedule.
- F. Noise Reduction Coefficient (NRC): Not less than NRC indicated by product choice.
- G. Modular Size: As indicated in a schedule.

#### 2.4 METAL SUSPENSION SYSTEM

- A. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, fully concealed, metal suspension system and accessories of type, structural classification, and finish indicated that complies with applicable requirements in ASTM C635/C635M.
1. Refer to Finish schedule and legend for specified product.
  2. High-Humidity Finish: Where indicated, provide coating tested and classified for "severe environment performance" according to ASTM C635/C635M.

#### 2.5 ACCESSORIES

- A. Attachment Devices: Size for five times the design load indicated in ASTM C635/C635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing according to ASTM E488/E488M or ASTM E1512 as applicable, conducted by a qualified testing and inspecting agency.
- B. Wire Hangers, Braces, and Ties: Provide wires as follows:
1. Zinc-Coated, Carbon-Steel Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper.
  2. Stainless-Steel Wire: ASTM A580/A580M, Type 304, nonmagnetic.
  3. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C635/C635M, Table 1, "Direct Hung") will be less than yield stress of wire.
- C. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
- D. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.
- E. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.
- F. Seismic Struts: Manufacturer's standard compression struts designed to accommodate lateral forces.

- G. Seismic Clips: Manufacturer's standard seismic clips designed to secure acoustical tiles in-place during a seismic event.

## 2.6 METAL EDGE MOLDINGS AND TRIM

- A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations complying with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for of suspension-system runners.
  - 1. Refer to Finish Schedule and Legend for specified product.
  - 2. Baked-Enamel or Powder-Coat Finish: Minimum dry film thickness of **1.5 mils (0.04 mm)**. Comply with ASTM C635/C635M and coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

## 2.7 ACOUSTICAL SEALANT

- A. Acoustical Sealant: As specified in Section 079219 "Acoustical Joint Sealants."

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing and substrates to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine acoustical tiles before installation. Reject acoustical tiles that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.
- B. Layout openings for penetrations centered on the penetrating items.

### 3.3 INSTALLATION OF SUSPENDED ACOUSTICAL TILE CEILINGS

- A. Install suspended acoustical tile ceilings according to ASTM C636/C636M and manufacturer's written instructions.



- B. Suspend ceiling hangers from building's structural members and as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
  2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
  3. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
  4. Do not attach hangers to steel deck tabs.
  5. Space hangers not more than **48 inches (1200 mm)** o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than **8 inches (200 mm)** from ends of each member.
  6. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical tiles.
1. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension-system flanges into kerfed edges of tiles so tile-to-tile joints are interlocked.
1. Fit adjoining tiles to form flush, tight joints. Scribe and cut tiles for accurate fit at borders and around penetrations through ceiling.
  2. Hold tile field in compression by inserting leaf-type, spring-steel spacers between tiles and moldings, spaced **12 inches (305 mm)** o.c.

### 3.4 ERECTION TOLERANCES

- A. Suspended Ceilings: Install main and cross runners level to a tolerance of **1/8 inch in 12 feet (3 mm in 3.6 m)** non-cumulative.

### 3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:

1. Periodic inspection during the installation of suspended ceiling grids according to ASCE/SEI 7.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Perform the following tests and inspections of completed installations of acoustical tile ceiling hangers and anchors and fasteners in successive stages and when installation of ceiling suspension systems on each floor has reached 20 percent completion, but no tiles have been installed. Do not proceed with installations of acoustical tile ceiling hangers for the next area until test results for previously completed installations of acoustical tile ceiling hangers show compliance with requirements.
  1. Within each test area, testing agency will select one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for **200 lbf (890 N)** of tension; it will also select one of every two postinstalled anchors used to attach bracing wires to concrete and will test them for **440 lbf (1957 N)** of tension.
  2. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.
- D. Acoustical tile ceiling hangers, anchors, and fasteners will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

### 3.6 ADJUSTING

- A. Clean exposed surfaces of acoustical tile ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.
- B. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095123

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## SECTION 096513 – RESILIENT BASE AND ACCESSORIES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Resilient Wall Base.

#### 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 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. Installation Qualification: Contractors for floor covering installation should be experienced in managing commercial flooring projects and provide professional installers, qualified to install the various flooring materials specified. An installer is “qualified” if trained by Manufacturer or a certified INSTALL (International Standards & Training Alliance) resilient floor covering installer.

#### 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 Tarkett, but not less than 55 deg F (13 deg C) or more than 85 deg F (29 deg C).

#### 1.6 PROJECT CONDITIONS

- A. Install resilient products after other finishing operations, including painting, have been completed.
- B. Maintain ambient temperatures within range recommended by Manufacturer, but not less than 65 deg F (18 deg C) or more than 85 deg F (29 deg C) in spaces to receive resilient products during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

- C. Maintain the ambient relative humidity between 40% and 60% during installation.
- D. Until Substantial Completion, maintain ambient temperatures within range recommended by Tarkett, but not less than 55 deg F (13 deg C) or more than 85 deg F (29 deg C).

## PART 2 - PRODUCTS

### 2.1 RESILIENT WALL BASE

1. Refer to Finish Legend and Schedule for Manufacturer and color
    - a. Basis of Design Manufacturer:  
Tarkett North America                      Phone:            (800) 899-8916  
30000 Aurora Rd.  
Solon, Ohio 44139  
Web: [www.tarkettna.com](http://www.tarkettna.com)  
E-mail: [info@tarkett.com](mailto:info@tarkett.com)
- Or approved equal.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
- B. Flooring products shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

### 2.3 RESILIENT **TIGHTLOCK** RUBBER WALL BASE

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Rubber Wall Base per Finish Schedule and Legend.
- B. Performance requirements meets ASTM F1861 Standard Specification for Resilient Rubber Wall Base, Type TP, Group 1.
- C. For type, specify: **TightLock for Carpet and TightLock for Resilient**
- D. TightLock for Carpet height specify: **4.5" (11.43 cm)**
- E. TightLock for Resilient height specify: **4.375" (11.11 cm)**
- F. For length specify: **75' (22.86 m)**
- G. For corners, specify: **Outside Corners**

H. Colors and Patterns: Per Finish Schedule and Legend.

I. Test Data:

1. Flexibility, ASTM F137: Passes 1/4 inch mandrel
2. Resistance to light, ASTM F1515: Passes
3. Resistance to chemicals, ASTM F925: Passes
4. ASTM E 648, Standard Test Method for Critical Radiant Flux of 0.45 watts/cm<sup>2</sup> or greater, Class 1.

## 2.4 INSTALLATION MATERIALS

A. Adhesives: as recommended by Manufacturer to meet site conditions

1. Tarkett 960 Cove Base Adhesive (Porous applications)
2. Tarkett 946 Premium Contact Bond Adhesive (Non-porous applications)

## 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 wall base.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- C. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- D. 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 wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.

3.4 CLEANING AND PROTECTION

- A. Comply with Manufacturer's written instructions for cleaning and protection of resilient products.
- B. Perform the following operations immediately after completing resilient product installation:
  - 1. Remove adhesive and other blemishes from exposed surfaces.
- 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. END OF SECTION 09.65.13

**SECTION 09 6516.  
RESILIENT SHEET FLOORING**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Commercial Resilient Sheet Flooring.
  - 2. Accessories.
- B. Related Requirements:
  - 1. Section 09 6513, Resilient Base and Accessories: For wall base, and expansion joint trim between resilient tile flooring and other finish flooring.

**1.3 SUBMITTALS**

- A. Manufacturer's technical data for each type of resilient flooring and accessory.
- B. Samples for verification of resilient sheet flooring, including accessories.
- C. Manufacturer's recommended maintenance practices for resilient sheet flooring and accessories required.
- D. Shop Drawings: Jointing, Termination Details; Includes 8½" x 11" details indicating joint method, termination details including reducers and/or caps required.
- E. Document and Archive project documentation to include Moisture and pH Test Results.
- F. Submit manufacturer's certification that products meet the requirements of SCAQMD Rule 1168 in areas where exposure to freeze/thaw conditions and direct exposure to moisture will not occur.

**1.4 CLOSEOUT SUBMITTAL**

- A. Maintenance Data for each type of floor to include in maintenance manuals.

**1.5 QUALITY ASSURANCE**

- A. Regulatory Requirements:
  - 1. ASTM E648 (NFPA 253): Critical Radiant Flux Class I
  - 2. ASTM E662 (NFPA 258): Smoke Density ≤ 450 DM Corrected
- B. Installer Qualifications: Minimum five (5) years of successful in-service performance and experience with installations of similar size and scope. Provide 3 recent project references, state license documentation (where applicable), insurance certificate and workman's comp documentation.
- C. ISO 9001 and ISO 14001 Certified Manufacturer
- D. Source Limitations: Provide each type of resilient sheet flooring and accessories from a single manufacturer, including recommended primers, adhesives, sealants, and leveling compounds.

**1.6 DELIVERY, STORAGE AND HANDLING**

- A. Comply with manufacturer's instructions and recommendations.
- B. Deliver materials to project site in manufacturer's original, unopened containers with labels indicating brand names, colors and patterns, and quality designations legible and intact.
- C. Upon receiving, confirm materials received are the correct color, style and quantity for each dye lot.



- D. Store all roll goods vertically and stage materials to install rolls in consecutive roll numbers.
- E. Store and protect all materials in a dry interior area maintained between 55°F and 85°F (13°C and 29°C). DO NOT use outside temporary, shipping containers or uncontrolled storage. Improper storage can result in unintended installation issues including bond failure, gapping or buckling, and it is not covered under the product warranty.
- F. ACCLIMATION: Store resilient flooring materials in spaces where they will be installed for at least 72 hours prior to installation.

## 1.7 SITE CONDITIONS

- A. Ambient Conditions:
  - 1. The building envelope must be completely enclosed.
  - 2. Areas to receive resilient flooring shall be maintained at temperatures and relative humidity (RH) in accordance with ANSI/ASHRAE 55 and Resilient Flooring and Adhesive Manufacturer requirements.
  - 3. Set and operate permanent or temporary (with data logging of Temp and ambient RH) HVAC at a consistent temperature between 65°F to 85°F (18°C and 29°C) for a minimum of 1 week and preferably 2-3 weeks or longer before, during and continuously after installation.
  - 4. Install resilient flooring and accessories after other trades, including painting and overhead trades have been completed.
  - 5. Maintain HVAC at a minimum temperature of 55°F (13°C) thereafter as per the manufacturer's recommendations. Space heaters are NOT acceptable.
  - 6. Do NOT install Resilient Tile Flooring if substrate temperatures fail to meet requirements.
  - 7. Do NOT install resilient flooring over new concrete slabs until they are cured and sufficiently dry to achieve bond with adhesive as determined by resilient flooring manufacturer's bond, moisture and pH tests.

## 1.8 EXTRA MATERIALS

- A. Furnish a minimum one percent (10%) extra resilient tile flooring and accessory materials in full and unopened cartons for each color and pattern installed.

## 1.9 WARRANTY

- A. Twelve (12) year limited non-prorated warranty including labor commencing on date of substantial completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURER

- A. Per Finish Schedule and Legend for basis of design.
  - 1. Or approved equal.
- B. Product Description and Physical Characteristics:
  - 1. Nominal Thickness: 2.3 mm non-cushioned.
  - 2. Standard Specification - ASTM F1303: Meets or Exceeds Requirements
  - 3. Classification: Type I, Grade 1
  - 4. Wear Layer: Embossed clear wear layer of 20 mils. for Commercial Use
  - 5. Backing Class B, Fused Non-cushioned textured backing system.
  - 6. Top Coat: HP Urethane Coating with Ceramic Bead.
- C. Test Data:
  - 1. ASTM E648 (NFPA 253 and FTM Standard 372) Critical Radiant Flux/Flammability: 0.99 W/cm<sup>2</sup> -Meets Requirements Class 1 ( $\geq 0.45$  W/cm<sup>2</sup>)
  - 2. ASTM E662 Smoke Density: <450 DM Corrected - Meets Requirements
  - 4. ASTM F925 Resistance to Chemicals: No or slight staining - Meets or exceeds requirements (Refer to stain resistance chart)
  - 5. ASTM F970 Residual Indentation: 1,000 PSI at or below maximum residual indentation (175 PSI @

- ≤0.005 Inch Residual Indentation) - Exceeds Requirements
6. ASTM F1914 Short Term Indentation: 0.006 Inch Residual Indentation (≤ 0.012 Inch Residual Indentation)
  7. ASTM F1514 Heat Stability: Avg. Delta E 0.18 – Exceeds Requirements (<8.0 Delta E)
  8. ASTM F1515 Light Stability: 300 AFU Exposure Delta E 0.80 – Exceeds Requirements (<8.0 Delta E)
  9. ASTM D2047 Slip Resistance: Static Coefficient of Friction, SCOF Dry: 0.74, SCOF Dry
  10. ANSI B101.3 Dynamic Coefficient of Friction: High Traction Surface Wet DCOF
  11. ASTM F963 Heavy Metals Content Analysis: <0.1 ppm None detected
  12. Castor Chair Test: 25,000 cycles 5 - No Change in appearance (198 lbs. load, 25,000 cycles Rating Scale 5 - No Change / 1 - Severe Change)
  13. ASTM D-4060 28,000 Cycles to see effect on design layer (H-18 wheel & 1 kg mass)
  14. REACH – Substances of Very High Concern (SVHC): SVHC's tested must be less than 0.1% by product weight. Meets Requirements
  15. Floorscore Certified – SCS-FS-04567

## 2.2 ACCESSORIES

- A. Adhesives: As recommended by flooring manufacturer to suit material and substrate conditions.
  1. TUF STIK 9000
    - a. Standard acrylic adhesive suitable for most situations. Strong green grab when wet and sets hard when cured.
    - b. Provides a 10 year under bed bond warranty.
    - c. Moisture & pH Limits: 90% RH and 8 Lbs. MVER & 8-10 pH
  2. TUF STIK 150 Spray Adhesive
    - a. High Shear spray adhesive suitable for most situations. Ideal for occupied renovations or where fast turnaround is important. Allows immediate use of the floor after installation.
    - b. Moisture & pH Limits: 93% RH and 6 Lbs MVER & 8-10 pH
  3. TUF STIK SPX Multi-Function Adhesive
    - a. One-part reactive modified polymer adhesive used in place of Epoxy or Urethane adhesives. Reduces footfall sound by Delta IIC 19, provides underfoot comfort as adhesive remains permanently flexible and provides a topical Waterproof bond when cured. TUF STIK SPX is suitable for use under Bariatric beds and can be used over clean scraped cutback adhesive.
    - b. Moisture & pH Limits: - 10 Lbs MVER No pH limit
  4. TEK 4000 Epoxy
    - a. Two-part reactive Epoxy adhesive for extreme conditions. Use under Bariatric beds and areas with topical water, direct sun exposure or heavy point loads.
    - b. Moisture & pH Limits: 85% RH - 6 Lbs. MVER No pH limit
- B. Concrete Slab Primer: Non-staining, low or no VOC acrylic or latex based primer suitable for use with acrylic adhesives.
- C. Patching, Leveling, Underlayment:
  - a. Ardex Feather Finish per Hospital standard.
  - b. The underlayment shall be mold, mildew and alkali resistant, non-shrinking and water-resistant with a minimum 3,500 psi cured compressive strength.
- D. Welding Rods: Manufacturer's standard or equal; color as selected.
- E. Chemical Weld: Manufacturer's standard or equal.
- F. Terminating Reducers: Manufacturer's standard; color as selected.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Ensure subfloor is properly prepared Concrete Slab. Determining jobsite suitability rests solely with the General Contractor and Flooring Contractor.
- B. Examine subfloor surfaces to ensure they are suitable for intended use. The subfloor shall be rigid, smooth and flat,

- permanently dry, clean & free of all foreign materials, including, but not limited to, dust, paint, marker, grease, oils, solvents, cutting/parting/curing compounds, sealers and residue from old adhesive or any other deleterious contaminants that may act as a bond breaker or staining agent.
- C. Concrete surface must be free of curing compounds or adhesives and have a compressive strength of 3500 psi or greater.
  - D. All ink, marker and paint on substrate must be removed by sanding to prevent bleed through and staining of the sheet flooring. Sealing and/or skim coating is not acceptable.
  - E. Determine surface porosity. Place dime to quarter size drops of water on the surface of the concrete and time how long they take to fully absorb into the concrete surface. If the water drops take longer than 90 seconds to be fully absorbed, the surface is considered non-porous. Slab absorbency testing should be performed in at least 3 areas on each installation. For large projects, test every 50 feet in both directions and document on floor plan along with moisture and pH test results.
  - F. Allow other finishing trades, especially plumbing and electrical, ceiling and walls and painting to complete their work before beginning the floor installation.
  - G. During spackling, painting, pipe cutting and other operations that can contaminate the subfloor are ongoing, cover the substrate to prevent contamination. Spackling, permanent marker, paint, paint thinner or machine oil and other construction trade items that contaminate the substrate and cause bond failure or discoloration.
  - H. Do not allow resilient flooring work to proceed until subfloor surfaces are satisfactory. Indicate adverse conditions of any type by letter to Architect and Flooring Distributor.
  - I. Close working spaces to all non-essential traffic before installation and as specified after installation.
  - J. Protect flooring surface from damage from other trades until the space is turned over. If traffic must be permitted on the flooring, protect with construction paper for foot traffic and plywood for heavy items or rolling loads. Failure to properly protect flooring from construction and trade damage may result in permanent damage to the flooring.
  - K. Provide good overhead lighting for proper subfloor preparation and installation. Poor lighting is no excuse for improper workmanship or installation of visible defects.
  - L. Expansion, Isolation and other moving joints are designed and incorporated in concrete slabs to permit movement without causing random cracks. Moving joints shall not be filled or covered with any floor covering. Moving joints must be honored through the flooring and should be treated with an expansion joint covering system as determined through consultation with the system manufacturer.

### 3.2 PREPARATION

- A. Perform a bond test before starting installation to confirm compatibility of adhesive and prepared substrate. Perform at least one bond test for each section of the concrete pour. Perform bond tests on the prepared surface with a 3' x 3' section of flooring. Allow a minimum of 48 hours and preferably 72 hours or longer before determining compatibility and bond strength. Pull up bond test areas by hand to confirm that the adhesive has a strong bond between the flooring and subfloor. If flooring is not strongly bonded to the subfloor additional testing is needed to determine why there is not a strong bond. When performing a bond test, always check for complete adhesive transfer on the back of the flooring in case more adhesive is needed for porous or rough concrete surface, or if too much adhesive is being used over a nonporous or burnished smooth surface. Adjust trowel size used to increase or decrease the amount of adhesive applied to suit substrate and environmental conditions.
- B. Moisture and pH testing shall be properly performed in accordance with current test standard and documented to confirm subfloor suitability. Do not install when the moisture vapor emission rate (MVER) or in-situ Relative Humidity (RH) exceeds adhesive limits or when surface pH is not within specification.
  - 1. Concrete:  
ASTM F2170 In-situ Relative Humidity  
ASTM F1869 Calcium Chloride; ASTM F710 pH Testing
  - 2. Wood: Calibrated Wood Pin Meter
- C. Remove debris, grit, and other foreign materials or substances from the surface of the subfloor before patching and smoothing. Sand or grind surface to remove mortar, drywall compound and curing compounds, paint, permanent marker and other contaminants or surface irregularities which may result in lack of adhesion, telegraphing or bleed through.
- D. The subfloor surface shall be smooth and flat to 3/16" in 10 ft. (3.9 mm in 3 m) and 1/32" in 1 ft. (1 mm in 300

cm) per ASTM F710.

- E. Where leveling or smoothing is required, apply leveling compound per hospital standard, Ardex Feather Finish. Apply compound in accordance with manufacturer's current printed instructions. The underlayment shall be mold, mildew and alkali resistant, non-shrinking and water-resistant with a minimum 3,500 psi cured compressive strength. Ensure proper mix water ratio, working time and drying time.
- F. Porous and/or dusty structurally sound substrates shall be primed by applying one or more coats of acrylic based primer-sealer with a short nap paint roller and allowed to dry before proceeding.
- G. After patching, sand the surface to remove all ridges and rework any remaining low spots or surface defects. Vacuum the entire surface paying close attention to the perimeter to remove all dust and debris.
- H. Floor covering should not be installed over expansion joints. Expansion joint covers compatible with floor covering should be used.
- I. Do not install floor covering over existing VCT or VAT without using an approved underlayment to hide tile seams.

### 3.3 INSTALLATION

- A. Install resilient sheet flooring and accessories using method indicated in strict compliance with manufacturer's printed instructions. Extend resilient sheet flooring into toe spaces, door reveals, and into closets and similar openings.
- B. Roll out resilient sheet flooring material with top surface up. Cut materials 2-3 inches longer than needed and allow material to relax for twenty-four (24) hours before installation. This will help to reduce end curl and difficulty getting the flooring to lay flat. For materials that are not laying flat, carefully back roll.
- C. Trim selvage edges and ends to remove all edge compression, distortion and damage.
- D. Prepare flooring installation. Underscribe, cut and fit resilient sheet flooring to permanent fixtures, built-in furniture and cabinets, pipes, outlets and permanent columns, walls and partitions. Floor shall be tight to door bucks and all abutments.
- F. Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk, pencil or another non-staining marking device.
- G. Apply adhesive in accordance with label instructions. Pay careful attention to using proper trowel to achieve correct adhesive coverage, open and working times based on surface absorbency and environmental conditions. Do not apply excess adhesive or leave lumps in adhesive or allow adhesive to over-dry.
- H. Tightly bond resilient sheet to subfloor without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections. Roll flooring with 100 lbs. 3-section roller. Hand roll resilient sheet flooring at seams and perimeter. Frequently check adhesive application of back of flooring to ensure full adhesive coverage and that trowel ridges are flattened. If adhesive has been down too long before installation, scrape clean and apply fresh adhesive.
- I. Once the room is installed, re-roll the floor using a 100 lbs. 3-section roller in both directions. Reroll the seams and perimeter with a hand roller making sure the adhesive is flattened to a thin uniform film and continuous coverage on the back of the sheet flooring.
- J. Seams: Heat welding is the manufacturer's preferred seaming method as this provides the strongest seam.
  - 1. Heat weld seams.
    - a. Groove seam to accept weld rod.
    - b. Melt specified weld rod into grooves using heat weld gun.
    - c. Once the heat weld is cool, use a guide plate on spatula or other trim knife to skive the weld rod for the first pass. Trim the second pass without the guide plate to provide a smooth flush seam. Glaze the seam to seal the weld rod surface.
  - 2. Chemical weld seams using manufacturer's approved low gloss chemical weld.

### 3.4 CLEANING AND PROTECTION

- A. Refer to Manufacturer's Recommendations for complete Maintenance Instructions.
  - 1. Before beginning any wet maintenance procedure, read all equipment and cleaning product instructions and safety warnings, wear appropriate protective gear and put out caution signs in the area to be cleaned.
  - 2. Sweep, dust mop or vacuum the floor to remove all loose dirt and grit. Do not use treated dust mops.

3. When available, and if within Manufacturers recommendation, clean the floor with an auto scrubber using a properly diluted Neutral pH cleaner and a 3M 5100 Red pad or equivalent pad or brush. Rotary or cylindrical brush cleaning is recommended for textured floors.  
**DO NOT USE A MORE AGGRESSIVE PAD OR BRUSH.**
  4. When an auto scrubber is not available, mop on a properly diluted Neutral pH floor cleaner. Apply the solution liberally, but do not flood the floor. Clean the floor using a mop, flat mop or machine scrub with a low speed (175-350 RPM) swing arm floor machine using a 3M 5100 Red pad or equivalent pad or brush.  
**DO NOT USE A MORE AGGRESSIVE PAD OR BRUSH.**
  5. Completely remove the cleaning solution using an auto scrubber, shop vacuum or mop and let the surface dry.
  6. Fans or air movers can speed up the drying process. Once the floor surface is clean and dry, remove caution signs.
- B. FURNITURE RESTS & PROTECTORS:**  
Use appropriate furniture rests and floor protectors under all chairs, furniture, rolling equipment and beds. Properselection and care of furniture rests, wheels and floor protectors is an important part of effective floor care.  
**KEY ELEMENTS INCLUDE:**
1. **NON-STAINING:** Be made of non-staining materials.
  2. **RADIUSED EDGE:** Provide slightly radius or rounded edges.
  3. **SUFFICIENT CONTACT AREA:** Have a surface contact area that is large enough to evenly distribute the load without causing damage to the floor. Generally, a 1” or larger diameter flat smooth contact area is appropriate for most applications.
  4. **COMPOSITION OF FLOOR GLIDES:** Commercial grade felt glides are preferred for resilient flooring. Stainless steel, nylon and non-staining rubber glides can be used. Do not use metal glides that may rust or plastic glides as they become abrasive with use and can scratch the floor.
  5. **COMPOSITION OF WHEELS:** Wheels for resilient & hard surface flooring should have a soft tread compound of urethane or non-staining rubber. Do not use hard plastic or metal wheels or rollers on resilient flooring. Hard wheels can cause surface damage to the flooring and break the adhesive bond causing bubbling.
- C. FLOOR PROTECTION:**
1. After installation protect installation from foot traffic for 24 hours and protect flooring from rolling and heavy point loads for 48-72 hours. For spray adhesive allow immediate use of flooring.
  2. The Owner and General Contractor are responsible to protect completed flooring after installation is released by the Flooring Contractor. Cover with protective material appropriate to prevent any damage from other construction trades until final acceptance by owner.

**END OF SECTION**

## SECTION 096519 – LUXURY VINYL TILE FLOORING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Luxury vinyl floor tile (plank).

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of resilient floor tile.
  - 1. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
  - 2. Show details of special patterns.
- C. Samples for Verification: Full-size units of each color and pattern of floor tile required.
  - 1. For heat-welding bead, manufacturer's standard-size Samples of each color required.
- D. Welded-Seam Samples: For seamless-installation technique indicated and for each floor covering product, color, and pattern required; with seam running lengthwise and in center of **6- by-9-inch (150-by-230-mm)** Sample applied to a rigid backing and prepared by Installer for this Project.
- E. Product Schedule: For floor tile.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials 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. Floor Tile: Furnish 10% attic stock of each type, color, and pattern of floor tile installed.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.
  - 1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than **50 deg F (10 deg C)** or more than **90 deg F (32 deg C)**. Store floor tiles on flat surfaces.

1.9 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than **70 deg F (21 deg C)** or more than **95 deg F (35 deg C)** in spaces to receive floor tile during the following periods:
  - 1. 48 hours before installation.
  - 2. During installation.
  - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than **55 deg F (13 deg C)** or more than **95 deg F (35 deg C)**.
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient floor tile, as determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.
  - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

### 2.2 LUXURY VINYL FLOOR TILE

- A. Provide Basis of Design product or approved equal.
  - 1. Refer to Finish Schedule and Legend for Basis of Design product.
- B. Tile Standard: ASTM F1700.
  - 1. Class and Type: As indicated by product designations.
- C. Thickness: **0.100 inch (2.5 mm)**.
- D. Size: 6” wide by 48” long.
- E. Seamless-Installation Method: **Heat welded**.
- F. Colors and Patterns: Per Finish Schedule and Legend.

### 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 floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated Provide product listed below or approved equal.
  - 1. M95.0 Resilient Flooring Adhesive
  - 2. M99 Resilient Flooring Adhesive
  - 3. M700 Adhesive
- C. Seamless-Installation Accessories:
  - 1. Heat-Welding Bead: Manufacturer's solid-strand product for heat welding seams.
    - a. Colors: Per Finish Schedule and Legend.
- D. Floor Polish: Provide protective, liquid floor-polish products as recommended by floor tile manufacturer.



### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
  - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F710.
  - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
  - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
  - 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing.
  - 4. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. (18.6 sq. m) and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
    - a. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum relative humidity level measurement approved by manufacturer.
- C. Fill cracks, holes, and depressions in substrates with trowelable Ardex Feather Finish leveling and patching compound, remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until materials are the same temperature as space where they are to be installed.
  - 1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

### 3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
  - 1. Lay tiles in pattern indicated.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
  - 1. Lay tiles in pattern of colors and sizes indicated.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles to 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.
- I. Seamless Installation:
  - 1. Heat-Welded Seams: Comply with ASTM F1516. Rout joints and heat weld with welding bead to fuse sections permanently into a seamless flooring installation. Prepare, weld, and finish seams to produce surfaces flush with adjoining flooring surfaces.

### 3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
  - 1. Remove adhesive and other blemishes from surfaces.
  - 2. Sweep and vacuum surfaces thoroughly.

3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Verify that polish is required by flooring Manufacturer. Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.
- E. Cover floor tile until Substantial Completion.

END OF SECTION 096519

## SECTION 096813 - TILE CARPETING

### 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. Modular carpet tile.

- B. Related Requirements:

- 1. Section 024119 "Selective Demolition" for removing existing floor coverings.
  - 2. Section 096513 "Resilient Base and Accessories", Section 096519 "Resilient Tile Flooring" for resilient wall base and accessories installed with carpet tile.

#### 1.3 PREINSTALLATION MEETINGS

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

- 1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:
    - a. Review delivery, storage, and handling procedures.
    - b. Review ambient conditions and ventilation procedures.
    - c. Review subfloor preparation procedures.

#### 1.4 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 manufacturer's written installation recommendations for each type of substrate.

- B. Shop Drawings: For carpet tile installation, plans showing the following:

- 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
  - 2. Carpet tile type, color, and dye lot.
  - 3. Type of subfloor.

4. Type of installation.
  5. Pattern of installation.
  6. Pattern type, location, and direction.
  7. Pile direction.
  8. Type, color, and location of insets and borders.
  9. Type, color, and location of edge, transition, and other accessory strips.
  10. Transition details to other flooring materials.
- C. Samples for Verification: 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-** (300-mm-) long Samples.
- D. Product Schedule: For carpet tile. Use same designations indicated on Drawings.
- E. Sustainable Product Certification: Provide ANSI/NSF 140 certification for carpet products.

#### 1.5 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.

#### 1.6 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.

#### 1.7 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 ten (10) percent of amount installed for each type indicated, but not less than **10 sq. yd.** (8.3 sq. m).

#### 1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Comply with the Carpet and Rug Institute's CRI 104.

1.10 FIELD CONDITIONS

- A. Comply with the Carpet and Rug Institute's 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 levels planned for building occupants 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.

1.11 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
  2. Failures include, but are not limited to, the following:
    - a. More than 10 percent edge raveling, snags, and runs.
    - b. Dimensional instability.
    - c. Excess static discharge.
    - d. Loss of tuft-bind strength.
    - e. Loss of face fiber.
    - f. Delamination.
  3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE

- A. **Manufacturers:** Subject to compliance with requirements, provide products by the following, or approved equal:
1. **Mannington Mills, Inc.**

- B. Color: Per Finish Schedule and Legend.
- C. Pattern: Per Finish Schedule and Legend.
- D. Face Fiber: Invista Antron Lumena Type 6,6 Four hold, Hollow Filament Nylon, with Permanent Stain and Bleach protection, static control and Duratech Soil Resistant Treatment, and a Fiber Modification Ratio of <1.5.
- E. Pile Characteristic: Textured Pattern Loop pile.
- F. Dye Method: Solution.
- G. Gage: 1/10.
- H. Stitches per inch: 9.
- I. Pile Thickness: .123 inches according to ASTM D6859.
- J. Tufted Yarn Weight: 17 oz per square yard.
- K. Size: 24”x24” modular tile.
- L. Sustainable Design Requirements:
  - 1. Sustainable Product Certification: Gold level certification according to ANSI/NSF 140.
- M. Performance Characteristics:
  - 1. Critical Radiant Panel Classification: Class 1 Direct Glue.
  - 2. Delamination: Not less than **4 lbf/in. (0.7 N/mm)** according to ASTM D3936.
  - 3. Dimensional Tolerance: Within **1/32 inch (0.8 mm)** of specified size dimensions, as determined by physical measurement.
  - 4. Dimensional Stability: 0.2 percent or less according to ISO 2551 (Aachen Test).

## 2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Ardex Feather Finish.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.
- C. Metal Edge/Transition Strips: Per Finish Schedule and Legend.

### 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.
- B. Examine carpet tile for type, color, pattern, and potential defects.
- C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.
  - 1. Moisture Testing: Perform tests so that each test area does not exceed manufacturers recommendation, and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
    - a. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a relative humidity level measurement as per Manufacturers recommendation.
    - b. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. General: Comply with the Carpet and Rug Institute's CRI 104 and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions **1/8 inch (3 mm)** wide or wider, and protrusions more than **1/32 inch (0.8 mm)** unless more stringent requirements are required by manufacturer's written instructions.
- C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

#### 3.3 INSTALLATION

- A. General: Comply with the Carpet and Rug Institute's CRI 104, Section 10, "Carpet Tile," and with carpet tile manufacturer's written installation instructions.



- B. Installation Method: As recommended in writing by carpet tile manufacturer.
- C. Maintain dye-lot integrity. Do not mix dye lots in same area.
- D. Maintain pile-direction patterns indicated on Drawings.
- E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.
- H. Install pattern per Construction drawings.

#### 3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
  - 1. Remove excess adhesive 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 the Carpet and Rug Institute's CRI 104, Section 13.7.
- 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 096813

## SECTION 099123 - INTERIOR PAINTING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

1. Primers.
2. Water-based finish coatings.
3. Water – based Epoxy paint system

- B. Related Requirements:

1. Section 055000 "Metal Fabrications" for shop priming metal fabrications.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include preparation requirements and application instructions.
2. Indicate VOC content.

- B. Samples for Verification: For each type of paint system and each color and gloss of topcoat.

1. Submit Samples on rigid backing, **8 inches (200 mm)** square.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.
5. Label each sample for date prepared.

- C. Product Schedule: Use same designations indicated on Drawings and in the Interior Painting Schedule to cross-reference paint systems specified in this Section. Include color designations.

#### 1.4 MAINTENANCE MATERIAL SUBMITTALS

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

1. Paint Products: 10 percent, but not less than **1 gal. (3.8 L)** of each material and color applied.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
  - 1. Maintain containers in clean condition, free of foreign materials and residue.
  - 2. Remove rags and waste from storage areas daily.

## 1.6 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures of less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - 1. Sherwin-Williams Company (The). No Substitutions allowed.
    - a. Refer to Finish Schedule and Legend for materials.
- B. Source Limitations: Obtain each paint product from single source from single manufacturer.

### 2.2 PAINT PRODUCTS, GENERAL

- A. Material Compatibility:
  - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- B. Colors and Sheen: Per Finish Schedule and Legend.

### 2.3 PRIMERS

- A. Alkali-Resistant, Water-Based Primer: Water-based primer formulated for use on alkaline surfaces, such as plaster, vertical concrete, and masonry.
- B. Interior Latex Primer Sealer: Water-based latex sealer used on new interior plaster, concrete, and gypsum wallboard surfaces.

- C. Interior, Institutional Low-Odor/VOC Primer Sealer: Water-based primer sealer with low-odor characteristics and a VOC of less than 10 grams per liter for use on new interior plaster, concrete, and gypsum wallboard surfaces that are subsequently to be painted with latex finish coats.

#### 2.4 WATER-BASED FINISH COATS

- A. Interior, Latex, Semigloss: Pigmented, water-based paint for use on primed/sealed interior plaster and gypsum board, and on primed wood and metals.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Sherwin-Williams Company (The). No Substitutions allowed.
  - 2. Gloss Level: Per Finish Schedule and Legend..
- B. Interior, Latex, High-Performance Architectural Coating, Low Sheen: High-performance architectural latex coating providing a significantly higher level of performance than conventional latex paints in the areas of scrub resistance, burnish resistance, and ease of stain removal.

#### 2.5 WATER BASED EPOXY

- A. Basis of design is Sherwin Williams Pro Industrial PreCatalyzed Water Based Epoxy or approved equal.
  - a. Refer to Finish Schedule and Legend for Color and Sheen.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
  - 1. Gypsum Board: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- E. Proceed with coating application only after unsatisfactory conditions have been corrected.
  - 1. Application of coating indicates acceptance of surfaces and conditions.

#### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations applicable to substrates and paint systems indicated.

- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
  - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

### 3.3 INSTALLATION

- A. Apply paints according to manufacturer's written instructions.
  - 1. Use applicators and techniques suited for paint and substrate indicated.
  - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
  - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
  - 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

### 3.4 FIELD QUALITY CONTROL

- A. Dry-Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry-film thickness.
  - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
  - 2. If test results show that dry-film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry-film thickness that complies with paint manufacturer's written recommendations.

### 3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
  - 1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.
  - 2. Dispose of contaminants in accordance with requirements of authorities having jurisdiction.
  - 3. Allow empty paint cans to dry before disposal.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

### 3.6 INTERIOR PAINTING SCHEDULE

- A. **Gypsum Board** Substrates:
  - 1. Latex over Latex Sealer System :
    - a. Prime Coat: Interior latex primer sealer.
    - b. Intermediate Coat: Matching topcoat.
    - c. Topcoat: Interior, latex, per Finish Schedule and Legend.

END OF SECTION 099123

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## SECTION 102113.17 - PHENOLIC-CORE TOILET COMPARTMENTS

### 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. Phenolic-core toilet compartments configured as toilet enclosures, entrance screens and urinal screens.

- B. Related Requirements:

- 1. Section 102800 "Toilet, Bath, and Laundry Accessories" for toilet tissue dispensers, grab bars, purse shelves, and similar accessories mounted on toilet compartments.

#### 1.3 ACTION SUBMITTALS

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

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for toilet compartments.

- B. Shop Drawings: For toilet compartments.

- 1. Include plans, elevations, sections, details, and attachment details.
  - 2. Show locations of cutouts for compartment-mounted toilet accessories.
  - 3. Show locations of centerlines of toilet fixtures.
  - 4. Show locations of floor drains.
  - 5. Show overhead support or bracing locations.

- C. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:

- 1. Each type of material, color, and finish required for toilet compartments, prepared on 6-inch- square Samples of same thickness and material indicated for Work.
  - 2. Each type of hardware and accessory.

- D. Product Schedule: For toilet compartments, prepared by or under the supervision of supplier, detailing location, and selected colors for toilet compartment material.



#### 1.4 SUBMITTALS

- A. Maintenance Data: For toilet compartments to include in maintenance manuals.

#### 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 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame-Spread Index: 75 or less.
  - 2. Smoke-Developed Index: 450 or less.
- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for toilet compartments designated as accessible.

#### 2.2 PHENOLIC-CORE TOILET COMPARTMENTS

- 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. [Bobrick Washroom Equipment, Inc.](#)
  - 2. [Bradley Corporation.](#)
  - 3. [Marlite.](#)
- B. Toilet-Enclosure Style: [**Overhead braced**] [**Floor anchored**] [**Ceiling hung**] [**Floor and ceiling anchored**].
- C. Entrance-Screen Style: [**Overhead braced**] [**Floor anchored**] [**Ceiling hung**] [**Floor and ceiling anchored**].
- D. Urinal-Screen Style: [**Wall hung**] [**Floor anchored**] [**Overhead braced**] [**Post to ceiling**].
- E. Door, Panel[, **Screen**], and Pilaster Construction: Solid phenolic-core panel material with melamine facing on both sides fused to substrate during panel manufacture (not separately laminated), and with eased and polished edges[ **and no-sightline system**]. Provide minimum **3/4-inch- (19-mm-)** thick doors and pilasters and minimum **1/2-inch- (13-mm-)** thick panels.
- F. Pilaster [**Shoes**] [**and**] [**Sleeves (Caps)**]: Formed from stainless steel sheet, not less than **0.031-inch (0.79-mm)** nominal thickness and **3 inches (76 mm)** high, finished to match hardware.

- G. Urinal-Screen Post: Manufacturer's standard post design of **monolithic phenolic urinal screen cutout at bottom to form a post** [material matching the thickness and construction of pilasters] [or] [**1-3/4-inch- (44-mm-)** square, aluminum tube with satin finish] <Insert requirement>; with shoe[ **and sleeve (cap)**] matching that on the pilaster.
- H. Brackets (Fittings):
  - 1. Stirrup Type: Ear or U-brackets, [**chrome-plated zamac**] [**clear-anodized aluminum**] [**stainless steel**] [**chrome-plated brass**].
  - 2. Full-Height (Continuous) Type: Manufacturer's standard design; [**stainless steel**] [**aluminum**].
- I. Phenolic-Panel Finish:
  - 1. Color and Pattern: Per Finish Legend and Schedule, with manufacturer's standard through-color core matching face sheet.
  - 2. Edge Color: Through-color matching facing sheet color.

## 2.3 HARDWARE AND ACCESSORIES

- A. Hardware and Accessories: Manufacturer's heavy-duty operating hardware and accessories.
  - 1. Hinges: Manufacturer's minimum 0.062-inch- thick stainless continuous, cam type that swings to a closed position allowing emergency access by lifting door. Mount with through-bolts.
  - 2. Latch and Keeper: Manufacturer's heavy-duty surface-mounted cast-stainless steel latch unit designed to resist damage due to slamming, with combination rubber-faced door strike and keeper, and with provision for emergency access. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible. Mount with through-bolts.
  - 3. Coat Hook: Manufacturer's heavy-duty combination cast-stainless steel hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories. Mount with through-bolts.
  - 4. Door Bumper: Manufacturer's heavy-duty rubber-tipped cast-stainless steel bumper at out-swinging doors. Mount with through-bolts.
  - 5. Door Pull: Manufacturer's heavy-duty cast-stainless steel pull at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible. Mount with through-bolts.
- B. 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.

## 2.4 MATERIALS

- A. Aluminum Castings: ASTM B26/B26M.
- B. Aluminum Extrusions: ASTM B221.

- C. Brass Castings: ASTM B584.
- D. Brass Extrusions: ASTM B455.
- E. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304, stretcher-leveled standard of flatness.
- F. Stainless Steel Castings: ASTM A743/A743M.
- G. Zamac: ASTM B86, commercial zinc-alloy die castings.

## 2.5 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. 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.
- C. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at tops and bottoms of posts. Provide shoes and sleeves at posts to conceal anchorage.
- D. Door Size and Swings: As designated in construction drawings.

## 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. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
  - 1. Maximum Clearances:
    - a. Pilasters and Panels: 1/2 inch.

- b. Panels and Walls: 1 inch.
- 2. 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.
  - a. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
  - b. Align brackets at pilasters with brackets at walls.
- 3. Full-Height (Continuous) Brackets: Secure panels to walls and to pilasters with full-height brackets.
  - a. Locate bracket fasteners so holes for wall anchors occur in masonry or tile joints.
  - b. Align brackets at pilasters with brackets at walls.
- B. Floor-Anchored Units: 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. Hang doors and adjust so tops of doors are level with tops of pilasters when doors are in closed position.
- C. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

### 3.3 ADJUSTING

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

END OF SECTION 102113.17

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## SECTION 102600 - WALL AND DOOR PROTECTION

### 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. Bumper Rails.
  - 2. Corner guards.
  - 3. Abuse-resistant wall coverings.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes.
  - 2. Include fire ratings of units recessed in fire-rated walls and listings for door-protection items attached to fire-rated doors.
- B. Shop Drawings: For each type of wall and door protection showing locations and extent.
  - 1. Include plans, elevations, sections, and attachment details. Show handrail design and support spacing required to withstand structural loads.
- C. Samples for Verification: For each type of exposed finish on the following products, prepared on Samples of size indicated below:
  - 1. Wall Guards: 12 inches (300 mm) long. Include examples of joinery, corners, and field splices.
  - 2. Handrails: 12 inches (300 mm) long. Include examples of joinery, corners, and field splices.
  - 3. **Corner** Guards: 12 inches (300 mm) long. Include example top caps.
  - 4. Abuse-Resistant Wall Covering: 6 by 6 inches (150 by 150 mm) square.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of handrail.
- B. Material Certificates: For each type of exposed plastic material.

- C. Sample Warranty: For special warranty.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of wall and door protection product to include in maintenance manuals.
  - 1. Include recommended methods and frequency of maintenance for maintaining best condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to finishes and performance.

#### 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. **Wall-Guard and Handrail** Covers: Full-size plastic covers of maximum length equal to 10 percent of each type, color, and texture of cover installed, but no fewer than **two, 96-inch- (2400-mm-)** long units.
  - 2. **Corner-Guard** Covers: Full-size plastic covers of maximum length equal to 10 percent of each type, color, and texture of cover installed, but no fewer than **two, 48-inch- (1200-mm-)** long units.
  - 3. **Mounting and Accessory Components**: Amounts proportional to the quantities of extra materials. Package mounting and accessory components with each extra material.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store wall and door protection in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
  - 1. Maintain room temperature within storage area at not less than **70 deg F (21 deg C)** during the period plastic materials are stored.
  - 2. Keep plastic materials out of direct sunlight.
  - 3. Store plastic wall- and door-protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of **70 deg F (21 deg C)**.

#### 1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of wall- and door-protection units that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures including detachment of components from each other or from the substrates, delamination, and permanent deformation beyond normal use.

- b. Deterioration of metals, metal finishes, plastics, and other materials beyond normal use.
2. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Source Limitations: Obtain wall- and door-protection products of each type from single source from single manufacturer, Per Finish Schedule and Legend.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Surface Burning Characteristics: Comply with ASTM E84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  1. Flame-Spread Index: 25 or less.
  2. Smoke-Developed Index: 450 or less.
- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities.

### 2.3 WALL GUARDS

- A. Bumper Rail: Standard-duty assembly consisting of continuous snap-on plastic cover installed over concealed retainer; designed to withstand impacts.
  1. Cover: Refer to Finish Schedule and Legend for product selection.
  2. Continuous Retainer: Minimum **0.080-inch- (2.0-mm-)** thick, one-piece, extruded aluminum.
  3. Retainer Clips: Manufacturer's standard impact-absorbing clips.
  4. Bumper: Continuous, resilient bumper cushion(s).
  5. End Caps and Corners: Prefabricated, injection-molded plastic; matching color cover; field adjustable for close alignment with snap-on cover.
  6. Accessories: Concealed splices and mounting hardware.

### 2.4 CORNER GUARDS

- A. Surface-Mounted, Plastic-Cover Corner Guards: Manufacturer's standard assembly consisting of snap-on, resilient plastic cover installed over retainer; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition.
  1. Cover: Refer to Finish Schedule and Legend for product selection.
  2. Continuous Retainer: Minimum **0.060-inch- (1.5-mm-)** thick, one-piece, extruded aluminum.



3. Retainer Clips: Manufacturer's standard impact-absorbing clips.
4. Top and Bottom Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.

## 2.5 ABUSE-RESISTANT WALL COVERINGS

- A. Abuse-Resistant Sheet Wall Covering: Fabricated from semirigid, plastic sheet wall-covering material.
  1. Refer to Finish Schedule and Legend for product specified.
  2. Size: 48 by 96 inches (1219 by 2438 mm) for sheet.
  3. Sheet Thickness: 0.080 inch (2.0 mm).
  4. Color and Texture: Refer to Finish Schedule and Legend.
  5. Height: Wainscot unless otherwise indicated on Construction Drawings.
  6. Trim and Joint Moldings: Extruded rigid plastic that matches wall-covering color.
  7. Mounting: Adhesive.

## 2.6 MATERIALS

- A. color throughout; extruded and sheet material as required, thickness as indicated.
- B. Polycarbonate Plastic Sheet: ASTM D6098, S-PC01, Class 1 or Class 2, abrasion resistant; with a minimum impact-resistance rating of 15 ft.-lbf/in. (800 J/m) of notch when tested according to ASTM D256, Test Method A.
- C. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.
- D. Adhesive: As recommended by protection product manufacturer.

## 2.7 FABRICATION

- A. Fabricate wall and door protection according to requirements indicated for design, performance, dimensions, and member sizes, including thicknesses of components.
- B. Factory Assembly: Assemble components in factory to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.
- C. Quality: Fabricate components with uniformly tight seams and joints and with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

## 2.8 FINISHES

- A. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances, fire rating, and other conditions affecting performance of the Work.
- B. Examine walls to which wall and door protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.
  - 1. For wall and door protection attached with adhesive, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Complete finishing operations, including painting, before installing wall and door protection.
- B. Before installation, clean substrate to remove dust, debris, and loose particles.

#### 3.3 INSTALLATION

- A. Installation Quality: Install wall and door protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
- B. Mounting Heights: Install wall and door protection in locations and at mounting heights indicated on Drawings.
- C. Accessories: Provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation.
  - 1. Provide anchoring devices and suitable locations to withstand imposed loads.
  - 2. Where splices occur in horizontal runs of more than 20 feet (6.1 m), splice aluminum retainers and plastic covers at different locations along the run, but no closer than 12 inches (305 mm) apart.
  - 3. Adjust end and top caps as required to ensure tight seams.
- D. Abuse-Resistant Wall Covering: Install top and edge moldings, corners, and divider bars as required for a complete installation.

3.4 CLEANING

- A. Immediately after completion of installation, clean plastic covers and accessories using a standard ammonia-based household cleaning agent.
- B. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION 102600

## SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Public-use washroom accessories.
  - 2. Healthcare accessories.
  - 3. Hand dryers.
  - 4. Childcare accessories.
  - 5. Underlavatory guards.
  - 6. Custodial accessories.

#### 1.3 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.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
  - 2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
  - 3. Include electrical characteristics.
- B. Samples: For each exposed product and for each finish specified.
  - 1. Approved full-size Samples will be returned and may be used in the Work.
- C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated.
2. Identify accessories using designations indicated.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For manufacturer's special warranties.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For accessories to include in maintenance manuals.

#### 1.7 WARRANTY

- A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.
  1. Failures include, but are not limited to, visible silver spoilage defects.
  2. Warranty Period: 15 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty for Hand Dryers: Manufacturer agrees to repair or replace hand dryers that fail in materials or workmanship within specified warranty period.
  1. Warranty Period: 10 years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 OWNER-FURNISHED MATERIALS

- A. Per equipment schedule on Construction drawings.

#### 2.2 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
  - 1. Remove temporary labels and protective coatings.
- B. Grab Bars: Install to comply with specified structural-performance requirements.
- C. Shower Seats: Install to comply with specified structural-performance requirements.

#### 3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Clean and polish exposed surfaces according to manufacturer's written instructions.

END OF SECTION 102800

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## SECTION 104413 - FIRE PROTECTION CABINETS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Fire-protection cabinets for the following:
    - a. Portable fire extinguisher.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing semirecessed- installation method and relationships of box and trim to surrounding construction.
- B. Shop Drawings: For fire-protection cabinets.
  - 1. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples for Verification: For each type of exposed finish required, prepared on samples 6 by 6 inches (150 by 150 mm) square.
- D. Product Schedule: For fire-protection cabinets. Indicate whether recessed, semirecessed, or surface mounted. Coordinate final fire-protection cabinet schedule with fire-extinguisher schedule to ensure proper fit and function.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

#### 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.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Source Limitations: Obtain fire-protection cabinets, accessories, and fire extinguishers from single source from single manufacturer.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E814 for fire-resistance rating of walls where they are installed.

### 2.3 FIRE-PROTECTION CABINET

- A. Cabinet Type: Suitable for facility standard fire extinguisher.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Activar Construction Products Group, Inc. - JL Industries.
    - b. Babcock-Davis.
    - c. Guardian Fire Equipment, Inc.
- B. Cabinet Construction: Nonrated.
- C. Cabinet Material: Stainless steel sheet.
- D. Semirecessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface, with exposed trim face and wall return at outer edge (backbend).
  - 1. Square-Edge Trim: 1-1/4- to 1-1/2-inch (32- to 38-mm) backbend depth.
- E. Cabinet Trim Material: Same material and finish as door.
- F. Door Material: Stainless steel sheet
- G. Door Style: Vertical duo glazed panel with frame.
- H. Door Glazing: Tempered float glass (clear).
- I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
  - 1. Provide recessed door pull and friction latch.

2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.

J. Accessories:

1. Door Lock: Non locking.
2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Owner.
  - a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."

K. Materials:

1. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304.
  - a. Finish: ASTM A480/A480M No. 4 directional satin finish.
2. Tempered Float Glass: ASTM C1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

## 2.4 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's AMP 500, "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 unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine walls and partitions for suitable framing depth and blocking where semirecessed cabinets will be installed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Prepare recesses for semirecessed fire-protection cabinets as required by type and size of cabinet and trim style.

### 3.3 INSTALLATION

- A. General: Install fire-protection cabinets in locations and at mounting heights indicated
  - 1. Fire-Protection Cabinets: **42 inches (1067 mm)** above finished floor to top of fire extinguisher.
- B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.
  - 1. Unless otherwise indicated, provide semirecessed fire-protection cabinets.
  - 2. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.
- C. Identification:
  - 1. Apply vinyl lettering at locations indicated.

### 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 manufacturer's written installation instructions.
- B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
- D. Touch up marred finishes or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet and mounting bracket manufacturers.
- E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 104413

## SECTION 122413 - ROLLER WINDOW SHADES

### 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. Manually operated roller shades with **single** rollers.

- B. Related Requirements:

- 1. Section **061000 "Rough Carpentry"** for wood blocking and grounds for mounting roller shades and accessories.
  - 2. Section 079200 "Joint Sealants" for sealing the perimeters of installation accessories for light-blocking shades with a sealant.

#### 1.3 ACTION SUBMITTALS

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

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.

- B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.

- 1. Motor-Operated Shades: Include details of installation and diagrams for power, signal, and control wiring.

- C. Samples for Verification: For each type of roller shade.

- D. Product Schedule: For roller shades. Use same designations indicated on Drawings.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

- B. Product Certificates: For each type of shadeband material.

- C. Product Test Reports: For each type of shadeband material, for tests performed by manufacturer and witnessed by a qualified testing agency.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For roller shades to include in maintenance manuals.

#### 1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Roller Shades: Full-size units equal to 5 percent of quantity installed for each size, color, and shadeband material indicated, but no fewer than two units.

#### 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

#### 1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Source Limitations: Obtain roller shades from single source from single manufacturer.

## 2.2 MANUALLY OPERATED SHADES WITH SINGLE ROLLERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
1. Draper Inc.
- B. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.
1. Bead Chains: Manufacturer's standard
    - a. Loop Length: Full length of roller shade.
    - b. Limit Stops: Provide upper and lower ball stops.
    - c. Chain-Retainer Type: Clip, jamb mount .
- C. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
1. Roller Drive-End Location: Right side of interior face of shade
  2. Direction of Shadeband Roll: Regular, from back (exterior face) of roller
  3. Shadeband-to-Roller Attachment: Manufacturer's standard method.
- D. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.
- E. Shadebands:
1. Per Finish Schedule and Legend
- F. Installation Accessories:
1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.
  2. Exposed Headbox: Rectangular, extruded-aluminum enclosure including front fascia, top and back covers, endcaps, and removable bottom closure.
  3. Endcap Covers: To cover exposed endcaps.

## 2.3 SHADEBAND MATERIALS

- A. Shadeband Material Flame-Resistance Rating: Comply with **NFPA 701**. Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- B. Light-Filtering Fabric: Woven fabric, stain and fade resistant.
- C. Light-Blocking Fabric: Opaque fabric, stain and fade resistant.
1. Source: Roller shade manufacturer. Provide product per Finish Schedule and Legend.

## 2.4 ROLLER SHADE FABRICATION

- A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.
- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F (23 deg C):
  - 1. Surface Mount, per Finish schedule and legend.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 ROLLER SHADE INSTALLATION

- A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.
- B. Roller Shade Locations: As indicated on Drawings.

### 3.3 ADJUSTING

- A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

### 3.4 CLEANING AND PROTECTION

- A. Clean roller shade surfaces, after installation, according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION 122413

## SECTION 122623 - PLASTIC-LAMINATE-CLAD COUNTERTOPS

### 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. Plastic-laminate-clad countertops.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- B. Shop Drawings: For plastic-laminate-clad countertops.
  - 1. Include plans, sections, details, and attachments to other work. Detail fabrication and installation, including field joints.
  - 2. Show locations and sizes of cutouts and holes for items installed in plastic-laminate-clad countertops.
  - 3. Apply AWI Quality Certification Program label to Shop Drawings.
- C. Samples for Verification: As follows:
  - 1. Plastic Laminates: For each type, color, pattern, and surface finish required, **8 by 10 inches (200 by 250 mm)** in size.
  - 2. Wood-Grain Plastic Laminates: For each type, color, pattern, and surface finish required, **12 by 24 inches (300 by 600 mm)** in size.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and fabricator.
- B. Product Certificates: For the following:
  - 1. Composite wood and agrifiber products.
  - 2. High-pressure decorative laminate.
  - 3. Chemical-resistant, high-pressure decorative laminate.



4. Adhesives.

- C. Quality Standard Compliance Certificates: AWI Quality Certification Program.
- D. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
  - 1. Shop Certification: AWI's Quality Certification Program accredited participant.
- B. Installer Qualifications: Fabricator of products.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver countertops only after casework and supports on which they will be installed have been completed in installation areas.
- B. Store countertops in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.
- C. Keep surfaces of countertops covered with protective covering during handling and installation.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install countertops until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.
- B. Field Measurements: Where countertops are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Established Dimensions: Where countertops are indicated to fit to other construction, establish dimensions for areas where countertops are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

## PART 2 - PRODUCTS

### 2.1 PLASTIC-LAMINATE-CLAD COUNTERTOPS

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of plastic-laminate-clad countertops indicated for construction, finishes, installation, and other requirements.
  - 1. Provide inspections of fabrication and installation together with labels and certificates from AWI certification program indicating that countertops comply with requirements of grades specified.
- B. Grade: Custom.
- C. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGS.
- D. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
  - 1. Per Finish Schedule and Legend.
- E. Edge Treatment: 3.0-mm ( )PVC edging per Finish Schedule and Legend.
- F. Core Material: Fire-retardant-treated plywood.
- G. Core Thickness: **3/4 inch (19 mm)**.

### 2.2 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard unless otherwise indicated.
  - 1. Wood Moisture Content: **8 to 13** percent.

### 2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use materials that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products according to test method indicated by a qualified testing agency.
  - 1. Use treated materials that comply with requirements of referenced quality standard. Do not use materials that are warped, discolored, or otherwise defective.
  - 2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
  - 3. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.

- B. Fire-Retardant-Treated Lumber and Plywood: Products with a flame-spread index of 25 or less when tested according to ASTM E84, 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. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 15 percent, respectively.

## 2.4 ACCESSORIES

- A. Wire-Management Grommets: Circular, molded-plastic grommets and matching plastic caps with slot for wire passage.
  - 1. Outside Diameter: **2 inches (51 mm)**.
  - 2. Color: Per Finish Schedule and Legend.

## 2.5 MISCELLANEOUS MATERIALS

- A. Adhesive for Bonding Plastic Laminate: As selected by fabricator to comply with requirements.

## 2.6 FABRICATION

- A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
- B. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch (25 mm) over base cabinets. Ease edges to radius indicated for the following:
  - 1. Solid-Wood (Lumber) Members: 1/16 inch (1.5 mm) unless otherwise indicated.
- C. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
  - 1. Notify Architect seven days in advance of the dates and times countertop fabrication will be complete.
- D. Shop cut openings to maximum extent possible to receive appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
  - 1. Seal edges of cutouts by saturating with varnish.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Before installation, condition countertops to average prevailing humidity conditions in installation areas.
- B. Before installing countertops, examine shop-fabricated work for completion and complete work as required, including removal of packing.

#### 3.2 INSTALLATION

- A. Grade: Install countertops to comply with same grade as item to be installed.
- B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.
  - 1. Provide cutouts accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
  - 2. Seal edges of cutouts by saturating with varnish.
- C. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.
  - 1. Secure field joints in countertops with concealed clamping devices located within 6 inches (150 mm) of front and back edges and at intervals not exceeding 24 inches (600 mm). Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.
- D. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with chemical-treatment manufacturer's written instructions, including those for adhesives used to install woodwork.
- F. Countertop Installation: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
  - 1. Install countertops level and true in line. Use concealed shims as required to maintain not more than a 1/8-inch-in-96-inches (3-mm-in-2400-mm) variation from a straight, level plane.
  - 2. Secure backsplashes to tops with concealed metal brackets at 16 inches (400 mm) o.c. and to walls with adhesive.

3. Seal joints between countertop and backsplash, if any, and joints where countertop and backsplash abut walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

### 3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective countertops, where possible, to eliminate functional and visual defects. Where not possible to repair, replace countertops. Adjust joinery for uniform appearance.
- B. Clean countertops on exposed and semiexposed surfaces.
- C. Protection: Provide Kraft paper or other suitable covering over countertop surfaces, taped to underside of countertop at a minimum of 48 inches (1220 mm) o.c. Remove protection at Substantial Completion.

END OF SECTION 122623

## SECTION 123661 - SOLID SURFACING COUNTERTOPS AND WINDOWSILLS

### 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 surface material countertops and windowsills.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For countertop and windowsill
- B. materials.
- C. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.
  - 1. Show locations and details of joints.
  - 2. Show direction of directional pattern, if any.
- D. Shop Drawings: For Windowsills. Show materials, finishes, edge profiles, methods of joining.
- E. Samples for Verification: For the following products:
  - 1. Countertop material, 6 inches (150 mm) square.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For solid surface material countertops to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

#### 1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in- service performance.

- B. Installer Qualifications: Fabricator.

#### 1.7 FIELD CONDITIONS

- A. Field Measurements: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

#### 1.8 COORDINATION

- A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

### PART 2 - PRODUCTS

#### 2.1 SOLID SURFACE COUNTERTOP MATERIALS

- A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Avonite Surfaces.
    - b. Corian
    - c. Formica Corporation.
  - 2. Colors and Patterns: Per Finish Schedule and Legend.
- B. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

#### 2.2 COUNTERTOP FABRICATION

- A. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."
  - 1. Grade: Custom.
  - 2. Backsplash: Per Construction drawings.
  - 3. End Splash:
- B. Countertops: **1/2-inch- (12.7-mm-)** thick, solid surface material with front edge built up with same material.
- C. Backsplashes: **1/2-inch- (12.7-mm-)** solid surface material.
- D. Fabricate tops with shop-applied edges and backsplashes unless otherwise indicated. Comply with solid surface material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

- E. Joints: Fabricate countertops without joints.
- F. Cutouts and Holes:
  - a. Provide vertical edges, rounded to 3/8-inch (10-mm) radius at juncture of cutout edges with top surface of countertop, slightly eased at bottom, and projecting 3/16 inch (5 mm) into fixture opening.

## 2.3 INSTALLATION MATERIALS

- A. Adhesive: Product recommended by solid surface material manufacturer.
- B. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint Sealants."

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates to receive solid surface material countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install countertops level to a tolerance of 1/8 inch in 8 feet (3 mm in 2.4 m), 1/4 inch (6 mm) maximum. Do not exceed 1/64-inch (0.4-mm) difference between planes of adjacent units.
- B. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.
- C. Secure countertops to subtops with adhesive according to solid surface material manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- D. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
- E. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.
- F. Install aprons to backing and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Predrill holes for screws as recommended by manufacturer.



- G. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.
  - 1. Seal edges of cutouts in particleboard subtops by saturating with varnish.
- H. Apply sealant to gaps at walls; comply with Section 079200 "Joint Sealants."

END OF SECTION 123661.

**20 00 00 BASIC MATERIALS AND METHODS**

20 00 01 GENERAL

- A. This Section includes procedural requirements for the Work of Divisions 20 – 29 to supplement the requirements specified in Division 1.
- B. The organization of the Specifications into Divisions, Sections and Subsections, and the arrangement of the Plans shall not in and of itself divide the Work among the Contractors and Subcontractors nor establish the Work to be performed by any trade.
- C. The “Scope of Work” and “Work Included” under each respective sectional heading, nevertheless, attempts to segregate the Work by known contracting activities. In the final analysis, the General Contractor shall be responsible for scoping the work for each trade based on local practice to include all the Work of a given type in the related proposal, regardless of where and how identified in the Bid Documents.

20 00 02 SCOPE OF WORK

- A. This project is for a renovated Sterile Receiving Department at UMC UMTH, for University of Missouri – Columbia, located at 1 Hospital Drive, Columbia, MO.
- B. The Mechanical Work for this project shall include all material, labor and services necessary for and incidental to providing the following systems (respective Sections of the Specifications are noted in the right hand column):
  - 1. Basic Mechanical Materials and Methods 20
  - 2. Insulation Work 20
  - 3. Fire protection system 21
  - 4. Plumbing Work 22
  - 5. HVAC Piping and Equipment 23
  - 6. Air Distribution 24
  - 7. Temperature Control Systems 25

20 00 03 REFERENCES

- A. The Plans, the general provisions of the Contract, including the General, Supplementary and/or Special Conditions and specification sections of Division 1 shall apply to Work of Divisions 20 - 29 of the Specifications.
- B. All provisions and conditions cited in this Section shall apply to Work for all other sections of Divisions 20 – 29 of these Specifications.

20 00 04 REFERENCES, REGULATORY REQUIREMENTS

- A. All material and equipment shall be listed, labeled or certified by Underwriters Laboratories, Inc., where relevant standards have been established (see also Paragraph 20 00 60). Material and equipment, which are not covered by UL Standards, will be acceptable provided they meet safety requirements of a nationally recognized testing laboratory. Products which no nationally recognized testing laboratory accepts, lists, labels, certifies or determines to be safe will be considered if inspected or tested in accordance with national industrial standards

such as NEMA or ANSI. Evidence of compliance shall include test reports and definitive submittals.

- B. Pressure vessels and pressure retaining safety devices shall be certified in accordance with applicable requirements of the ASME Boiler Code.
- C. Definitions:
1. **“Listed”**: A product is “listed” if of a kind mentioned in a list which: Is published by a nationally recognized laboratory which makes periodic inspections of such production. States that such product meets nationally recognized standards or has been tested and found safe for use in a specified manner.
  2. **“Labeled”**: The product is “labeled” if: It embodies a valid label or other identifying mark of a nationally recognized testing laboratory such as UL, Inc. Production is inspected periodically by a nationally recognized testing laboratory. The labeling indicates compliance with nationally recognized standards or tests to determine safe use in a specified manner.
  3. **“Certified”**: The product is “certified” if: The product has been tested and found by a nationally recognized testing laboratory to meet nationally recognized standards or to be safe for use in specific manner. Production is inspected periodically by a nationally recognized testing laboratory. The product bears a label, tag or other record of certification.

#### 20 00 05 DEFINITIONS

- A. The term **“unfinished space”** as used in Division 20 - 25 of the Specifications shall be a mechanical or electrical equipment room. These are rooms that are generally unpainted and accessible only to building maintenance personnel.
- B. The term **“finished space”** as used in Division 20 - 25 of the Specifications shall mean any space not defined as “unfinished space” (i.e. occupied rooms, corridors, stairways, closets, etc.).
- C. The term **“exterior”** or **“outdoors”** as used in Division 20 - 25 of the Specifications shall mean exposed to atmospheric weather conditions.
- D. The term **“interior”** or **“indoors”** as used in Division 20 - 25 of the Specifications shall mean not exposed to atmospheric weather conditions.
- E. The term **“concealed”** as used in Division 20 - 25 of the Specifications shall mean anything that is not visible in a “finished space”.
- F. The term **“inaccessible”** as used in Division 20 - 25 of the Specifications shall mean located within walls or above non-lay-in ceiling (i.e., drywall, plaster).
- G. The term **“packaged”** as used in Division 20 - 25 of the Specifications shall be construed to be a factory manufactured piece of equipment for which all components are totally assembled, prepiped and prewired within its own structure and ready to operate when connected to proper external mechanical and electrical services.
- H. The term **“cold piping system”** as used in Division 20 - 25 of the Specifications shall be a piping system containing media at or below 79 degrees F temperature.

- I. The term “**ambient piping system**” as used in Division 20 - 25 of the Specifications shall be a piping system containing media which is neither heated nor chilled and remains at a temperature range between 80 and 109 degrees F temperature.
- J. The term “**hot piping system**” as used in Division 20 - 25 of the Specifications shall be a piping system containing media at or above 110 degrees temperature.

20 00 06 CODES, STANDARDS, ETC.

- A. The material, workmanship and systems for Work of this Division shall comply with all applicable codes, standards, regulations and laws of the legal governmental jurisdiction at the project site.
- B. Should the Contractor perform any work that does not comply with the requirements of the applicable codes, standards, regulations, statutes, laws, acts, or which does not receive the approval of the responsible inspection authority, Contractor shall bear all costs arising in correcting the deficiencies.
- C. Applicable requirements of the current and accepted edition of the following industry standards, codes and specifications shall apply to the Work for Divisions 20 - 29:

AGA	American Gas Association	20
AMCA	Air Moving and Conditioning Association	24 00 00
ANSI	American National Standards Institute	20 10 00
API	American Petroleum Institute	23 00 00
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers	
ASME	American Society of Mechanical Engineers	20 10 00
ASSE	American Society of Sanitary Engineers	22 00 00
ASTM	American Society of Testing and Materials	20 10 00
AWS	American Welding Society	23 00 00
AWWA	American Water Works Association	22 00 00
CISPI	Cast Iron Soil Pipe Institution	22 00 00
IEEE	Institute of Electrical & Electronic Engineers	
IPCEA	Insulated Power Cable Engineers Association	
MSS	Manufacturers Standardization Society of Valve and Fitting Industry	20 10 00
NIST	Institute of Science and Technology	20 10 00
NEC	National Electric Code, including amendments by local authority having jurisdiction	
NEMA	National Electrical Manufacturers Association	
NFPA	National Fire Protection Association	21 00 00
NSF	National Sanitation Foundation	22 00 00
NIOSH	National Institute of Occupational Safety and Health	
OSHA	Occupational Safety and Health Act	
SMACNA	Sheet Metal and Air Conditioning Contractors National Association	24 00 00
UL	Underwriters Laboratory, Inc.	

END OF SECTION



## **20 10 00 BASIC MECHANICAL MATERIALS and METHODS**

### 20 10 01 GENERAL

- A. This Section describes and specifies basic mechanical materials and methods to be utilized in the Work included in other sections of Divisions 20 - 25.
- B. The Plans, the general provisions of the Contract including the General, Supplementary and/or Special Conditions and specification sections of Division 1 shall apply to Work of Divisions 20 - 25 of the Specifications.
- C. Provisions and conditions cited in this Section shall apply, where and when relevant, to Work of other sections of Divisions 20 - 25 of these Specifications.

### 20 10 02 REGULATORY REQUIREMENTS

- A. Work for this section of the Specifications shall be performed in accordance with the Codes, Standards, etc. as identified in Division 20.

### 20 10 03 RELATED SECTIONS of the SPECIFICATIONS

- A. Requirements of the following Section(s) of the Specifications apply to Work of this Section:
- B. Division 20 - Basic Mechanical Conditions
- C. Requirements of this Section of the Specifications shall apply to Work of the following sections of Divisions 20 - 29:
  - 1. Division 20 - Insulation Work
  - 2. Division 21 - Fire Protection System
  - 3. Division 22 - Plumbing Work
  - 4. Division 23 - HVAC Piping and Equipment
  - 5. Division 24 - Air Distribution System
  - 6. Division 25 - Temperature Control System

### 20 10 04 WORK INCLUDED

- A. Furnish material, labor and services necessary for and incidental to the installation of the following work where shown on the Plans and as hereinafter specified. Include all necessary work in related sections of the Specifications (sub-section 20 10 03) to perform the Work completely.
- B. Identification of piping and equipment for the work of Divisions 20 - 25.
- C. Testing, adjusting and balancing of systems for the work of Divisions 20 - 25.
- D. Cleaning of piping and equipment for the work of Divisions 20 - 25.
- E. Painting of piping and equipment for the work of Divisions 20 - 25.
- F. Demolition for the work of Divisions 20 - 25.

20 10 05 WORK NOT INCLUDED

- A. Materials and methods are specified in this section for the work of Divisions 20 - 25. The Work, itself, is specified in the respective sections of Divisions 20 - 25 of the Specifications.

20 10 06 SUBMITTALS

- A. The Contractor shall submit materials for the Work of Divisions 20 - 25 for approval in accordance with Section 20 00 43. The requirements are enumerated in the respective sections of Divisions 20 - 25 of the Specifications.
- B. Single and multiple manufacturers are cited in this Sub-section as acceptable sources of piping material. While “or equivalent” is not included, the intent of this Section is to permit substitution as defined in Sub-section 20 00 51, EQUIPMENT MANUFACTURERS, unless “no substitution allowed “ is noted.
- C. The following shall be submitted under this section of the specification:
1. Firestop schedule and product data, see Section 20 10 20 for specific requirements.
  2. Coordination drawings, see Section 20 10 53 for specific requirements.
  3. Testing and Balancing, see Section 20 10 80 for specific requirements.
  4. Identification, see Section 20 10 90 for specific requirements.
  5. Commissioning, see Section 152300 for specific requirements.

20 10 07 SPECIAL REQUIREMENTS

- A. Special requirements for work shall be specified in the respective sections of Divisions 20 - 25 of the Specifications.

**20 10 10 BASIC PIPING MATERIALS**

A. General:

1. The intent of sub-sections 20 10 11, 20 10 12, and 20 10 13 is to identify materials that may be utilized for Divisions 20 - 25 Work as specified for each specific piping system. Piping, hangers, valves, fittings and joining materials for Division 21 Fire Protection shall be FM Global and U.L. listed as specified in Division 21 and may not necessarily be as specified in this section; however all methods and procedures which are not in conflict with those permitted by NFPA shall govern.
2. Respective piping materials shall be manufactured, fabricated and/or provided in accordance with the ANSI, ASTM, ASME or other accepted industry standard as specified herein.

20 10 11 PIPE AND TUBE

A. General:

1. All pipe and tube material shall be uncoated, unless specified otherwise.
2. Manufacturer's mill reports and applicable documents to certify the validity of procured piping materials shall be on file at the Contractor's office.

B. Steel pipe:

1. Steel pipe shall be specified by finish, size by nominal diameter, ASTM specification number, manufacturing process, wall thickness (by schedule number or decimal dimension) and end preparation as follows:

2.

ASTM finish	mfr. spec#	wall method	size thickness	end range	prep
black	A-53	CW/ERW	Sch 40, 80	2" and smaller	T&C
black	A-53	SMLS	Std, Sch 40,80	all	PE/T&C
black	A-106	SMLS Grade A	Std, Sch 40,80	all	PE/T&C
galv	A-53	SMLS Grade A	Std, Sch 40,80	all	PE/T&C

- a. Per ANSI B36.10, schedule 40 is standard weight pipe for 10" pipe size and smaller.
- b. Schedule 80 in this pipe size range is extra strong pipe.
- c. Standard weight pipe for all sizes 12" and larger is 0.375" wall thickness and are generally not referred to by schedule number.
- d. Outside diameters of pipe sizes 14" and larger are even whole numbers (e.g. - 18" O.D., 20" O.D., etc.)

CW = continuous weld  
 ERW = electric resistance weld  
 SMLS = seamless  
 PE = plain end  
 T&C = threaded and coupled

3. All steel pipe shall be mill coated and rust free.

C. Copper tube:

1. Type L, and M copper tube shall be in accordance with ASTM B88. Tubing is available in various finished products and wall thickness, which must be called out as well as sizes



being either “nominal” or “outside diameter” (O.D.) since there are overlaps in smaller sizes.

2.	size	annealed		application
type	range	hard	soft	
L	1/4"-8"	x		general use, HVAC, refrig., plumbing (ASTM B-88)
M	1/4"-8"	x		lightest, gravity drains and vents (ASTM B-88)
DWV	1-1/4"-6"	x		plumbing drains and vents (ASTM B-306)

D. Cast iron pipe:

1. Hub and spigot soil pipe shall be accordance with ASTM A-74. Available in service weight and extra heavy, both with coal tar coating, 5 foot and 10 foot lengths, single and double hub ends, range 2" - 15" diameter.
2. No-hub soil pipe shall be in accordance with ASTM A-888, CISPI 301. Available with coal tar coating, 5 foot and 10 foot lengths, range 1-1/2" - 10" diameter.

20 10 12 FITTINGS

A. Cast iron:

1. Screwed fittings and flange unions: 125# standard and 250# extra heavy threaded in accordance with ANSI B16.4 (except plugs and bushings which are ANSI B16.14). Available in black or galvanized, range 1/4" - 8".
2. Flanged fittings and flanges: 125# standard, flat faced in accordance with ANSI B16.1. 250# extra heavy, raised face in accordance with ANSI B16.2. Flange facing and drilling shall be in accordance with ANSI B16.5. Available black and limited galvanized, range 1-1/2" - 12".
3. Flanged elbows shall be long radius (1.5 x diameter), short radius elbow are not permitted, unless specifically noted.
4. Drainage fittings: recessed pitched threads for non-pressurized applications. Available in standard black uncoated, coated or galvanized, range 1-1/4" - 8".
5. Soil pipe hub and spigot and no-hub fittings shall be accordance with ASTM A-74, ANSI A-112.5.1, CISPI std #301 and HS-82. Hub and spigot fittings available in service weight and extra heavy, coal tar coating, range 2" - 15" diameter. No-hub fittings with coal tar coating, range 1-1/2" - 10".

B. Forged steel:

1. Fittings: 2000#, 3000# and 6000# threaded in accordance with MSS SP49 - SP50. 3000# and 6000# socket weld in accordance with ANSI B16.11/MSS SP79. Available black and electro zinc plated; socket weld for schedule 80 bore. Range 1/8" - 4".
2. Unions: 3000# threaded and socket weld, steel to steel and brass to steel; 6000# threaded and socket weld, steel to steel only all in accordance with MSS SP83. Available 3000# black and electro zinc plated, 6000# black only, range 1/8" - 4".
3. "Weldolets, Thredolets, Sockolets and Elbolets": In accordance with ANSI B36.10/ASTM A216, except Elbolets which are ANSI B16.11. Weldolets available standard and extra strong, black only, range 1/8" - 24". Others available 3000# and 6000#, black only, range 1/8" - 4" (limited). Source: Bonney Forge.

C. Butt weld:

1. Butt welding fittings shall be in accordance with ASTM A-234 and ANSI B16.9. End preparation of butt welding fittings shall be in accordance with ANSI B16.25.
2. Elbows shall be long radius (1.5 x diameter), short radius elbows, and 180-degree returns are not permitted, unless specifically noted.

D. Forged steel flanges:

1. 150# and 300# forged steel flanges shall be manufactured to the requirements of ASTM A-181 with dimension in accordance to ANSI B16.5. Flange faces shall be flat or raised face as required.
2. Forged steel flanges shall be furnished as weld neck pattern. Slip-on, lightweight slip-on (drilled to 125# ANSI standards) and orifice flanges shall be provided only where specified and/or noted.

E. Copper (alloy and bronze) shall be in conformance with the following ANSI specifications:

1. Cast bronze threaded fittings: ANSI B16.15
2. Cast copper alloy solder fittings: ANSI B16.18
3. Wrought copper pressure solder fittings: ANSI B16.22
4. Cast copper DWV solder fittings: ANSI B16.23
5. Cast bronze flanged fittings: ANSI B16.24
6. Cast copper alloy for flared tubing: ANSI B16.26
7. Wrought copper DWV solder fittings: ANSI B16.29
8. Short radius 90 degrees elbows and 180 degree returns are not permitted, unless specified and/or specifically noted.

F. Grooved:

1. All grooved components shall be of one manufacturer made in accordance with ANSI B-31.1, B-31.9. Fittings shall be ANSI 150#, 300# cast of ductile iron in accordance with ASTM A-536, Grade 65-45-12. Fittings shall have an enamel finish. Segmentally welded fittings are not acceptable.
2. Only the following fittings will be accepted: Long radius (1.5 x diameter) 90° and 45° elbows, tee, reducing tee, concentric/eccentric reducers, and flange adapter nipples. Flange rings, reducing couplings, saddle tee, and others not listed above are not acceptable.

20 10 13 VALVES

A. General:

1. It is indented that valves specifications are for high quality HVAC / Plumbing applications, not lesser quality “Contractor / Value / Economy” series. Valves produced internationally shall be from the Manufacturer’s owned facilities. Valves shall not be manufactured by third party OEM suppliers. Valve submittal shall indicate where the valve is assembled and tested.
2. When two or more valves of the same type are to be used in the same service, all valves of this type shall be of the same manufacturer.
3. Only general valve series are specified. Valves shall have all options, trim, seat material, and accessories as specified whether or not listed as a prefix, suffix or valve number.
4. All valve manufacturers and models listed shall be considered as “acceptable manufacturers” and may be submitted without concern from subsection 20 00 62

5. All valves for use in “cold” piping shall have stem or neck extensions allowing proper insulation and a continuous vapor barrier.
6. No asbestos packing allowed.

**B. Ball Valve:**

1. 2” and smaller: Bronze ASTM B584 (or low lead bronze for lead-free), 2-piece body, 600 psi WOG, quarter turn lever handle, blow-out proof stem, stem extension (for “cold” applications), full port, virgin TFE seats, all stainless steel trim, threaded or soldered ends. Nibco S-585-70-66, Apollo 77-240, Watts Series B-6081, Hammond 8311 or approved equivalent. Full port valves 2 ½” and 3” the same model numbers as the 2” and smaller valves are also acceptable.
2. 2-1/2” - 3”: Bronze ASTM B584 (or low lead bronze for lead-free), 2-piece body, 600 psi WOG, quarter turn lever handle, blow-out proof stem, stem extension (for “cold” applications), standard port, virgin TFE seats, all stainless steel trim, threaded or soldered ends. Nibco S-585-66, Apollo 70-240, Watts Series B-6001, Hammond 8511 or approved equivalent. Full port valves 2 ½” and 3” the same model numbers as the 2” and smaller valves are also acceptable.
3. 2-1/2” and smaller: Bronze 3 piece body, 600 psi WOG, quarter turn lever handle, blow-out proof stem, stem extension (for “cold” applications), full port, TFE seats, bronze trim, threaded or soldered ends. NIBCO figure 595-Y-66, Apollo 82-200, Milwaukee BA-360, Hammond 8613, Watts B-6800, or approved equivalent. Full port valves 2 ½” and 3” the same model numbers as the 2” and smaller valves are also acceptable.
4. Ball valves used for chilled water shall have insulated T-handle Nibco Nib-Seal, Apollo ThermaSeal, Hammond Valve Insulator/MS.
5. Gauge cocks where not specified or specifically identified shall be ¼” bronze 2 piece body ball valves with lever handle and threaded ends per the above specification.
6. Drain valves and air vents shall be ¾” bronze 2 piece body ball valves per the above specification, with ¾” hose end adapter cap and chain. In ½” through 2” pipe, contractor may use Webstone model T-drain.

**C. Balancing Valves:**

1. General: Balance valves shall provide positive shut-off for service and shall have adjustable memory stops to allow returning to original balanced position after servicing.
2. 3” and smaller: Body shall be bronze or Dezincification Resistant Brass rated to 300 psig. Valves shall be multi-turn, provide positive shut off; include: position indication, memory stops, integral pressure tap ports provided with “drip caps”. Quarter turn valves are not acceptable. Balance valves shall be Nibco 1810, Tour and Anderson 786/787, Apollo 59A, Armstrong CBV, Macon Balancing STV/L Series or approved equivalent.

**D. Check:**

1. Check valves installed at pump discharge size 2 ½ and larger shall be Silent type, size 2” and smaller may be swing type.
2. 2” and smaller: Class 125 (125 psi at 400°F, 200 psi at 150°F), bronze, horizontal swing, vertical up-flow, Y pattern, teflon renewable seat and disc in conformance with MSS SP80. Nibco 413, Grinnell 3300, Watts 5000, Crane 1707, Hammond IB904, Stockham B320, or approved equivalent.

## **20 10 20 MISCELLANEOUS MATERIALS**

### 20 10 21 SLEEVES (NON-WATER PROOF, NON-FIRE RATED)

- A. Piping passing through non-fire rated interior walls or floors shall be neatly field cut round holes with hole saws for non-masonry/concrete, and core drill for masonry/concrete. "Beating" an opening in a gypsum or masonry wall shall not be accepted.
- B. Install Schedule 40 pipe sleeves where pipes passing through floors of spaces where water could leak to the area below (i.e., mechanical rooms, janitor closets, kitchens, etc.). ID of pipe sleeve shall accommodate pipe insulation. Pipe sleeve shall extend a minimum of 4" above the finished floor, grout the annular space between the oversized core drill in the floor and the sleeve.
- C. In new construction, field formed walls or floors, the contractor shall install appropriate blocking or material or pipe sleeves.

### 20 10 22 FIRESTOPS AND SMOKESTOPS, FIRE RATED/SMOKE PARTITIONS.

- A. All penetrations through rated assemblies, walls, shafts, floors, roofs, etc., shall be firestopped in accordance with Local Building Codes, NFPA, U.L. Fire Resistant Directory, and manufacturer's instructions.
- B. Provide a FIRESTOP PRODUCT SCHEDULE consisting of the following minimum information:
  - 1. Type – indicate the type of materials, or system.
  - 2. Manufacturer – manufacturer's name, product name and product number.
  - 3. Mechanical System – indicate which Divisions 20 - 25 items the product is utilized for.
  - 4. Rating – indicate the fire rating and UL detail numbers.
- C. Submit the following with the above FIRESTOP PRODUCT SCHEDULE:
  - 1. Manufacturer's specifications and technical data including installation instructions.
  - 2. Details of each proposed assembly.
  - 3. Manufacturer's representative who shall provide qualified engineering judgments and drawings for non-standard applications.
  - 4. Contractor's qualifications and related experience.
- D. Materials shall be stored per the manufacturer's recommendations and as specified for General Project storage in Division 20.

### 20 10 23 SEALS, NON-FIRE RATED

- A. All penetrations through non-rated walls, floors, etc., shall be sealed for draft stopping with caulk, putty, etc., designed for this use.

### 20 10 24 ESCUTCHEONS

- A. Wall, floor, and ceiling plates shall be spun brass, plain pattern, chrome plated, spring type or setscrew fastening. Provide escutcheons for all exposed piping in finished spaces.

20 10 25 ACCESS DOORS

- A. Access to mechanical equipment and ductwork of Divisions 20 - 29 required for testing, adjusting, inspection, maintenance or servicing shall be the responsibility of the Contractor. Doors for manufactured equipment shall be an integral feature included with the respective equipment. Access openings in ductwork shall be included with the fabrication in accordance with SMACNA practices.
- B. Openings in building components for access to concealed mechanical work shall be furnished by the Contractor and installed with the building construction work. Access doors shall be located as indicated on the Plans or as strategically required for inspection, maintenance, and service. The model and style shall fit the building construction, fire rating requirements and provide adequate size and function.
- C. Access doors shall be sized as shown on the drawings or shall be a minimum size of 18" x 18" and otherwise shall be large enough for purpose intended and shall be fabricated of heavy gauge steel frames and door panels with double action concealed spring hinges, 1/4 turn flush screwdriver operated cam locks and prime coat paint finish. Access doors for various applications shall be as follows:
- |   |                                       |
|---|---------------------------------------|
| <u>building construction:</u>                                 | <u>Milcor access door:</u>            |
| flush door in dry wall construction (walls and ceilings)      | style DW                              |
| flush door in masonry or tile walls with exposed frame flange | style M (steel), Style MS (stainless) |
| flush door in plaster construction (walls and ceilings)       | style K                               |
| recessed door in acoustical plaster ceiling                   | style AP                              |
| recessed door in suspended drywall ceiling                    | style CT (aluminum - wet locations)   |
| flush door in suspended drywall ceiling                       | style CF (aluminum - wet locations)   |
| door in suspended drywall ceiling                             | style ATR (fire resistive door)       |
| fire rated separation (walls and ceilings) - fire rated door  |                                       |
- D. Access doors are not required for Work above lay-in panel ceilings.
- E. Submittals shall indicate schedule of locations, sizes, types, adjacent building construction, finish, fire rating including thickness and type of insulation, conformance to UL requirements and associated labeling, metal and gauge of fabrication. Access door shall be as manufactured by Karp Associates, Milcor, or Higgins MfCO.

20 10 29 RESTRICTIONS, GENERAL FOR ALL PIPING SYSTEMS

- A. Do not use gaskets or packing containing asbestos.
- B. Selections of material and equipment and options for substitution shall conform to the requirements of Sub-section 20 00 60, MATERIAL and EQUIPMENT.
- C. "Bull head" tee connections are not permitted, unless approved by the Engineer.
- D. Close nipples and bushing reducers are not permitted.
- E. Slip joints are permitted in sanitary drainage systems only, on the fixture side of traps.
- F. Mitered elbows are not permitted in welded pipe construction.

- G. Solder for use in joints of copper piping for domestic (sanitary) cold water, hot water, hot water recirculating and softened water shall not contain lead.
- H. Black and galvanized pipe, fittings, nipples and specialties are not permitted in water piping systems where copper and/or brass are the basic materials.
- I. Short radius 90-degree elbows and 180-degree returns are not permitted, unless specified and/or specifically noted.
- J. The use of pipe hooks, chain and perforated band iron are not permitted for hanging or supporting piping.
- K. Power driven inserts and attachments are not permitted unless approved by the Architect/Engineer on express request by the Contractor.
- L. Welded attachments to the structural steel of the building are not permitted unless otherwise noted or approved by the Architect/Engineer on specific request of the Contractor.
- M. Hose kits for terminal units shall not be permitted.

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## **20 10 30 JOINTS AND CONNECTION METHODS**

### 20 10 31 THREADED

- A. Threads for all screwed pipe systems shall be American National Standard taper threads in accordance with ANSI B-1.201.
- B. Threads shall be full, sharp, clean and free of fins and burrs. Pipe ends shall be reamed to remove internal burrs.
- C. Threaded connections shall be joined using teflon sealing tape applied to the male threads only.
- D. D. This sub-section does not apply to threads for compression, flare and sanitary drainage slip type drainage fittings.

### 20 10 32 WELDED

- A. Welded joints shall be “V” type butt welds in accordance with ANSI B31.1.
- B. The Contractor shall only use welders regularly engaged in the piping trades and certified by the National Certified Welding Bureau, using procedures set forth in ASME Boiler Construction Code, Section IX, “Welding Qualifications”.
- C. Contractor shall keep a copy of welder's certification on file at Contractor's office. Upon request the Architect/Engineer may request Contractor to produce certifications. Any pipe installed by a non-certified welder shall be removed if requested by Architect/Engineer.
- D. All steel piping shall be cleaned of mill scale and rust before assembly. Welds shall be chipped and hammered after each pass and joints shall be built up to at least the same thickness as that of the pipe wall. All welding shall be done in accordance with the welding procedures of the National Certified Pipe Welding Bureau conforming to the requirements of the ASA Code for Pressure Piping.
- E. Architect/Engineer shall have the authority to accept or reject the welds and require random samples of installed welds to be removed, tested and inspected.

### 20 10 33 GROOVED

- A. Grooved joints for grooved couplings and fittings shall be in accordance with accepted manufacturer's specifications and practices.
- B. Grooves may be cut or rolled in accordance with manufacturer's recommendations for type of pipe, sizes and thicknesses specified for respective systems.
- C. Gaskets shall be suitable for the temperature, pressure and compatibility with the fluid contained therein. Unless specifically specified otherwise or incompatibility with the system, gaskets shall be EPDM grade E.
- D. Grooved couplings shall be ASTM-A47 grooved malleable iron clamp type couplings as manufactured by Victaulic or equivalent.
- E. Grooved couplings for vibration isolation or as unions at equipment connections shall be similar to Victaulic Style 77; all others shall be similar to Victaulic Style 07.



20 10 34 SOLDERED AND BRAZED

- A. Soldered and brazed connections shall be made in accordance with recommendations of the current edition of the Copper Tube Handbook of the Copper Development Association or as hereinafter specified.
- B. General criteria for soldered and brazed joints shall be as follows:
  - 1. Copper tubing shall be square-end cut by varied methods at the Contractor's option. The ends of the tubing shall be reamed to remove both internal and external burrs.
  - 2. Joints for copper piping for hydronic systems, domestic water, temperature controls, DWV systems and other applications of fluids below 250 degrees F. shall be soldered with 95-5 Tin Antimony. 50-50 Tin Lead solder shall not be used.
  - 3. Joints in copper piping where otherwise specified shall be brazed with Copper Phosphorus (BCuP Series), Silver solder (BAg Series), or other approved high temperature brazing alloy.
  - 4. Cleaning of tubing and fittings, application of flux and heat, purging and cooling shall be in accordance with recommendations of solder and brazing alloy manufacturers for the joint type and material specified in the respective "PIPING MATERIAL SCHEDULE" in Section 155000.

20 10 35 CAST IRON PIPE AND FITTINGS

- A. Joints for hub and spigot and no-hub cast iron soil pipe and fittings shall be installed in accordance with recommendations of the CISPI, unless noted otherwise.
- B. Do not use joint material which has deteriorated or which does not spread easily or smoothly.
- C. No-hub couplings shall be NSF Listed and conform to the requirements of CISPI 310, ASTM C1277, FM1680, IAPMO 35-89 and gaskets shall comply with ASTM C564.
  - 1. Band, screw housing, screw, and shield shall all be stainless steel.
  - 2. 1-1/2" through 4" couplings shall have a minimum of two clamps. 5" through 10" couplings shall have a minimum of four clamps. 12" through 15" coupling shall have a minimum of six clamps.
  - 3. Medium duty couplings (80 in./lbs) shall be ASTM C1540: Anaco/Husky HD-2000, Ideal 'MD', Mission HeavyWeight, Clamp-All Hi-Torque 80, MIFAB X-Hub, Thermafit Industries POC.

20 10 36 MECHANICAL JOINTS

- A. Mechanical joints and joining material shall meet the requirements of ANSI/AWWA C111/A21.11.
- B. Clean bell and plain end, and lubricate gasket as recommended by manufacturer. The joint area must be free of dirt.
- C. All bolts and tie rods shall be galvanized. Tighten bolt to 75-90 ft.-lbs. torque alternating from top to bottom maintaining equal distance between face and gland during tightening.
- D. Where flanged joints are used to interface with equipment or other piping materials they shall be flanged joints in accordance with ANSI B16.1. The gaskets shall be full forced, made of rubber and shall meet the requirements of ANSI B16.21.

**20 10 40 HANGERS, SHIELDS, SUPPORTS AND ANCHORS**

A. General:

1. All hanger devices (e.g. - concrete inserts, expansion anchors, clamps, pipe hangers, strut, etc.) shall be UL approved for the intended service. Material shall be applied within the load limitations prescribed by the respective manufacturer. Loads transmitted to the building shall be within the limitations of the structure.
2. Acceptable manufacturers of hanger material are Anvil International, B-Line Systems, Inc., Tolco, PHD Manufacturing, ERICO/Michigan Hanger Co., National Pipe Hanger Corp.
3. This section shall not apply to Division 21 Fire Protection.

20 10 41 HANGERS

- A. Piping shall be supported from the building structure, walls, and floors. Piping shall not be supported from other piping, ductwork, conduits, etc. Loads shall be within the allowable load of building component that is connected to. Piping loads shall include, but not limited to, the weight of the piping, valves, specialties, insulation, pipe covering, pipe content, pressure test media content, wind, snow, seismic, etc.
- B. Where piping is indicated on common trapeze hangers, racks, stanchions or brackets, the various trade contractors involved shall agree to a mutually acceptable arrangement among themselves, but each shall be responsible for the correctness and compliance of their work.
- C. Pipe hangers, supports, etc. for “cold” or “hot” piping systems shall have hangers sized for the outside diameter of the insulation in order to maintain a continuous vapor barrier.
- D. Pipe hangers for all “ambient” and “hot” piping systems shall be the same size as the pipe, except at roller hangers or supports where the treatment shall be the same as for “cold” piping systems.
- E. Hangers, and other supports, anchors, guides, etc. in direct contact with copper piping material shall be copper plated. All others shall be electro-plated for indoor use.
- F. The use of pipe hooks, chain, perforated band iron, wire, or cable are not permitted for hanging or supporting piping.
- G. Singular, horizontal, suspended piping above grade shall be hung with pipe hangers per the following schedule, unless noted otherwise:

<u>pipe sizes</u>	<u>piping application</u>	<u>Anvil International type and figure number</u>
3” and smaller	not subject to expansion/contraction	adjustable ring, #69
2-1/2” and larger	systems with pipe guides and anchors	adjustable steel yoke, #181 (2)
4” and smaller	copper pipe/tubing	adjustable ring, #CT-99

1. hanger to be sized for outside diameter of insulation and to be used with insulation protection shield, figure 167.

- 2. hanger to be sized for outside diameter of insulation and to be used with insulation protection saddle, figure #160 through figure #165.
- H. Hangers, supports, etc. shall position the piping properly in the work, and provide for expansion and contraction.
- I. Vertical piping shall be supported at each floor level with riser clamps bearing on the building structure or pipe sleeve.
- J. Pipe stands shall be field fabricated to meet the anticipated loads. The base plate shall be spaced 1" minimum above the finished floor with concrete or grout.
- K. Wall brackets shall be field fabricated to meet the anticipated loads. The minimum brace angle shall be 45° from the horizontal.

20 10 42 HANGER RODS AND HANGER SPACING

- A. Where "All-thread" rod is used it shall be galvanized, cadmium or zinc electro-plated. Where plain rod is used the threads shall be a minimum of 2" in length on each end.
- B. Hangers and hanger rod spacing for metallic piping shall be provided and installed in accordance with the Building Codes or the following schedule, whichever is more stringent:

<u>pipe size</u>	<u>rod diameter</u>	<u>max. hanger spacing</u>
1-1/4" & smaller	3/8" diameter	8' on centers
1-1/2" & 2"	3/8" "	10' oc
2-1/2" & 3"	1/2" "	10' oc

- C. Hangers for non-metallic piping shall be spaced in accordance with the Building Codes or the following schedule, whichever is more stringent:

<u>pipe size</u>	<u>rod diameter</u>	<u>max. hanger spacing</u>
1" & smaller	3/8" diameter	4' oc
1-1/4" - 2"	3/8" "	5' oc
3"	1/2" "	6' oc

20 10 43 ANCHORING

- A. Anchors for piping, ductwork, or equipment in new concrete construction may be suspended at the Contractor's option, or as shown on the plans, from inserts placed in the concrete as it is poured-in-place. Mechanical equipment rooms shall have inserts placed at a maximum of 4 ft. centers.

<u>hanger rod size</u>	<u>Grinnell insert figure number</u>
7/8" or smaller	single - CB universal, figure #282
7/8" or smaller	multiple - 1-5/8" x 1" continuous strut, #PS 449

- B. Anchors for piping, ductwork, or equipment in new concrete construction, existing concrete construction or new precast construction shall be suspended from epoxy resin set anchors, installed per the manufacturer's recommendations set into holes drilled into the concrete. Anchors shall be UL and/or FM approved, and applied within the allowable working load ratings for the respective size. Cataloged load values shall be derated by one third for seismic allowances. Minimum embedment depth shall be 2/3 of concrete thickness. Field pullout test shall be performed when requested by the Engineer. Anchors shall be Hilti type HVA.
- C. Anchors for piping, ductwork, or equipment in steel structured buildings shall be attached to the steel by bolting directly through the void in the bar joist chord or by using the appropriate

cataloged type C-clamp or beam clamp. The roof deck shall not be used for supporting the piping or ductwork.

- D. Welded attachments to the structural steel of the building are not permitted unless otherwise noted on the Construction Documents or where approved by the Architect/Engineer on specific request of the Contractor.
- E. Power driven inserts and attachments are not permitted unless approved by the Architect/Engineer on express request by the Contractor.
- F. In all cases, anchor loading shall be based on hanger spacing, weight of the pipe to be supported when full and insulated, weight of any additional loads imposed upon the anchor, wind loading, seismic loading, quality of the material that the anchor is being installed in, etc. The Contractor shall verify in the field that the anchors used and the materials that they are being installed in are suitable for the load imposed and shall bring any problems to the attention of the Owner's Representative in writing immediately.
- G. Where anchors are loaded in shear in existing concrete structure, suitably sized and installed wedge type anchors may be used. Wedge type anchors shall be Hilti Kwik Bolt II.

20 10 44 SEISMIC RESTRAINT

- A. All materials and workmanship shall specifically comply with the above listed Building Code with respect to seismic requirements for the support and anchorage of all mechanical systems and equipment as installed on this project. Lateral forces to be restrained shall be as required by ASCE 7 Section 11 and 13 Architectural, Mechanical, and Electrical Components and Systems. Refer to structural drawings and/or Geotechnical Report for design values.

-Site Class (ASCE 7-05, Table 11.4-1 and 11.4-2)	D
- Seismic Use Group	IV
- Seismic Design Category	D
- Spectral Acceleration, Short period ( $S_{DS}$ )	1.45

- B. All piping support and restraint details and practices shall conform to the publication "Seismic Restraint Manual Guidelines for Mechanical Systems" by SMACNA, 2008 Edition, and/or "Seismic Restraints" by B-Line systems, Inc.
- C. DELEGATED DESIGN: Design hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, herein referred to as Seismic engineer. Prepare drawings, calculations and details for any anchorage, bracing and/or sway bracing for seismic restraint as required by the local codes and Authority Having Jurisdiction. Seismic engineer shall inspect the final installation for compliance with the approved Seismic shop drawings. Seismic engineer to identify items that need to be corrected or changed and provide contractor additional/revised drawings as required.
- D. SUBMITTALS:
  - 1. SHOP DRAWINGS: Submit drawings, calculations and details shall be signed and sealed by a Professional Engineer licensed in the State of the Project's location.
  - 2. CLOSEOUT: As-built seismic drawings with Letter from Seismic engineer stating that the completed installation meets the design.

- E. INSTALLATION: Contractor shall only use those materials submitted and approved. Contractor shall notify Seismic Engineer when actual installation differs from the approved Seismic shop drawing.

## **20 10 50 BASIC MECHANICAL METHODS - GENERAL**

### 20 10 51 INTENT OF PROJECT DOCUMENTS

- A. Install the Work in accordance with the Project Documentation and considerations enumerated in Subsection 20 00 01, GENERAL (Project Documents).

### 20 10 52 ARRANGEMENT OF WORK

- A. All Work shall be arranged so that hangers and supports for the mechanical equipment and materials shall be within the load limitations of the structure and the respective hanger and/or support.
- B. Contractor shall not scale from drawings to determine the exact locations for devices, piping, ductwork, etc., but shall follow the architectural drawings, the structural drawings and the actual building conditions, in establishing dimensions and lines of run. The work shall be adjusted to accommodate interferences anticipated and encountered. The Contractor shall verify the exact material quantities and lengths required.
- C. Piping that is required to pitch shall have priority over piping that does not pitch. Work which cannot be changed in elevation shall have priority over that which can be moved. Offsets, transitions and changes in direction shall be made in piping and ductwork to maintain headroom and pitch whether or not indicated on the Plans. The Contractor shall provide air vents, traps, dirt legs, drains, lifts, sanitary vents, mechanical vent lines, etc. as required to install the mechanical systems for proper operation and maintenance.
- D. Do not install work in the immediate proximity of electrical components (e.g. - panels, switches, controls, boxes, etc.) in equipment rooms. Drip pans above and/or around electrical equipment are not permitted.
- E. Aluminum and copper products shall not be encased in concrete.
- F. Work in “finished spaces” shall be concealed within walls, chases or above the ceiling unless specifically indicated otherwise. Install the Work to coordinate with other trades and to conform to the architectural reflected ceiling plan.
- G. The work shall be installed parallel with the building lines unless specifically shown or noted otherwise.

### 20 10 53 COORDINATION

- A. Each Contractor shall prepare and submit coordination drawings (at a scale equal to or larger than the project documents) to the Architect/Engineer for review prior to any fabrication or installation.
- B. It shall be the Contractor's responsibility to coordinate their work with the work of other trades, and with the architectural and structural drawings. Where physical interferences cannot be resolved between the trades, or when encountered in the field, the Contractor shall prepare composite drawings at a scale of not less than  $3/8" = 1'-0"$  clearly showing the Work of Divisions 20 - 29 in relation to the Work of others to identify the conflict. Submit a proposed resolution to the Architect/Engineer for approval in accordance with Sub-sections 20 00 01, GENERAL (Project Documents) and 20 10 06, SUBMITTALS.

1. Do not proceed with Work in question until the matter is mutually resolved among the involved parties, and adequate information has been submitted to the Architect/Engineer for review. No additional compensation shall be granted for modifications and execution of the resolution(s). Modifications are to be incorporated in the “as-built” drawings.
- C. Contractor shall review the Project Documents, site conditions, and the requirements of other disciplines, and shall report any discrepancies between them to the Architect/Engineer and obtain from him written permission for changes necessary in the Mechanical Work. Subsequent clarification(s) by the Architect/Engineer will not be a change in scope of the Work. The Contractor at no addition in the contract price shall perform any such modifications required.
- D. Contractor shall verify tie-in locations to verify sizes, direction of flow (via pressure or physical tracing, not labels), materials, elevations, etc. prior to commencing new work. Contractor shall notify Architect/Engineer upon discovery of discrepancy. Work performed prior to verification will be corrected at no cost to Owner.
- E. The drawings shall not be scaled; obtain detailed information, shop drawings, installation and maintenance bulletins, etc. to determine exact requirements and to satisfactorily achieve the intent of the Project Documents.
- F. The Contractor shall furnish and properly install all sleeves, slots, chases, openings, recesses, supports, anchors and anchor bolts required for his Work in coordination with the other trades as the building is erected.
- G. The expenses for changes required by neglect in executing, coordinating or scheduling the Work properly or avoiding conflicts shall be borne by the Contractor precipitating the issue requiring the changes.

20 10 54 DELIVERY, STORAGE AND HANDLING

- A. Delivery, storage and handling of equipment and material are the Contractor's responsibilities. The Contractor shall perform the Work in accordance with the following criteria:
  1. Delivery shall be arranged by the Contractor (including Owner furnished items) for the expeditious and economical pursuit of the Work and to meet the scheduling requirements of the Contract.
  2. The Contractor will be assigned a “lay-down” area at the job site and shall confine temporary storage to this area.
  3. The Contractor may take delivery of equipment and material at his “shop” or an off-site location as suits the performance and schedule of the Work.
  4. Regardless of where and how equipment and material are temporarily stored prior to installation, or if installed at the job site prior to acceptance, the Contractor is responsible for the following:
    - a. All equipment and material shall be accessible to the Architect/Engineer for inspection.
    - b. All equipment and material shall be protected adequately and properly from the weather, dirt and water, chemical, mechanical or comprehensive damages.
    - c. The Contractor shall be liable for the repair and/or replacement (including labor) of any equipment and material lost, damaged or defective prior to acceptance.
  5. The Contractor shall arrange all labor, tools, services and scheduling to perform the handling of equipment and material for his Work.

20 10 55 GENERAL CLEANING

- A. Each Contractor and Subcontractor shall be responsible for progress and final clean-up of his respective Work in accordance with the Contract Documents, requisite ordinances and regulations. Clean-up and legal disposal of debris from the Work, excess refuse and presence at the job site shall be performed in a timely and satisfactory manner. If not, the Contractor shall be notified of the unsatisfactory condition. If the matter persists, the Contractor will be back charged for the clean-up performed by others.
- B. Clean exposed exteriors and limited access interior surfaces of all equipment, piping and ductwork of foreign matter to provide an “as new” condition.

20 10 56 CLEANING OF PIPING SYSTEMS

- A. The Contractor shall clean the respective piping system(s) that are included in his scope of work. All systems shall be flushed with water or air (depending on ultimate use) to relieve any congestion and internally cleanse the respective piping system. The Contractor shall provide all flushing media in sufficient quantity, inlet connections, discharge or drainage outlets and any temporary provisions to protect components, or remove it, to facilitate the flushing. Clean and replace all strainer screens and filters. Flush clean and drain all low points in the piping.
- B. Owner's representative shall be present for flushing, cleaning, and rinsing. Water treatment representative must check water after rinsing to insure all chemical cleaner has been removed and the Alkalinity of the rinse water is equal to that of the make-up water.
- C. All pipe systems for hydronic applications shall be flushed continuously with 100% city water make-up until the water runs clean from all drain locations. Each piping system shall be subsequently cleaned with recommended dosage of an approved pre-cleaning chemical designed to remove deposition such as pipe dope, oils, loose rust, mill scale and other extraneous materials for a minimum period of twenty-four (24) hours then drained, refilled, and rinsed clean. Flushing before and rinsing after cleaning shall be supplying constant make-up water while draining at all system low points and drains.
- D. New or repaired potable water systems shall be purged of deleterious matter and disinfected prior to utilization. The method to be followed shall be that prescribed by the health authority having jurisdiction or, in the absence of a prescribed method, the procedure described in either AWWA C651 or AWWA C652, or as described in this section. This requirement shall apply to “on-site” or “in-plant” fabrication of a system or to a modular portion of a system.
  - 1. The pipe system shall be flushed with clean, potable water until dirty water does not appear at the points of outlet.
  - 2. The system or part thereof shall be filled with a water/chlorine solution containing at least 50 parts per million (50 mg/L) of chlorine, and the system or part thereof shall be valved off and allowed to stand for 24 hours; or the system or part thereof shall be filled with a water/chlorine solution containing at least 200 parts per million (200 mg/L) of chlorine and allowed to stand for 3 hours.
  - 3. Following the required standing time, the system shall be flushed with clean potable water until the chlorine is purged from the system.
  - 4. The procedure shall be repeated where shown by a bacteriological examination that contamination remains present in the system.



20 10 57 PRESSURE TESTING

- A. The Contractor shall submit a schedule at the beginning of the Work of the piping systems that are to be pressure tested, and indicate whether tests will be for an entire or partial system. Entire piping systems shall be pressure tested at one time unless it is not possible or practical.
- B. All piping to be insulated or concealed shall be pressure tested prior to the application of the insulation or concealment.
- C. A representative of the Architect/Engineer shall witness all pressure testing. The Contractor shall notify the Architect/Engineer at least three (3) days prior to the test date.
- D. Each piping system shall be tested per the method, test pressure, and test duration as specified in the Piping Material Schedules.
- E. The Contractor shall provide all test media, measuring devices, inlet connections, test measurement connections, and disposal of test media. The Contractor shall protect, isolate and/or remove piping system components that can not be subjected to test pressures.
- F. Hammer each joint in welded or soldered piping while under test. Leaks shall be repaired and the test(s) repeated until the respective piping system is tight.

## **20 10 60 BASIC MECHANICAL METHODS - INSTALLATION**

### 20 10 61 GENERAL

- A. The Contractor shall install all equipment and material as specified in the Project Documents. The Contractor shall review the installation requirements, and provide all of the appurtenances and accessories required for complete systems and a functioning installation. The Contractor shall be prepared to submit installation details and procedures where specified or requested for approval by the Architect/Engineer.
- B. The Contractor shall follow the manufacturer's instructions for the handling, temporary storage, protection and installation of the respective equipment and material. The Contractor shall promptly notify the Architect/Engineer in writing of any discrepancy or conflict between the Project Documents and the manufacturer's instructions, and request clarification. Unless there is a specific change in the scope of work, no additional compensation shall be granted for modification(s) and execution of the clarification.
- C. Work performed that does not comply with the manufacturer's instructions, any approval or instructions from the Architect/Engineer, or that causes a significant and/or unapproved deviation from the intent of the Project Documents shall not be grounds for additional compensation for costs to modify the Work in a manner directed by and to the satisfaction of the Architect/Engineer.
- D. All Work shall be installed to permit access and/or removal of components (e.g. - coils, fan wheels and shafts, filters, guards, bearings, motors, mechanical drives, etc.) that require periodic maintenance, servicing, repair and/or replacement. Equipment, piping, ductwork, conduit and raceways shall be arranged to permit access to valves, motors, motor and temperature controls, and to clear the opening of doors and access panels.
- E. Welded attachments to the building structure are not permitted.

### 20 10 62 PIPING

- A. All piping shall be properly installed and supported with adequate provisions for clearance from other work, for expansion, contraction, slope, anchorage and prevention of transmission of vibration.
- B. Piping shall be generally installed parallel to building lines in the most expeditious and economical manner and to facilitate servicing. Piping shall be positioned and installed to provide noiseless circulation, and pitched to provide drainage and avoid air pockets. Valves and specialties shall be located to provide proper function and be readily accessible for servicing and maintenance.
- C. All piping connecting to equipment shall be installed without springing and any strain at final connections. The Contractor may be requested to disconnect piping to demonstrate that the piping has been so installed.
- D. Steel piping connections to equipment with rotating or reciprocating components shall be provided with a minimum of two grooved clamp type couplings per piping connection, which shall be Victaulic Style 77 couplings or equivalent. Copper piping connections to equipment with rotating or reciprocating components shall be provided with Mason Industries SafetyFlex model SFDEJ flexible joint. Air handling units with internal fan isolation are not included in the above.

- E. Changes in direction in the piping shall be made with manufactured fittings only. All elbows shall be long radius (1.5 x diameter) unless specifically noted otherwise. Bending may be permitted on submittal for approval of a satisfactory procedure to the Architect/Engineer for approval. Bending is to be accomplished with hydraulic type equipment producing no mal-formations in the piping.
- F. Full size branch connections and branch connections one size smaller in steel piping shall be made with manufactured fittings only. Branch connections two sizes and smaller than the main run may, in special cases with the Engineer's written permission, be made with manufactured fittings, weld-o-let or thread-o-let type fittings for welded piping construction, saddle type fittings for grooved piping construction or a pipe-to-pipe nozzle weld. Small branch connections for thermometers, pressure gauges, controls, etc. may be made with nozzle welded 3000# forged steel threaded couplings, thread-o-lets or saddle fittings. For insulated piping, provide branch connections with sufficient "neck" length to extend beyond the thickness of the insulation.
- G. Changes in direction in piping systems using hard temper copper tubing shall be made with manufactured and cataloged elbow fittings. Branch connections and reductions in all copper tubing systems shall be made with tee and reducer fittings. At the Contractor's option, utilizing a "Tee Turner" tool and corresponding procedure may provide branch connections. These joints shall be brazed and not soldered.
- H. Minimum slope for piping shall be provided in accordance with the following schedule, unless otherwise specified, noted or shown:

Type of Piping Fluid Conveyed	System Component	Pitch	Direction of Fall
Sewer, sanitary	main/branch	1/8"/Ft.	w/flow
Chilled/heating water	supply/return main	1"/40Ft.	from vent
Chilled/heating water	runouts to risers	1/8"/Ft.	back to mains
Condensate drain]		1"/20Ft.	w/flow
Domestic water		1"/40Ft.	to drain

- I. All piping materials shall be physically cleaned internally and externally of mill scale, oxidation, grease, oil, dirt, mud, loose and foreign matter before fabrication and installation.
- J. All open ends of piping and equipment shall be closed during fabrication and installation to keep dirt and foreign matter out of the Work.

20 10 63 VALVES

- A. Shut-off valves shall be provided at all inlet and outlet connections to equipment, at major branch connections to mains, where required for normal service, and where shown on the drawings, flow diagrams or details.
- B. Valves shall be the same size as the adjacent piping, except for control valves furnished in Division 25.
- C. Valves shall be accessible and free from interference when operated. Valves shall be installed with the stem on or above horizontal.
- D. Valves shall be packed and glands adjusted before final acceptance.

20 10 64 EQUIPMENT

- A. The Contractor shall furnish and install the necessary frames, stands, brackets, stiff-legs, hangers, etc. to support or suspend the equipment and material that require this installation arrangement. The Contractor shall be responsible for the size, quantity, location and design of the supports and suspensions. The design shall permit no deflection of the support, the suspension arrangement or related building members, nor impart any vibration into the building structure. Loads transmitted to the building shall be within the limitations of and distributed satisfactorily to the structure. Designs for supports and suspensions shall be submitted for approval to the Architect/Engineer. Any attachment to the floor shall be provided with a minimum of 1" thick concrete or grout between the base and the floor. All associated ferrous metal parts shall be painted or galvanized. Painting shall consist of one (1) coat of base primer on properly prepared surfaces and one (1) coat of rust inhibiting enamel, color selected by the Architect/Engineer.
- B. Each exposed mechanical drive and rotating shaft shall be provided with a protective guard. The guards may be provided with the respective equipment or may be field fabricated. The guard shall be constructed to comply with the appropriate safety requirements of the National Institute of Safety and Health and OSHA. Provide adequate and proper access for speed measurements for all rotating shafts. Guards shall not interfere with the lubrication of equipment nor restrict the airflow into fan inlets. The design for field fabricated guards shall be submitted for approval to the Architect/Engineer.
- C. All equipment having rotating or reciprocating components shall be provided with captive spring type vibration isolation mounts for seismic and restrained service. Mounts shall be selected at a maximum transmissibility of 0.03 (isolation efficiency of 97%) at the lowest anticipated operating speed of the equipment.
- D. Grease fittings for bearings shall be extended to accessible locations.
- E. Installation Instruction
1. Equipment shall be set level, plumb, properly oriented, aligned and secured in the location shown on the drawings.
  2. Shims used for leveling shall be of size sufficient to cover the entire bearing surface except where shims are used to level preparatory to grouting. Shims used in conjunction with grouting shall be located to properly support equipment at load points to prevent any distortion.
  3. Assembly and installation of the equipment shall be in strict compliance with the equipment vendor's instructions.
  4. Where specified, equipment shall be assembled, installed, inspected and adjusted under the supervision of the Vendor's representative.
  5. Lugs, saddles, supports, covers or similar components which have been shipped separately or loose shall be located and attached by the Contractor by means of welds or bolting.
  6. Holes in structural steel required for installation of equipment shall be drilled as required.
  7. Contractor shall supply and install self-anchoring anchors.
  8. The Contractor shall grout under the equipment to effect a firm permanent setting as required.
  9. Upon completion of installation the Contractor shall remove all staging, blocking and construction debris from the equipment.

10. The Contractor shall check all packaged or pre-assembled equipment to make sure that all packing shims and blocking is removed before rotating, running or testing the equipment.

20 10 65 MISCELLANEOUS

A. Sleeves, inserts, etc.

1. The Contractor shall furnish and properly install sleeves, inserts, supports, anchors and anchor bolts required for his Work. The size, quantity and location of chases, openings and recesses in the building structure shall be the responsibility of the Contractor performing the Work that requires these considerations. Patching of oversized openings and finishing thereof shall be the responsibility of the trade or Contractor requiring the opening. Material and labor for openings in new construction requiring structural framing including lintels and angles shall be furnished by the trade requiring the opening and installed by the General Contractor. Lintels shall be structural steel angles, channels, or tees of proper size and sections for the load supported.
2. Sleeves shall be provided for all penetrations through the building structure. Sleeves through floors shall extend 1" above the finished floor except where otherwise noted; sleeves through walls, partitions or structural members shall be flush with the exterior surface on both sides. Sleeves shall sized to include the pipe/duct insulation.
3. The space between the sleeve (or opening in the structure) and the pipe/duct or outside of the insulation of penetrations through fire rated components of the building shall be fire stopped, see Section 20 10 20 Miscellaneous Piping Materials. Penetrations through non-rated components of the building shall be draft stopped, see Section 20 10 20 Miscellaneous Piping Materials.

B. Unions and flanges:

1. A ground joint type union shall be provided in threaded and sweat joint piping, 2" and smaller pipe or tube size, down-stream of each branch shut-off valve, control valve and specialty item, the inlet and outlet connections of each piece of equipment, and where shown on the drawings.
2. Flanged connections shall be provided in piping 2-1/2" and larger at each manual valve, control valve, specialty item and the inlet and outlet of each piece of equipment.

C. Interconnections between dissimilar piping material systems shall be made with fittings manufactured for the specific application.

## **20 10 70 BASIC MECHANICAL METHODS - RELATED WORK**

### 20 10 71 DEMOLITION

A. Work Included:

1. The Contractor shall legally dispose of the designated equipment, apparatus and/or piping. Any cost of removal or salvage value shall be credited to the Contractor's account and shall be considered accordingly in the Contractor's bid.
2. Remove externally applied insulation only as required to facilitate dismantling and ultimate removal of the designated mechanical equipment and material. Do not include removal of any asbestos-based insulation.

B. Work Not Included:

1. The removal and disposal of asbestos based insulation or other hazardous materials applied to, or contained in, the mechanical equipment, material and piping designated to be demolished shall not be included in the scope of the work regardless if known ahead of time or discovered in the course of performing the Work. In the latter case, the Contractor shall notify the Architect/Engineer and shall not pursue that portion of the Work until others have removed the asbestos-based material. The removal and disposal of asbestos-based material shall be arranged by and to the account of the Owner, and conducted separately from the demolition work.

C. Miscellaneous:

1. Loose ends of mechanical systems shall be capped and/or sealed in a safe and secure manner approved by the Architect/Engineer.
2. Dead legs of branch piping are not permitted unless a cap is specifically shown on the drawings. Where a cap is not shown and the drawings indicate to cap piping, the Contractor shall remove branch piping back to the main and cap at that point.

### 20 10 72 CUTTING AND PATCHING

- A. The basic premise of this Sub-section is that the cutting and patching (where required) are performed in existing building components. In "new" construction, the premise is that the building component is already in place.
- B. The Contractor requiring the penetration of or the access way in the building structure to fulfill the intent of the Project Documents for his Work shall be responsible for the cutting and the subsequent patching in accordance with the following criteria:
1. .No structural component of the building shall be cut or violated without express approval of the Architect/Engineer.
  2. The Contractor shall verify the presence of any concealed utility or service within the structure (walls, roof, floor, etc.) in question, and shall be responsible for maintaining continuity and/or replacing it.
- C. Cutting of work-in-place in "new" construction because of error, neglect or damage inflicted shall be the responsibility of the Contractor precipitating the issue.
- D. "Patching" shall be construed as the repairing or replacing of the building structure to return it to an original or new condition, in the opinion of the Owner and/or Architect/Engineer, as existed prior to the cutting.

- E. Patching and finishing work shall be the responsibility of the Contractor requiring the cutting. The patching shall match all the substantive and visual aspects of the structure and adjacent surfaces. Restoration and finishes shall be as specified and executed in the respective sections, schedules and/or details of the Project Documents for the general construction work. Completed work and any special requirements shall be subject to approval by and satisfaction of the Architect/Engineer.

20 10 73 CONCRETE WORK (CAST-IN-PLACE)

A. General:

1. This sub-section shall supplement Section 03300 – Concrete Work for the concrete work required to install the work of Divisions 20 - 25.
2. In the event of a conflict between this sub-section and Section 03300, the more stringent shall apply.

B. The Contractor shall include the following Work:

1. Provide concrete foundations, bases and/or housekeeping pads for mechanical equipment furnished in his respective scope of work where such are not indicated on the architectural or structural drawings. Concrete work shall include requisite excavation, formwork, reinforcing and contained hardware.
2. Submit for approval to the Architect/Engineer detailed and dimensioned drawings of size, location, reinforcing and hardware contained therein of concrete work to be provided.

C. Housekeeping Pads:

1. All equipment setting on concrete or other type of pave flooring shall be set upon a raised “housekeeping” pad, unless noted otherwise.
2. The Contractor shall be responsible for this size, location, and any required anchor bolts. In general, housekeeping pads shall be a minimum of 3 ½” high, a ¾” chamfer on exposed corners and edges, and a minimum of 3” beyond the equipment on all sides or as required for anchor bolt edge distance.
3. Housekeeping pads shall be 3000 psi 28-day compressive strength concrete. Pads shall be reinforced and doweled to the floor slab. Refer to ASHRAE-A Practical Guide to Seismic Restraint 1999, Chapter 6 – Housekeeping Pads for size and spacing of reinforcing and dowels.
4. Specifically designed vibration isolation/inertia concrete bases for equipment will be specified and shown separately.

20 10 74 PAINTING

A. General:

1. This sub-section shall supplement Section 09900 – Painting for the painting work required for the work installed by Divisions 20 - 25.
2. In the event of a conflict between this sub-section and Section 09900, the more stringent shall apply.

B. Painting of the following shall be included in the scope of work of this sub-section:

1. All mechanical equipment including housings, fans, etc., not factory painted shall have prime coat and finish painting.
2. All plain steel hanger rods, plain steel pipe hangers, field fabricated or prefabricated steel supports and braces, and other ferrous metal. Prime coat only for all interior work, both exposed and concealed. Prime coat and finish painting of all exterior work.

3. Touch-up, as required, of factory finished equipment to original condition.
  4. All piping systems exposed in mechanical rooms, both insulated and uninsulated, shall have a color coded finish painting. Uninsulated piping shall receive a prime coat.
- C. Painting of the following shall not be included in the scope of work of this Sub-section, unless noted otherwise:
1. Surfaces to receive special finishes specified elsewhere.
  2. Building construction surfaces - floors, ceilings, interior and exterior walls, exposed concrete work, special finishes, etc.
  3. All stainless steel, brass, copper, aluminum, plastic, electro-plated and galvanized surfaces.
  4. Caulking, sealers, fire stops, etc.
  5. Valves, controls, specialties.
  6. Nameplates of equipment. Replace nameplate if painted.
  7. Light fixtures.
  8. Equipment (mechanical and electrical) which has been finished in a factory.
  9. Black steel surfaces over 250 degrees F. (e.g. - breechings, kitchen hood exhaust ducts, etc.).
- D. General Requirements:
1. The Contractor shall provide all labor, coating materials, accessory materials (e.g.- turpentine, painting thinners, etc.), tools and services necessary and reasonably incidental to the scope of work of Sub-section 20 10 75.
  2. Coatings shall be factory prepared and mixed; ready for application upon delivery; have good flow and brushing properties and be capable of drying and curing free of streaks or sags.
  3. Materials for each application shall be compatible with one another and with other specified materials with which contact may be made.
  4. Products shall meet the following UL fire hazard classifications when tested in accordance with ASTM E84: Flame spread, 0; Fuel contributed, 5; Smoke developed, 15.
  5. Coatings shall be applied in accordance with the paint manufacturer's recommendations with the surfaces well illuminated. In general, coatings shall not be applied when the relative humidity is above 60% nor the ambient temperature below 45 degrees F.
  6. The Architect/Engineer shall make color selections, when required.
- E. Acceptable Manufacturers
1. Benjamin Moore & Co.
  2. Porter International
  3. Pratt & Lambert, Inc.
  4. Sherwin Williams Co.
  5. Glidden
  6. Pittsburgh
- F. The Contractor shall submit the following to the Architect/Engineer for review and approval:



1. Statement of qualification that the company specializes in commercial painting and finishing with a minimum of five (5) years experience.
  2. Product data describing the following:
    - a. Instructions for substrate preparation including priming.
    - b. Instructions for product preparation, application procedures, clean-up and maintenance.
    - c. Recommended ambient temperature and relative humidity range, substrate temperature, moisture content and alkalinity at the time of application.
    - d. Manufacturer's list of trademarked products for each coat of each system. For each product, state vehicle type, percent solids by volume, method of application, drying time, recommended rate of coverage and dry film thickness for each coat. Coordinate with the Schedule in Sub-section in 20 10 75.84.
    - e. Advise any recommendations which differ from the specified or scheduled requirements.
  3. Material Safety Data Sheet (MSDS) for each coating and painting product, and maintain a file of it at the job site for reference and emergency use.
  4. Certificates and/or test reports demonstrating that the painting products specified meet regulatory requirements.
  5. Color charts and available sheens of finish, when required, for selection by the Architect/Engineer.
  6. Samples of painting products when requested for inspection by the Architect/Engineer.
- G. Painting:
1. The Contractor shall be responsible for delivery, handling and storage of all coating and painting materials for the pursuit of his work.
    - a. All painting products shall be delivered in sealed containers.
    - b. All painting product containers shall be labeled to show the manufacturer's name, type of coating, brand name, coverage, surface preparation, drying time, clean-up, color designation and instructions for mixing and reducing.
    - c. All painting products shall be handled and stored in accordance with the respective manufacturer's recommendations. In the absence of specific instructions, products shall be stored in well-ventilated areas at a minimum ambient temperature of 45 degrees F. and a maximum temperature of 90 degrees F.
    - d. Precautions shall be exercised to prevent fire hazards and spontaneous combustion. Provide adequate type and quantity of fire extinguisher at the job site.
  2. The Contractor shall perform the following in preparation of the painting application:
    - a. Verify that surfaces and substrate conditions are ready to receive the application of coatings as specified or in accordance with manufacturer's recommendations. Commencement of application is acceptance of existing conditions.
    - b. Provide drop clothes and other protective measures to prevent coatings on other work not included in the scope of work of this sub-section.
    - c. Where required by Architect/Engineer, post "WET PAINT" signs.
    - d. Solvent or power tool clean surfaces, as required or as deemed appropriate, to remove grease, scale, dirt, rust, mill scale, weld splatter and burrs. Apply primer immediately after cleaning.
  3. Application:
    - a. Coating products shall be prepared and applied in accordance with the respective manufacturer's instructions and reviewed submittals. Dry mil thickness of each coat shall be as scheduled or as recommended by the manufacturer. Finish coat shall not

- be less than 5.0 mils in thickness, and sufficient to cover completely substrates and undercoats.
- b. Where shop prime coat finishes are specified elsewhere, primer may be omitted, except as otherwise scheduled, specified or recommended by the coating manufacturer. Damaged shop prime coats shall be touched-up, using a primer compatible with or same as original primer.
  - c. Each coat shall be applied to provide a uniform finish, without sags, laps, brush marks or other defects. Allow applied coat to dry before next coat is applied.
4. Schedule - Latex, General Painting Materials:
- a. Steel - unprimed, located indoors or outdoors:  
One (1) coat lead and chromate free alkyd primer. Two (2) coats latex, semi-gloss.
  - b. Steel - shop primed, located indoors or outdoors:  
Touch-up with lead and chromate free alkyd primer.  
Two (2) coats latex, semi-gloss.
  - c. Insulation on mechanical equipment, located indoors:  
One (1) coat latex primer sealer.  
Two (2) coats latex, flat.
  - d. Schedule - Epoxy, General Painting Materials:

20 10 75 LUBRICATION

- A. Provide all oil and grease for the operation of all equipment until acceptance. The Mechanical Contractor and Subcontractors shall be held responsible for all damage to bearing while the equipment is being operated by them up to the date of acceptance of the equipment. Protect all bearings during installation and thoroughly grease steel shafts and other unpainted steel surfaces to prevent corrosion. All motors and other equipment shall be provided with covers as required for proper protection during construction. For equipment that is received void (dry) of lubrication the Contractor shall lubricate the equipment before storing to prevent internal damage to the equipment.

20 10 76 DRAINING, FILLING AND VENTING SYSTEMS

- A. The Contractor shall provide all required labor for draining, filling and venting of new or modified systems as many times as required during construction.
- B. Where draining and filling systems affects other systems or the Owner's normal operations, then they shall be scheduled at least 24 hours in advance with the Owner and shall be carried out to minimize such disruptions.

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## **20 10 80 TESTING, ADJUSTING AND BALANCING**

### 20 10 81 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Special Conditions apply to this section.

### 20 10 82 DESCRIPTION OF WORK

- A. This scope of services specifies the requirements and procedures for mechanical systems testing, adjusting, and balancing. Requirements include measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications, and recording and reporting the results. The test and balance work will be performed by the Owner's personnel. It is the Contractor's responsibility to assist as outlined below.
- B. Test, adjust and balance the following mechanical systems which are shown in the construction documents.
  - 1. Supply air systems
  - 2. Return air systems
  - 3. Exhaust air systems
  - 4. Hydronic systems
  - 5. Verify temperature control operations
  - 6. Domestic hot water recirculation systems
- C. The contractor's responsibilities are as follows:
  - 1. Notify the Owner's Representative fourteen (14) days prior to the schedule date for balancing the system.
  - 2. Schedule a seven (7) day allowance for the testing and balancing firm to complete the testing and balancing work when scheduling completion of all work required of the Contractor by the contract documents.
  - 3. Cooperate with the testing and balancing firm and shall make all necessary preparations for the TAB efforts.
  - 4. Complete the following work prior to requesting the TAB effort.
    - a. Clean and flush all piping systems.
    - b. Leak test and make tight all piping systems.
    - c. Fill all piping systems with clean water.
    - d. Clean and seal all ductwork systems.
    - e. Service and tag all equipment.
    - f. Set and align all motors and drives.
    - g. Start up and prove all equipment and systems.
    - h. Make preliminary settings on all control devices and have all systems operational.
    - i. Operate all systems successfully for twenty-four (24) hours minimum.
  - 5. Lubricate all motors and bearings.
  - 6. Patch insulation, ductwork and housing, using materials identical to those removed
  - 7. Seal ducts and piping, and test for and repair leaks.
  - 8. Seal insulation to re-establish integrity of the vapor barrier.

9. Attend a coordination meeting prior to the balancing of the system and a coordination meeting following the balancing of the system.
10. Provide a complete set of as-built drawings prior to the TAB effort.
11. Provide craftsmen of the proper trade to work with the TAB firm to make adjustments and installation changes as required.
12. Dedicate the resources to accommodate all changes identified by the test and balance firm in a timely manner.
13. If a significant rebalance (Owner's determination) of the HVAC system is required due to the Contractor's failure to properly install and check out the HVAC system, the cost of rebalancing the system shall be borne by the Contractor.
14. Provide sufficient labor and resources required to assist in the commissioning process.

20 10 83 PRE-BALANCING CONFERENCE

- A. Prior to beginning of the testing, adjusting and balancing procedures, a conference with the Owner's representative, Engineer and the Test and Balance Agency's representative will be held. The objective of the conference is final coordination and verification of system operation and readiness for testing, adjusting and balancing.

20 10 84 PRODUCTS

- A. PRODUCTS (Not applicable)

20 10 85 EXECUTION

- A. GENERAL (Not applicable)

## **20 10 90 BASIC MECHANICAL METHODS - IDENTIFICATION**

### 20 10 91 GENERAL

- A. This Sub-section specifies basic materials and methods for identification that shall apply to systems specified in other sections of Divisions 20 - 29 of the Specifications.
- B. The Contractor shall submit schedules and listings of Work to be identified indicating color code, material, name plate information and method of application for approval prior to performing the Work.

### 20 10 92 REFERENCES

- A. All provisions and conditions cited in this Sub-section shall apply to Work of all other sections of Divisions 20 - 29 of these Specifications, where and when relevant.
- B. Applicable requirements of the current and accepted edition of the following codes and standards shall apply to the Work of this Sub-section:
  - 1. ANSI/ASME A 13.1 - "Scheme for the Identification of Piping Systems".
  - 2. NFPA 99 – Health Care Facilities.

### 20 10 93 WORK INCLUDED

- A. Each respective Contractor and Subcontractor shall identify the applicable components of his Work in accordance with specifications hereinafter enumerated or where required by other sections of Divisions 20 - 29 of the Specifications.
  - 1. All equipment items.
  - 2. All chilled water, heating water, plumbing, and fire protection valves, both new and existing.
  - 3. All piping systems identifying the system type and direction of flow.
  - 4. All control devices and panels.

### 20 10 94 SUBMITTALS

- A. Contractor shall submit shop drawings for approval in accordance with Section 20 00 43 submittals.
- B. Provide an Identification Product Schedule consisting of the following minimum information:
  - Material - type of identification product.
  - System - indicate which system or equipment materials will be used for.
  - Manufacturer - Manufacturer's name, product name and model numbers.
  - Accessories - Miscellaneous materials used in affixing identification.
- C. Provide manufacturer's technical product sheet and recommended installation instructions.
- D. Provide color list/schedule and lettering sizes for pipe markers, valve tags, and equipment nameplates.
- E. Provide a valve tag list for approval prior to ordering or making valve tags.

20 10 95 GENERAL METHODS FOR IDENTIFICATION

- A. All surfaces to receive identification nameplates or markers shall be clean, degreased, dry, free of oxidation and prepared per manufacturer's recommendations.
- B. Plastic nameplates shall be installed with corrosion-resistant mechanical fasteners. Do not use adhesives.
- C. Tags shall be installed with corrosion-resistant chain and end fasteners.
- D. Pipe and duct markers shall be installed in accordance with the manufacturer's recommendations.
- E. Valve tag list for each separate trade (i.e., mechanical, plumbing, fire protection, and temperature control) shall each provide a valve tag list in electronic format or under glass in a suitable frame located in a location approved by Architect/Engineer.
- F. Valve tag information is required on "as-built" drawing submittals.
- G. Acceptable Manufacturers:
  - Products of the following manufacturers may be considered
  - 1. Seton Nameplate Corp.
  - 2. Brady Signmark Division
  - 3. Craftmark Identification Systems
  - 4. D & G Sign and Label

20 10 96 PIPING IDENTIFICATION

- A. All piping, bare pipe or insulated, exposed or concealed, shall be identified by one of the methods specified herein.
- B. Markers shall be installed in clear view; aligned with axis of pipe; located at not more than twenty-five foot (25') intervals on straight runs, risers and drops; located adjacent to each valve, control device and tee fitting; and located on each side of penetrations of the building structure and non-accessible enclosures.
- C. The following schedule shall govern label types for each application:

<u>Location</u>	<u>Type</u>
Mechanical Rooms	II
Above Lay-in Ceilings	I

- 1. Pressure Sensitive Tape (Type I): Vinyl pressure sensitive tape color coded and lettered in accordance with ANSI A13.1 for label of service. Flow direction shall be separately labeled with 2" wide pressure sensitive tape. The flow arrow band shall overlap the service label to secure it in place and shall not be less than two complete wraps around the pipe.
  - 2. Plastic Pipe Markers (Type II): Manufactured in accordance with ANSI A13.1 requirements, semi-rigid plastic, pre-formed to fit curvature of pipe or pipe insulation, color coded and imprinted with media identification and flow direction. Available in varied sizes for pipe diameter, wording and inclusion of arrow.
- D. The following legend, color, and lettering shall be used:

<u>Service and Legend</u>	<u>Color of Field</u>	<u>Letters</u>
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Materials Inherently Hazardous:

Hot Water Supply	Yellow	Black
Hot Water Return	Yellow	Black
Domestic Hot Water	Yellow	Black
Domestic Hot Water Return	Yellow	Black
Waste	Yellow	Black
Vent	Yellow	Black

Materials of Inherently Low Hazard:

Chilled Water Supply	Green	White
Chilled Water Return	Green	White
Cold Water	Green	White
Drain	Green	White

Fire Quenching Materials:

Sprinkler – Fire	Red	White
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20 10 97 VALVE IDENTIFICATION

- A. All valves exposed or concealed shall be identified with brass valve tags indicating the service of system the valve is in and the number of the valve.
- B. Valve tags shall be minimum 1-1/2" diameter brass stock with 1/4" legend identifying and 1/2" valve number both shall be black enamel filled. Legends shall be HVAC, PLBG, SPR, and GAS.
- C. Valve tags shall be secured in place with a No. 6 brass bead chain or No. 16 brass jack chain. Chains shall be attached to the valve lever handle or around the valve stem.
- D. An additional 10 consecutively numbered tags for each service shall be provided to the Owner for future use.
- E. The existing heating and chilled water systems are identified and a list can be obtained from the Owner. Additions to the existing systems shall start numbering at a multiple of (10) plus (1) leaving a minimum of 10 valve numbers between the existing system and the new (i.e., if the existing numbering stops at 66, the new number shall be at 81). The existing numbering convention shall be followed as closely as possible.
- F. Balance valves that are not used as a combination balance/service valve are not required to be labeled.
- G. Temperature control valves shall be identified with a 1/4" "T.C." legend and shall be numbered consecutively starting with major equipment and then terminal units (i.e., AHU-1 preheat, cooling, reheat control valves shall be numbered 1, 2, 3 respectively).

20 10 98 EQUIPMENT IDENTIFICATION

- A. All major equipment items (i.e., chillers, air handling units, fans, terminal units, pumps, boilers, etc.) shall be identified with appropriately sized nameplates permanently attached to the respective equipment.
- B. Small equipment items (i.e., in-line pumps, pot feeders, etc.) shall be identified with brass valve tags, see requirements for valve tags and chains.



- C. Equipment that is controlled by the Building Automation Control System shall be labeled with a 2" x 5" yellow label with black letters:  
    "CAUTION – THIS EQUIPMENT IS UNDER COMPUTER CONTROL AND MAY CYCLE AT ANY TIME."
- D. Interior equipment nameplates shall be 1/16" thick two-ply acrylic plastic 2-1/2" x 1" size minimum with white letters on a black background. Tag size shall be appropriate for equipment name, letters shall be a minimum of 1/2" high.
- E. Exterior equipment shall be identified with nameplates suitable for exterior use or shall be engraved aluminum plates .020" thick, minimum size shall be 4" x 1-1/2" plates.
- F. Nameplates shall be attached with corrosion-resistant No. 3 round head or No. 4 sheetmetal screws.

20 10 99 DUCTWORK IDENTIFICATION

- A. Supply, return and exhaust ductwork uninsulated or insulated, exposed or concealed, shall be identified as specified herein, except for exposed ductwork in finished areas.
- B. Markers shall be installed in clear view; installed on both sides of the duct; run parallel to the ductwork; located at not more than twenty-five foot (25') intervals on straight runs at all branch locations; and located on each side of penetrations of the building structure and non-accessible enclosures.
- C. Markers shall be pressure sensitive vinyl tape labeled for service and direction of airflow. Minimum size shall be 2" high x 8" long.
- D. Supply, return, exhaust and outdoor air ductwork labels shall be blue with white letters. Hazardous exhaust air ductwork labels shall be yellow. Outdoor air labels shall have an "air" legend.

20 10 100 CONTROL DEVICES IDENTIFICATION

- A. The materials specified herein Section 20 10 90 shall apply to Division 25 Temperature Control Systems. Additional identification work is specified in Division 25.

## **20 20 10 ELECTRICAL REQUIREMENTS**

### 20 20 11 GENERAL

- A. This Subsection specifies the basic requirements for electrical components which are an integral part of “packaged” mechanical equipment. These components include, but are not limited to, factory installed motors, starters, disconnect switches, control panels and related prewiring of power and control wiring for a single external electrical service connection. All material and equipment shall be provided for the application and service intended.
- B. Specific electrical requirements (e.g. horsepower, electric characteristics, etc.) for mechanical equipment shall be specified within the respective equipment specifications or shall be scheduled on the Plans.
- C. The Contractor shall verify that electrical characteristics of material and equipment furnished for Divisions 20 - 25 equipment are in accordance with the electric service and comply with the specifications and requirements of Division 26 - 29.
- D. Unless otherwise specified as an integral part of packaged mechanical equipment, motor control centers, motor starters and disconnect switches and the power wiring from power source to motor starting equipment (including variable frequency drive packages) and wiring from that equipment to the respective motors including final connections shall be performed as Electrical Work of Division 26 - 29.
- E. The field installation of electrical components, not included in Division 26 - 29, that are specified to be provided with the mechanical equipment and are shipped separately shall be the responsibility of the Contractor furnishing the base equipment.
- F. All electrical components and material shall be UL labeled.
- G. Submittals for the applicable electrical equipment shall include the following: identification of the equipment which the electrical material is to serve, application, voltage, phases, full load amperage, wattage and NEMA enclosure. For motors: horsepower, RPM, full load power factor and efficiency, frame size and service factor.
- H. Identification of electrical components of mechanical equipment shall be in accordance with Subsection 20 10 90, “Basic Mechanical Methods - Identification”.

### 20 20 12 REFERENCES

- A. Electrical material and equipment provided for Divisions 20 - 29 shall meet the applicable requirements of the latest accepted edition of the following codes and standards:

ANSI	American National Standards Institute
EI	Edison Electrical Institute
IEEE	Institute of Electrical and Electronic Engineers
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
UL	Underwriter's Laboratories, Inc.

### 20 20 13 MOTORS

- A. The following are basic minimum requirements for all motors. Additional motors, more detailed and specific requirements may be specified with the respective equipment.

- B. Single-phase motors shall be provided for all motors 1/2 HP or less, except as specified or scheduled otherwise and shall be of the permanent split capacitor (PSC) type.
- C. Polyphase motors shall be provided for all motors 3/4 HP or larger, except as specified or scheduled otherwise with a minimum power factor of .85 at 65% of full load or shall be power factor corrected.
- D. Multi-speed motors shall have dual windings wound to the speeds scheduled or specified.
- E. Torque characteristics shall be sufficient to satisfactorily accelerate the driven load(s) with low in rush current.
- F. Motor horsepower sizes shall be large enough so that the driven load shall not require the motor to operate in the service factor range.
- G. Temperature rating: Rated for 40 deg. C environment with maximum temperature rise for continuous duty at full load of 40°C for open dripproof motors, 50°C for splash proof motors, and 55°C for totally enclosed motors (Class B insulation). Motors used with variable frequency drives/inverters shall be NEMA MG1, Part 31 Compliant and have a Class B temperature rise with Class F insulation design to resist transient spikes, high frequencies, and short rise time pulses produced by inverters.
- H. Starting capability: Frequency of starts as specified by the automatic control system. For manually controlled motors, not less than five (5) evenly time spaced starts per hour.
- I. Service factor: 1.15 for polyphase motors and 1.35 for single-phase motors.
- J. Motor construction:
  - 1. NEMA standard frame sizes, general-purpose open dripproof (unless otherwise specified), continuous duty, Design “B” (unless “C” is required for high starting torque). Motor frame, end bells and conduit box shall be cast iron; stator windings shall be copper. Aluminum is unacceptable for any parts. Provide grounding lug in motor terminal box.
  - 2. Motors located outdoors or otherwise exposed to water, dust, etc where an open motor would not be suited, shall be totally enclosed fan-cooled (TEFC).
  - 3. Bearings: Ball or roller bearings with inner and outer shaft seals. Externally accessible inlet/outlet grease fittings. Where motors are enclosed within equipment, extend grease tubing to exterior of the enclosure. Bearings designed to resist thrust loading for drives producing lateral or axial thrust. Fractional horsepower, light duty motors may have sleeve bearings.
  - 4. Overload protection: Built-in thermal overload protection.
  - 5. Noise rating: Motors shall meet IEEE, Standard 85.
  - 6. Efficiency: Motors shall be NEMA Premium Efficiency per NEMA Standards Publication MG 1-2003, Table 12-12 and 12-13.
  - 7. Nameplate: Indicate full identification of manufacturer's name, model number, serial number, horsepower, speed, voltage, characteristics, construction, special features, etc. Nameplates in harsh environments such as for cooling towers, or in pool equipment rooms, etc. shall be suited to the specific application.
- K. Acceptable manufacturers: Baldor, General Electric, Gould, Marathon, Magnetek, Reliance, Siemens, Toshiba, and U.S. motors.

20 20 14 DISCONNECT SWITCHES

- A. Fusible: For 3/4 horsepower and larger. Disconnect switch shall be horsepower rated, heavy duty, spring reinforced fuse clips each phase, quick-make/quick-break mechanism with arc quenchers, dead front line side shield, solderless lugs, silver electroplated current carrying parts, lockable hinged door, capacity and electric characteristics as specified.
- B. Non-fusible: For 1/2 horsepower motor and smaller. Disconnect switch shall be horsepower rated, toggle switch type, quantity of poles and voltage rating as specified.

20 20 15 MULTI-SPEED MOTORS AND CONTROLS

- A. Multi-speed motors, when required, shall be specified under the heading of the respective equipment to be driven.
- B. Motor controls for multi-speed applications shall be specified, also, under the heading of the respective equipment, if said equipment is a “packaged” type unit.
- C. Otherwise, multi-speed motor controls shall be specified in Division 26.

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## **20 25 00 INSULATION**

### 20 25 01 GENERAL

- A. This Section specifies mechanical insulation of piping, equipment and ductwork.
- B. The Plans, the general provisions of the Contract including the General, Supplementary and/or Special Conditions and specification sections of Division 1 shall apply to Work of Divisions 20 - 29 of the Specifications.
- C. Provisions and conditions cited in this Section shall apply to Work for other sections of Divisions 20 - 29 of these Specifications.

### 20 25 02 REFERENCES, REGULATORY REQUIREMENTS

- A. Work for this Section of the Specifications shall be performed in accordance with the Codes, Standards, etc. as identified in Division 20 in addition to the following:
  - 1. State and local Air Pollution Codes and Regulations.
  - 2. NFPA 255/UL 723/ASTM E-84 Surface Burning Characteristics of Building Materials.
  - 3. UL 1479/ASTM E-814 Fire Test of Through-Penetration Firestops.

### 20 25 03 RELATED SECTIONS OF THE SPECIFICATIONS

- A. Requirements of the following Sections of the Specifications apply to Work for this Section:
  - .1 Division 20 - Basic Mechanical Conditions
  - .2 Division 20 - Basic Mechanical Materials and Methods
  - .3 Division 22 - Plumbing Work
  - .4 Division 23 - HVAC Piping and Equipment
  - .5 Division 24 - Air Distribution

### 20 25 04 DEFINITIONS

- A. The term “**fitting**” where used in this Section of the Specifications shall be construed as an elbow, tee or reducer. Unions, flanges and valves shall not be considered as fittings.
- B. The term “**cold**” shall be defined as the temperature of a surface that may result in the formation of condensation.
- C. The term “**accessory**” shall include staples, bands, wire, mesh, clips, pins, studs, tape, anchors, corner angles, cements, adhesives, coatings, sealers, mastics, finishes, etc.
- D. The term “**ASJ**” where used in this Section of the Specifications shall mean a reinforced vapor retarding All Service Jacket.
- E. The term “**SSL**” where used in this Section of the Specifications shall mean Self-sealing Lap Joint closure system for longitudinal jacket joints.
- F. The term “**supply air**” where used in this Section of the Specifications shall mean downstream of a coil.
- G. The term “**outdoor air**” where used in this Section of the Specifications shall mean ambient air that has not been conditioned.
- H. The term “**return air**” where used in this Section of the Specifications shall mean conditioned air that is returned from the space.

- I. The term “**mixed air**” where used in this Section of the Specifications shall mean air streams that are a mixture of “outdoor air” and “return air”.
- J. The term “**relief air**” where used in this Section of the Specifications shall mean excess return air that is relieved from the building.
- K. The term “**exhaust air**” where used in this Section of the Specifications shall mean air that is removed due to contaminates, odors, or heat.

20 25 05 WORK INCLUDED

- A. Furnish material, labor and services necessary for and incidental to the insulation of the following systems where shown on the Plans and as hereinafter specified. Include all necessary considerations in the related sections of the Specifications (Subsection 20 25 03) to perform the Work completely.
  - 1. Chilled water piping.
  - 2. Heating water piping.
  - 3. Condensate drain piping.
  - 4. Waste piping and floor drains located above grade serving condensate drains.
  - 5. Ductwork/sheetmetal systems.
  - 6. Domestic hot, hot recirculating and cold-water piping.
- B. Providing appropriate size calcium silicate/cellular glass/pipe shield manufactured inserts to the trade contractor for installation between the pipes and oversized hangers as specified in this section.
- C. Fire wrapping piping system located in occupied spaces or plenum spaces that do not meet flame spread 25 and smoke development 50.

20 25 06 SUBMITTALS

- A. The Contractor shall submit shop drawings for approval in accordance with Subsection 20 00 43, Duties of Contractor - Submittals.
- B. Provide an INSULATION PRODUCT SCHEDULE consisting of the following minimum information:
  - Material - type of insulation material, jackets, or covers.
  - Manufacturer - manufacturers name, product name, and K-value where applicable.
  - Accessories - tapes, staples, coatings, adhesives including manufacturer's name and product name.
  - Systems - indicate systems where product is used.
- C. Provide an INSULATION THICKNESS SCHEDULE consisting of the following minimum information:
  - System - indicate which system insulation is installed.
  - Location - inside, outside, concealed, exposed, etc.
  - Size - indicate size range of pipe, insulation type used.
  - Thickness - indicate insulation thickness in inches.
- D. Provide manufacturer's technical product data of each material and accessory item with engineering support information and recommended installation procedure. Indicate product number, “K” value, thickness and required accessories for each application.

- E. At the completion of the project, submit a letter stating all materials are asbestos free, and meet the specified ASTM E-84 flame/smoke rating of 25/50, and that all piping and duct penetrations are smoke or fire stopped as required by the Code.

20 25 07 SPECIAL REQUIREMENTS

- A. Contractor's Qualifications: Contracting company shall be one specializing in insulation application and have a minimum of three (3) years experience in this work.



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## 20 25 10 INSULATION MATERIALS

### 20 25 11 GENERAL

- A. Materials and accessories furnished for this Section of the Specifications shall be standard cataloged products, new, commercially available and suitable for the service specified.
- B. Insulation material and/or accessories containing asbestos are prohibited.

### 20 25 12 FIRE SAFETY STANDARDS

- A. All insulation material shall have composite fire and smoke hazard ratings in accordance with NFPA 255 and UL 723 not exceeding the following values as tested by the latest procedures of ASTM E-84: flame spread of 25; smoke developed of 50.
- B. Accessories such as adhesives, mastics, cements, tapes and cloths for seams, joints and fittings shall have the same ratings as hereinbefore listed. All products and their respective shipping cartons shall have indications that flame and smoke ratings meet the aforementioned requirements. Any treatment of jackets or facings to impart acceptable flame and smoke safety values shall be permanent; water-soluble applications are prohibited. The Insulation Contractor shall bear responsibility that all products to be used meet the foregoing criteria.

### 20 25 13 TYPES OF INSULATION MATERIALS

The following types of insulation material are enumerated in the respective INSULATION MATERIAL SCHEDULE. K values listed are in units of (Btu in/hr ft.<sup>2</sup> °F) and are based on specific products and are to be met or exceed. ANSI/ASTM types or class shall not provide relief for any K value specified.

- A. Type CS: Hydrous calcium silicate, molded pipe or block form, asbestos free, ANSI/ASTM C533, Type I, “k” value of 0.41 at 200 degrees F for pipe, “k” value of 0.39 at 200 degrees F for block, density of 15#/cubic foot. Owens-Corning Calcium Silicate or equivalent by Knauf, Manville or Pabco.
- B. Type GF1: Glass fiber, non-combustible, preformed for pipe and tube application, ANSI/ASTM C547, Class 1, “k” value of 0.23 at 75 degrees F. Owens-Corning type ASJ with SSL-II vapor retarder jacket or equivalent by CertainTeed, Knauf, Manville or Schuller.
- C. Type GF2: Glass fiber, non-combustible, rigid board with vapor retarder facing, ANSI/ASTM C612, “k” value of 0.24 at 75 degrees F, density of 3#/cubic foot. Owens-Corning type 703 with ASJ 25 jacket or equivalent by CertainTeed, Knauf, Manville or Schuller.
- D. Type GF3: Glass fiber, flexible blanket, laminated to reinforced kraft vapor retarder facing, ANSI/ASTM C553, Type II, “k” value of 0.27 at 75 degrees F, density of 1#/cubic foot. Owens-Corning type 100 All-Service faced duct wrap or equivalent by CertainTeed, Knauf, Manville or Schuller.
- E. Type F1: Flexible elastomeric foamlastic with smooth exterior surface, preformed for pipe and tube application, ASTM C534, Type I, “k” value of 0.28 at 75 deg. F. Armstrong AP Armaflex pipe insulation, K-Flex LS tube, Aerocel EDPM tube.
- F. Type F2: Flexible elastomeric foamlastic with smooth exterior surface, sheet material, ASTM C534, type II, “k” value of 0.28 at 75 degrees F. Armstrong AP Armaflex sheet material, K-Flex LS sheet, Aerocel EDPM sheet.

- G. Type FG: Rigid foamglass preformed for pipe applications ASTM C552, K value of 0.33 at 75°F with all-purpose vapor retarder jacket. Pittsburgh Corning Foamglass.
- H. Type PI: Polyisocyanurate preformed for pipe applications ASTM C591, aged “k” value of 0.19 at 75 degrees F, density of 2#/cubic foot. Shall be ASTM E84 less than 25/50 rated. Saran 560 vapor barrier.
- I. Type PH: Phenolic preformed for pipe applications ASTM C1126, Type III, grade 1. ASTM E84 less than 25/50 rated, Saran 560 vapor varrier, 0.15@75°F.

20 25 14 TYPES OF PIPING JACKET MATERIALS

- A. PVC jacketing 0.030” thick for pipe insulation and PVC fitting covers shall be applied over the insulation and vapor barrier system where indicated below for aesthetics or mild abuse areas.
- B. Finish piping insulation with factory or field application for respective locations as follows:
  - Dry, low abuse: Concealed, not exposed to view.  
(indoor) Mechanical equipment room.  
Exposed, finish space.
  - Pipe: ASJ jacket.
  - Fittings: Pre-molded PVC covers.

20 25 15 DELIVERY AND STORAGE OF MATERIALS

- A. All of the insulation materials and accessories covered by this specification shall be delivered to the job site and stored in a safe, dry place with appropriate labels and/or other product identification.
- B. The Contractor shall use whatever means are necessary to protect the insulation materials and accessories before, during, and after installation. No insulation material shall be installed that has become damaged in any way. The Contractor shall also use all means necessary to protect work and materials installed by other trades.
- C. If any insulation material has become wet because of transit or job site exposure to moisture or water, the Contractor shall not install such material, and shall remove it from the job site. An exception may be allowed in cases where the Contractor is able to demonstrate that wet insulation when fully dried out (either before installation, or afterward following exposure to system operating temperatures) will provide installed performance that is equivalent in all respects to new, completely dry insulation. In such cases, consult the insulation manufacturer for technical assistance and provide the Architect/Engineer with a copy of manufacturer's recommendation for approval.

20 25 16 ACCEPTABLE MANUFACTURERS

The following are acceptable manufacturers for products specified in this section of the specification.

- A. Metal jackets:
  - 1. Childers Products Co., Inc.
  - 2. Insul-Coustics
  - 3. Pabco Surfit Metal Corp.
  - 4. RPR Products, Inc.
- B. PVC covers:

1. Proto Corp.
2. Ceelco Corp.
3. Speedline PVC Corp.

C. Adhesives and Coatings:

1. Alpha Associates
2. Miracle Adhesives
3. Vimasco Corporation

D. Fasteners

1. ACS Industries
2. GEMCO
3. Midwest Fasteners

E. Fire Stop

1. 3M
2. Metacaulk
3. Specified Technologies, Inc.
4. USG Interior, Inc.

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**20 25 20 INSULATION MATERIAL SCHEDULES:**

20 25 21 INSULATION MATERIAL SCHEDULE I-1

A.	Service: Hot and cold piping	<u>thickness</u>	<u>insulation material</u>
B.	Chilled water supply and return piping 2" and smaller	3/4"	Type PI*, PH, F1
	2-1/2" through 5"                      1"		Type PI*, PH, F1 (Contractor's option)
	6" and larger	1-1/2"	Type PI, PH
C.	Hot water (141°F – 200°F) supply and return 1-1/4" and smaller	1-1/2"	Type GF1, F1 (Contractor's option)
	1-1/2" and larger                      2"		
D.	Domestic water- hot, hot recirc. 2" and smaller	1"	Type GF1, F1 (Contractor's option)
	2-1/2" and larger                      1-1/2"		Type GF1
E.	Domestic water-cold	1/2"	Type F1, GF1 (Contractor's option)
F.	Condensate Drain Lines:	1/2"	Type F1
	All - except air handling units in Mechanical Rooms where drain line is 2'-0" or less in total length and located at the Mechanical Room floor.		
G.	Waste Piping and Floor Drains:	1/2"	Type F1
	Piping above grade serving floor drains, hub drains, indirect cabinets, etc., that receive condensate from cooling coils. Insulate piping to where it connects to main waste pipe.		

20 25 22 INSULATION MATERIAL SCHEDULE I-2

A. Service: Ductwork, 0 to 250 degrees F.

Location

Thickness

B. Conditioned Spaces and Return Air Plenums

1.	Supply Air, Heated or Cooled Make-up/Ventilation Air	1"
2.	VAV box coil return bends, Duct mounted coils	1"
3.	Return Air	N/A
4.	Outdoor Air and Mixed Air	1"
5.	Outdoor Air and Mixed Air Plenums, and Filter sections	1"
6.	Relief Air	N/A
7.	Exhaust Air	N/A

## **20 25 30 INSULATION APPLICATION**

### 20 25 31 INSULATION APPLICATION - GENERAL

- A. Respective piping system, duct system and/or equipment shall be pressure tested, proved tight and accepted, as specified in section for installation of such, before insulation is applied. Sheet metal ductwork joints shall be sealed prior to insulating. Coordination among the respective contractors is essential.
- B. Insulation materials and accessories shall be applied in accordance with respective manufacturer's recommendations and recognized industry practice for the insulation to serve its intended purpose. All surfaces to receive insulation shall be clean, dry, free of oxidation and prepared as required.
- C. The insulation work shall be subject to inspection during the various applications and construction phases. Material, accessories, finishes, methods and workmanship that are not in compliance with these Specifications and/or approved submittals may lead to rejection of the Work and replacement at the Contractor's expense.
- D. Tie-ins to existing systems and all new work shall be insulated to provide a complete and functional system. Finishes shall be compatible wherever possible.
  - 1. When existing insulation thickness is different than the specified thickness herein, the Contractor shall notify the Architect/Engineer. It is the intent that the existing piping would be restored to its original condition (thickness and finish) as if new work had not been performed.

### 20 25 32 INSULATION APPLICATION - PIPING

- A. Insulate each piping section with single thickness full-length units of insulation, with a single cut piece to complete the run where a fitting is encountered. Do not use cut pieces or scraps abutting each other.
- B. Extend piping insulation without interruptions through walls, floors, and similar piping penetrations, except where otherwise specified.
- C. Insulation on unions, flanges, valves, strainers, expansion joints, pump impeller housings and other equipment requiring accessible servicing shall be removable and reusable without damage. Items requiring periodic attention shall have covers and/or casings to contain the insulation.
- D. All "cold" piping systems shall be insulated with type and thickness of material herein specified and shall have a continuous vapor retarder through all fittings, hangers, supports and sleeves.
- E. In cold systems flanges, unions, valves, etc., shall be covered with an oversized pipe insulation section sized to provide the same thickness as on the main piping section. An oversized insulation section shall be used to form a collar between two insulation sections with low-density blanket insulation being used to fill gaps. Jacketing shall match that used on main piping system. Rough cut ends shall be coated with suitable weather and/or vapor resistant mastic as required by the system location and service. All valve stems must be sealed with caulking that allows free movement of the stem but provides a seal against moisture incursion.
- F. In hot system flanges, unions, valves, etc., shall be left exposed; insulation ends shall be tapered and sealed to allow bolts to be removed or other required access.



- G. The installation of cold piping systems shall use oversize (outside the thickness of the insulation) pipe hangers.
1. Piping systems 3" and smaller, the Insulation Contractor shall replace temporary wood blocking with insulation of thickness as scheduled in this section of the specification. Metal pipe shields shall be placed between the pipe hanger and the insulation.
  2. Piping systems 4" and larger, the Insulation Contractor shall replace the temporary wood blocking with high density pre-formed insulation (i.e. calcium silicate, cellular glass) inserts with suitable characteristics for the weight, temperature and application and insulation protection shields at each hanger. The specified insulation should stop and start at the insert at the hanger locations. The insert shall be wrapped with vapor barrier jacketing. Circumferential joints shall be taped with vapor barrier tape and coated with vapor barrier sealant. B-Line, or equivalent, figure B-3380 through B-3384, 360 deg. calcium silicate insert/shields and figure B-3153 protection shields may be used or equivalent may be field fabricated per details submitted for approval.
  3. If in the event pipe hangers are not oversized, this Contractor shall notify the Engineer and the Contractor(s) who provided and/or installed hangers. Hangers shall be corrected before pipe is insulated.
  4. Where size on size hangers have been approved by the Engineer in writing for use in special situations, the insulator shall insulate the hanger and hanger rod with ½" Type F insulation. Pipe insulation shall terminate at each side of the hanger and have vapor barrier end joint butt strips. Hanger insulation shall overlap pipe insulation a minimum of 4" on each side of the hanger and secured to the pipe insulation with contact adhesive. Hanger rods shall be insulated for a minimum of 12" secured to the rod with contact adhesive and the end sealed with a bead of caulk.
  5. The Contractor shall adjust hangers after the insulation and pipe shields have been installed to provide an evenly supported piping system. No hanger shall bear the entire weight or not carry any weight of piping system.
- H. Special requirements for fiberglass pipe insulation:
1. Fiberglass pipe insulation, All Service Jacket/Self Sealing Lap (ASJ w/SSL) type, shall be installed with laps positioned to shed water, position at either 10 o'clock or 2 o'clock and shall not be visible to view. End joint butt strips shall be installed on all piping with ½" adhesive to adhesive overlap.
  2. For piping systems using fiberglass insulation, the fittings shall be insulated with: double thickness molded fiberglass fittings, or preformed cellular glass fittings secured with twine or wire; or with flexible elastomeric foamplastic; at the Contractor's option. The pre-molded PVC fitting covers shall be installed over the fiberglass inserts and secured with SS tacks. Victaulic fittings or couplings shall be insulated with sheet elastomeric foam plastic insulation formed to the fitting and formed "collars" over all couplings encountered.
  3. For piping systems using fiberglass insulation, butt joints in hot piping shall be made with 2" wide vapor barrier tape over butt joints. Butt joints in cold piping shall be made with a wet coat of vapor barrier lap cement on butt joints and seal joints with 2" vapor barrier tape. All pipe insulation ends shall be tapered and sealed.
  4. On "cold" applications only, the following additional requirements shall apply: the premolded fittings shall be sealed with an approved vapor barrier retardant prior to installing the jacket materials. Premolded PVC fitting covers shall then be installed over the premolded inserts, all joints shall be sealed with vapor barrier cement and 2" vapor barrier tape on lap joints. Premolded stainless steel or aluminum fitting covers shall be installed per the manufacturer's instructions and a bead of clear silicon caulk applied to all joints. Straight lengths of insulation abutting all fittings shall have both ends sealed with vapor barrier cement to prevent "wicking" or moisture migration. At a maximum of

twenty-one foot (21') intervals, joining ends of the butt joints shall be sealed with vapor barrier cement prior to butting together to prevent "wicking" or moisture migration.

- I. For piping systems using elastomeric foamplastic insulation, joints and seams shall be sealed with manufacturer's recommended contact adhesive. Fittings shall be insulated from segments fabricated from pipe insulation or sheet material, secured and sealed with contact adhesive. Termination points and ends shall be sealed to the pipe to prevent backflow of condensation on the inside of the insulation. Any piping outdoors or otherwise exposed to UV or ozone provide two (2) coats of WB Armaflex or Rubatex 374 finish.

#### 20 25 33 INSULATION APPLICATION - EQUIPMENT

- A. Manufactured equipment (i.e. air handling equipment, terminal units, air device plenums, etc.) requiring insulation shall be specified in the respective equipment specifications to be factory insulated with internally applied liner or double wall casing.

#### 20 25 34 INSULATION APPLICATION - DUCTWORK

- A. Ductwork systems shall be insulated in accordance with the insulation schedules. Insulate each duct section with single thickness full length pieces. Do not use scraps abutting each other.
- B. Extend insulation without interruptions through walls, floors, and similar penetration, except where otherwise specified.
- C. "Cold" duct systems shall have insulation with a continuous vapor retarder through all fittings, hangers, supports, air devices, fire dampers, duct mounted coils, dampers, and other devices in the ductwork system, etc.
- D. In "cold" duct systems, using rigid board or sheet elastomeric foam insulation, support angles, stiffener angles, ductmate flanges, etc. they shall be covered with an oversized insulation strip sized to provide the same insulation thickness as on the duct. Provide a minimum of 2" of overlap on each side of the obstruction.
- E. Board insulation shall be properly cut and dry fitted to the surface to be insulated. Edges shall be neat and clean cut. No intermediate cut pieces shall be allowed on the bottom and sides of the ductwork. Insulation board shall be secured in place using mechanical fasteners such as welded pins or speed clips. Locate not less than 3" from each edge or corner and approximately 12" on centers on all sides. There shall be a minimum of two (2) rows of pins on the bottom of the duct and one (1) on the sides. Additional pins may be needed on the bottom to prevent sagging. All seams, joints, penetrations and breaks in the vapor retarder jacket shall be sealed with pressure sensitive tape matching insulation facing. Edges shall be provided with 28 ga. 1" x 1" aluminum corner beading properly secured and shall have the same facing material as the insulation board.
- F. Flexible duct wrap insulation shall be cut properly and fitted to "stretchout" dimensions and a 2" piece of insulation removed from the facing at the end of the piece to form an overlapping staple and tape flap. Insulation shall be installed with facing outside so tape flap overlaps facing at the other end. Insulation shall be butted tightly. Seams shall be stapled on 6" centers with outward clinching staples. Adjacent sections of duct wrap insulation shall be butted tightly with the 2" tape flap overlapping and stapled. For horizontal oval ducts over 30" wide, duct wrap insulation shall be secured additionally to the bottom of the duct with mechanical fasteners such as pins and speed clip washers spaced on 18" centers to prevent sagging. All seams, joints, tears, punctures and other penetrations in the vapor retarder jacket shall be sealed with FRK backing pressure sensitive tape.

- G. Stop and point insulation around access doors and damper operators to allow operation without disturbing insulation.
- H. Where a duct run changes from interior lining to exterior application (or vice versa), there shall be a 6" overlap of insulation.
- I. In "cold" duct system with internal duct insulation, with 1 1/2 " thickness flexible duct wrap, insulate air devices, fire dampers, duct mounted coils, dampers, and other devices in the ductwork system that are not internally insulated.

20 25 35 PVC PIPING INSULATION PLENUM FIRE WRAP

- A. Provide 1/2 inch minimum thickness fire resistant blanket wrap consisting of inorganic blanket encapsulated with a scrim-reinforced aluminum foil and overlap seam to provide a flexible, non-combustible enclosure for cables and PVC non-plenum rated pipe in return air plenums as tested to UL 910.
- B. Plenum Wrap shall be tested in accordance with the following:
  - ASTM C 411, ASTM C 518, ASTM E 84, ASTM E 136, and UL 910
  - Maximum Flame Spread (Ft.) 0.01
  - Maximum Smoke (Optical Density) 0.01
  - Average Smoke (Optical Density) 0.00
  - Surface Burning Characteristics (ASTM E 84)
- C. Cut Fire Barrier Plenum Wrap to a length sufficient to wrap completely around the perimeter of the pipe, plus provide a longitudinal overlap of not less than 1 inch and an overlap of 1 inch, minimum, over the adjacent wrap section. Use aluminum foil tape to seal cut edges of the blanket. Temporarily secure Plenum Wrap in place using 3/4 inch wide filament tape. Install minimum 1/2 inch wide by 0.015 inch (28 gauge) thick stainless steel metal banding with stainless steel metal band clamp or 16 gauge galvaneal tie wire around the Plenum Wrap to hold it in place. Place the bands or tie wires 1/4 inch from each edge of the blanket and at the midpoint of the blanket, 11-3/4 in. on center. Tension the banding or tie wire to hold the Plenum Wrap snugly in place, compressing the foil but not cutting the foil.
- D. PVC Piping Insulation Plenum Fire Wrap shall be 3M Fire Barrier Plenum Wrap 5A or approved equivalent.

END OF SECTION

## **21 00 00 FIRE PROTECTION SYSTEM**

### 21 00 01 GENERAL

- A. This section specifies a hydraulically calculated fire protection system designed and installed by the Contractor as described on the drawings and hereinafter.
- B. It is the intent that the drawings and specifications shall describe and provide for a working installation complete in every detail and all items necessary for such complete installation shall be furnished whether specifically mentioned or not.
- C. The Plans, the general provisions of the Contract including the General, Supplementary and/or Special Conditions and specification sections of Division 1 shall apply to Work of Divisions 20 - 29 of the Specifications.
- D. Provisions and conditions cited in this Section shall apply to Work for other sections of Divisions 20 - 29 of these Specifications.

### 21 00 02 REFERENCES, REGULATORY REQUIREMENTS

- A. Work for this Section of the Specifications shall be performed in accordance with the Codes, Standards, etc. as identified in Division 20 in addition to the following:
  - 1. National Fire Protection Association (NFPA) 13, 2010, 2016.
  - 2. The Local Authority having jurisdiction.
  - 3. Owner's Insurance carrier – FM Global (F.M.).

### 21 00 03 REFERENCES, RELATED SECTIONS OF THE SPECIFICATIONS

Requirements of the following Sections of the Specifications apply to Work for this Section:

- A. Division 20 - Basic Mechanical Conditions.
- B. Division 20 - Basic Mechanical Materials and Methods

### 21 00 04 DEFINITIONS

- A. The term **“layout”** where used in this Section of the Specifications shall mean drawings prepared by the Contractor showing where all piping and heads are located. These drawings should include pipe elevations, need not include pipe sizes and should not include hydraulic calculations.
- B. The term **“Authority Having Jurisdiction”** or **“AHJ”** where used in this Section of the Specification shall mean the organization, office, or individual responsible for approving equipment, an installation, or a procedure.
- C. The term **“rhythm”** where used in this Section of the Specifications shall mean spaced in a manner which would place the heads at the same location with respect to lights or diffusers (i.e., for a row of lights spaced at 12' centers heads shall also be on 12' centers so that the heads will remain the same number of ceiling tiles or distance away from the lights; where

there is an odd number of tiles between lights or diffusers, it is also preferable to have heads located at the tile centered between them).

- D. The term “**working drawings**” where used in this Section of the Specifications shall mean drawing of the quality and containing all information as which would be required for approval by local official and for field construction.

21 00 05 WORK INCLUDED

- A. Furnish material, labor and services necessary for and incidental to the installation of the following systems where shown on the Plans and as hereinafter specified. Include all necessary work in the related sections of the Specifications (Subsection 21 00 03 to perform the Work completely.
- B. Provide fire protection calculation back to pump. Contractor to field verify pipe routing from project area to fire protection pump.
- C. Furnish and install a complete hydraulically engineered extension of the building fire protection system including the relocation of existing heads on existing branch lines.
- D. Most recent water supply test data is available upon request to owner.
- E. Contractor shall coordinate his work with the work of other trades, and with the architectural and structural drawings.

21 00 06 SUBMITTALS

- A. Submit sealed fire protection and fire alarm drawings from engineer or record performing delegated design.
- B. The Contractor shall prepare submittals for approval in accordance with Subsection 20 00 43, Duties of Contractor - Submittals.
- C. Submit “Layout drawings” and equipment cut sheets with 30 days from the General Contractor’s contract date.
- D. Contractor shall submit “Working drawings” coordinated with the other trades for review prior to any fabrication or installation and prior to the General Contractor’s fourth partial pay request.

21 00 07 SPECIAL REQUIREMENTS

- A. The Contractor preparing the drawings and calculations shall be NICET Level 3 certified or a Professional Engineer licensed in the State of Missouri whichever is required by the Authority Having Jurisdiction.
- B. All equipment shall be U.L. Listed or F.M. approved for use in fire protection systems.
- C. Where Pipe and accessories installed under this section of the specification tie-in to existing systems, Contractor shall verify existing lines for: sizes, direction of flow (via pressure or physical tracing of piping, not labels), materials, and elevations before installing new work. Contractor shall notify Architect/Engineer upon discovery of discrepancy. Work performed prior to verification will be corrected at no cost to Owner.

21 00 08 CLOSE-OUT REQUIREMENTS

- A. Reference Section 20 00 48.
- B. Where NFPA maintenance information is utilized, it shall be edited to contain only information that is relevant to this project.

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## **21 00 10 DESIGN**

### 21 00 11 WATER SUPPLY

- A. The water pressure read at hydrant #0648 read on March 25, 2014 had a static pressure of 79 psi and a residual pressure of 55 psi flowing 1250 gal/min.
- B. This information is provided for general information only. Most recent flow test information is available from owner.
- C. In sprinkler systems that require a fire pump to meet sprinkler requirements, the sprinkler pipe sizes shall be based on Pipe Schedule method. This is to provide maximum sprinkler operation when the fire pump is not available, and minimizes the size of the fire pump. This also provides the possibility that with future water infrastructure improvements, the fire pump would no longer be required.
- D. Design water pressure requirements shall include a minimum of [10-psi] safety factor. Where Authority having jurisdiction requires a higher safety factory it shall be used.
- E. The point of this Contractor's work shall start where determined by the "General Contractor" and local trade practices.

### 21 00 12 LAYOUT - GENERAL TO ALL SPRINKLER SYSTEMS

- A. The "layout" shall be submitted to the Architect prior to performing hydraulic calculation, sizing pipes or seeking approvals from the authority having jurisdiction.
- B. The Architect/Engineer will review "layout" for aesthetics, and pipe routings for consistency with the construction documents.
- C. Minimum head spacing shall be as per NFPA-13., F.M., Other, additional heads may be required by the Architect/Engineer to create spacing that works with the reflected ceiling plans. Contractor shall layout any areas not shown on the plans with symmetry and "rhythm" in mind.
- D. Heads shall be on return bends and centered  $\pm 1"$  for 2' x 2' ceiling tiles, or on quarter points  $\pm 1"$  for 4' x 2' ceiling tiles.
- E. Contractor shall not scale the drawing, refer to architectural drawings for dimensions. Where the room dimension is at the maximum size listed for the sprinkler heads, install an additional row of sprinklers.
- F. Contractor shall locate heads in the field from the final wall locations. It shall be brought to the Architect's/Engineer's attention where the center of tile location exceeds the maximum distance of the sprinkler. Additional heads shall be added and the layout modified as directed by the Architect/Engineer at no additional cost to the Owner.
- G. All sets and rises shall be located above ceilings of adjacent spaces of rooms without ceilings as opposed to making the sets and risers in the exposed spaces.



- H. Inspector test connections and auxiliary drains shall be piped to spaces not occupied by building occupants, i.e., Mechanical Rooms, Storage Rooms, Janitor's Closets, etc.

#### 21 00 13 APPROVALS

- A. Submittal drawings shall show lights, ducts, and pipes indicating all necessary rises and drops in sprinkler piping required for routing. Drawings shall be of a minimum of the same scale as the contract documents (1/8" = 1'-0" scale). A 1/4" scale drawing of the service entrance and an elevation of the service entrance shall be required. A sprinkler riser diagram showing all control valves, test connections, supervisory switches, and drains shall be required.
- B. The "layout" submittals shall be provided as PDF drawings of the piping layout. Equipment cut sheets shall also be provided at this time.
- C. Any pipe sizing or hydraulic calculations performed prior to the Contractor receiving the "layout" submittal with the 'approved stamp' of the Engineer shall be at the Contractor's own risk. Any design changes resulting in resizing pipe and/or revising hydraulic calculations will be done at no cost to the Owner.
- D. The "working drawing" submittals shall be provided as PDF drawings of the piping layout and include hydraulic calculations. Calculations shall include peaking information for each area calculated. The hydraulic calculation used for the system design shall be clearly identified from all other hydraulic calculations and should show the safety factor the designed system has relevant to the available water test pressure.
- E. Hydraulic calculations shall include: actual pipe internal diameters and coefficients of materials approved in the "layout" submittal; design density; remote area size; and area per sprinkler.
- F. The Contractor shall not pursue any approvals or interpretations of the design documents except through the office of the Architect/Engineer.
- G. All work shall meet the requirements of the Owner, authority having jurisdiction, F.M., Architect and Engineer. These requirements may be greater than required by NFPA. Work shall not start prior to the Contractor receiving the "working drawing" shop drawings with the 'stamp' of the Engineer and approval from the authority having jurisdiction.

#### 21 00 14 TESTING

- A. Preliminary testing witnessed by the Architect/Engineer shall be conducted to assure proper operation before the final test is scheduled. Prior to this testing, pipes shall be flushed, hydrostatically tested, and all valves and devices shall be operated. All requirements of "System Acceptance" of NFPA 13 shall be met in full.
- B. The sprinkler system shall be final Acceptance tested in the presence of the Owner's Representative and the governing agencies having jurisdiction for approval.

#### 21 00 15 ACCEPTANCE

- A. Acceptance test performed as described above.
- B. Contractor shall fill out completely and sign Contractor's Material and Test Certificate provided in NFPA-13 and submit to Engineer for approval and thus system acceptance.

C. Spurious Alarms

1. If the Owner experiences an unacceptable number of spurious or unexplained false alarms during the installation and guarantee periods, the Contractor shall be responsible for providing the necessary labor, material and technical expertise to correct the problem to the satisfaction of the Owner.
2. Any spurious alarms associated with waterflow devices or valve supervisory switches, range hood and duct fire suppression system monitoring devices, or monitoring of special suppression systems are considered unacceptable.
3. The Contractor shall coordinate with the fire alarm contractor to resolve spurious or unexplained false alarms.

D. Keys and Special Tools

1. The Contractor shall supply the Owner with three complete sets of any special tools or keys necessary for normal operation and maintenance of the system. Keys and locks for equipment shall be identical.

21 00 16 SPACE CLASSIFICATION

- A. The most stringent of NFPA-13, local practices, or the following criteria shall be used in the sprinkler system design and hydraulic calculations.
  - 1) Light Hazard:  
Hospitals
- B. The hazard protection level shall be increased as required for areas with hazardous materials, flammable and combustible liquids, or storage that requires additional protection per NFPA 13. The sprinkler design criteria for spaces with hazardous materials and/or flammable and combustible liquids shall be in accordance with NFPA 30 and the requirements for Extra Hazard occupancies of NFPA 13.
- C. Reduction in design area shall be permitted for quick response sprinklers in accordance with NFPA 13.

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## 21 00 20 SERVICE ENTRANCE

### 21 00 18 PIPING MATERIAL AND FITTING SCHEDULE

- A. Size: 2-1/2" and larger above grade.
  - 1. Pipe: Schedule 40 steel at the Contractor's option.
  - 2. Fittings: Butt-welded, groove-end, forged steel flanges, thread-o-let, weld-o-let.
  - 3. Joints: Butt welded, groove-end couplings, flanged.
  - 4. Tests: Hydrostatically at not less than 200 psi for two (2) hours per NFPA 13, Section 8-2.2.
  
- B. Size: 2" and smaller above grade.
  - 1. Pipe: Schedule 40.
  - 2. Fitting: Cast iron.
  - 3. Joints: Screwed, groove-end.
  - 4. Tests: Hydrostatically at not less than 200 psi for two (2) hours per NFPA 13, Section 8-2.2.
  
- C. Size: All below grade.
  - 1. Pipe: Ductile iron.
  - 2. Fitting: Ductile iron.
  - 3. Joints: Mechanical (restrained joints (mega-lug)
  - 4. Tests: Hydrostatically at not less than 200 psi for two (2) hours per NFPA 13, Section 8-2.2.
  - 5. Provide adequately designed and sized concrete anchor/thrust blocks at fire hydrants.
  - 6. Provide retainer glands where flanged ductile iron pipe is installed at point of building entry.
  
- D. The following types of fittings are prohibited: plain end couplings and fittings, saddle tee, Victaulic flange rings, and Victaulic reducing couplings.
  
- E. Pipe velocities shall not exceed 14 feet per second in any section of the piping system.

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## **21 00 30 WET PIPE SPRINKLER SYSTEM**

### 21 00 31 SPRINKLER HEADS

- A. All sprinkler heads are to be quick response liquid in glass bulb type, with a minimum of ½ inch orifice, ½ inch NPT, and a K factor of 5.65. Sprinklers have an orifice larger than ½ inch shall be ¾" NPT.
- B. In finished spaces with ceilings, concealed sprinklers with an adjustable white coverplate shall be used. Heads shall be equivalent to the Viking model Horizon Mirage, Star model Stealth S110, Central model Royal Flush Concealed, or Reliable model G4QR.
- C. In unfinished spaces or in concealed locations, upright and pendent sprinkler heads with a natural bronze finish shall be used. Heads shall be equivalent to the Viking Microfast Model M, Reliable model F1FR, or Star model SG.
- D. In finished spaces without ceilings the heads shall be the same as above with the addition of a white factory finish.
- E. Sidewall sprinklers where utilized in Unobstructed Construction shall be horizontal recessed type with a white factory finish. Heads shall be equivalent to Viking Microfast model M, Reliable HSW-1, or Star Galaxy model.
- F. Temperature range and response time shall be suitable for the location and the expected heat release. Within a space all sprinklers should be the same Temperature Range and Response Time to avoid "skipping".

END OF SECTION

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**22 00 00 PLUMBING WORK**

22 00 01 GENERAL

- A. The Plans, the general provisions of the Contract including the General, Supplementary and/or Special Conditions and specification sections of Division 1 shall apply to Work of Divisions 22 of the Specifications.
- B. Provisions and conditions cited in this Section shall apply to Work for other sections of Divisions 22 of these Specifications.
- C. Each plumbing fixture, accessory, equipment item and specialty shall be installed in accordance with the respective manufacturer's recommendations.
- D. Plumbing fixtures, equipment and specialties shall be protected against damage in the period between installation and acceptance. Any item damaged shall be removed, repaired and/or replaced at no additional compensation.
- E. All operable devices and features of plumbing fixtures, accessories, equipment and specialties provided for in the Scope of Work of this Section shall be operated and proved to function satisfactorily for a period of eight (8) hours. Adjust, balance, lubricate as required, and instruct the Owner in the proper operation and maintenance of each device.
- F. The plumbing system shall comply with the 2011 Reduction of Lead in Drinking Water Act. Components shall be "lead free" equivalent of model number specified regardless if manufacturer's prefix and suffix have been included.

22 00 02 REFERENCES, REGULATORY REQUIREMENTS

- A. Work for this Section of the Specifications shall be performed in accordance with the Codes, Standards, etc. as identified in Division 20.

22 00 03 RELATED SECTIONS OF THE SPECIFICATIONS

The following sections of the Specifications apply to Work under this Section:

- 1. Division 20 - Basic Mechanical Conditions and Basic Mechanical Material and Methods
- 2. Division 25 - Temperature Control (for monitoring domestic water temperature)

22 00 04 DEFINITIONS

(none)

22 00 05 WORK INCLUDED

- A. Furnish material, labor and services necessary for and incidental to providing the following Plumbing Work where shown on the Plans and as hereinafter specified. Include all necessary work in the related sections of the Specifications (Subsection 20 00 43) to perform the Work completely.
  - 1. Sanitary waste system, including but not limited to, sanitary piping, vent piping, acid waste, acid vent piping, plumbing fixtures, floor drains, and cleanouts.
  - 2. Potable domestic water system, including but not limited to, backflow preventers, pressure regulators, water meter, cold water piping, hot water piping, hot water return piping, and connection to all plumbing fixtures, equipment or specialties.
  - 3. Contractor shall coordinate his work with the work of other trades, and with the architectural and structural drawings.



4. Draining, filling, and venting of all modified systems as required for the above work. This includes scheduling shutdowns with the Owner. (Refer to Section 20 10 70).
5. Provide sufficient labor and resources required for the testing and balancing (Refer to Section 20 10 80) and for the commissioning process (Refer to Section 152300).
6. Smoke stopping of all penetrations of pipes and firestopping of the same through fire rated partitions as shown on the architectural drawings including, but not limited to stairways, shafts, corridors, floors, roofs, and required exits. (Refer to Section 20 10 20).
7. Cleaning and pressure testing equipment, piping, and accessories installed under this section of the specification. (Refer to Section 20 10 50).
8. All seismic restraints for the above work. (Refer to Section 20 10 40).
9. Installing accessories specified under other sections of the specification referenced in subsection 20 00 05.

22 00 06 SUBMITTALS (SEE SUBSECTION 20 00 43)

- A. The Contractor shall submit the following shop drawings for approval in accordance with Subsection 20 00 43 - Submittals.
  1. Piping materials and valves as specified in Piping Material Schedule(s) in subsection 22 20 00.
  2. All specified drains and overflows in subsection 22 30 00.
  3. All specified plumbing fixtures in subsection 22 40 00.
  4. All specified plumbing equipment in subsection 22 60 00.
  5. All specified plumbing specialties in subsection 22 80 00.
  6. All general items specified under Division 20 utilized in the installation of work required by this section of the specification.
- B. Provide manufacturer's technical product data of each material and accessory item with engineering support information and recommended installation procedure. Data shall be specific to product specified and clearly identified on all data sheets, which contains multiple models or sizes.
- C. At the completion of the project, submit a letter stating all materials are asbestos free, and meet the specified ASTM E-84 flame/smoke rating of 25/50, and that all piping and duct penetrations are smoke or fire stopped as required by the Code.
- D. Contractor shall submit coordination drawings to the Engineer for review prior to any fabrication or installation. (Refer to Section 20 10 50).

22 00 07 SPECIAL REQUIREMENTS

- A. Where Pipe and accessories installed under this section of the specification tie-in to existing systems, Contractor shall verify existing lines for: sizes, direction of flow (via pressure or physical tracing of piping, not labels), materials, and elevations before installing new work. Contractor shall notify Architect/Engineer upon discovery of discrepancy. Work performed prior to verification will be corrected at no cost to Owner.
- B. Where lines installed under this section of the specification tie-in to existing lines Contractor shall verify all existing lines, their elevations and directions of flow before running any new lines.
  1. Contractor shall notify Architect/Engineer upon discovery if the new line cannot tie-in to the existing line due to location, elevation, or direction of flow.

## 22 20 00 PLUMBING PIPING SYSTEMS

### A. General

1. Furnish and install the piping systems shown on the Plans and as hereinafter specified in the respective PIPING MATERIAL SCHEDULE. Include all necessary considerations in the related sections of the Specifications (subsection 22 00 05) to provide for complete systems.
- B. All drainage lines shall be flushed clean at the completion of the Work. Rod out any obstructions encountered.
- C. All domestic water lines shall be flushed clean at the completion of the Work. Refer to Section 20 10 56 – Cleaning of Piping Systems.
- D. Pressure test each respective piping system for tightness to the test pressure indicated without loss. Repair any leaks and retest, as required. If test pressure is not indicated, hydrostatically test to 1.5 times the system operating pressure.
- E. The Plans indicate the approximate location and arrangement of roughing-in for waste, vent and domestic water piping to serve the respective plumbing fixture, equipment and specialties. Final locations and arrangements shall be determined from approved shop drawings of the respective item.
- F. Provide approved backflow preventers in all branch lines in the domestic water system for connections to non-domestic applications.
- G. Main vents shall be the same size as waste lines and shall extend 12" minimum above the roof. Minimum vent thru the roof (VTR) shall be 3" size.
- H. Install all piping with pitch to vent or drain. Provide drain valves at low points and air vents at high points. Drain valves and air vents shall be 3/4" bronze, 2 piece body ball valves with 3/4" hose end adapter, cap, and chain. In 1/2" through 2" pipe, contractor may use Webstone model T-drain.
- I. The plumbing system shall comply with the 2011 Reduction of Lead in Drinking Water Act.

### 22 20 01 PIPING MATERIAL SCHEDULE P-1

- |              |  |
|--------------|--|
| A. Service:  | Sanitary waste (SAN) and Vent (V), above grade.  |
| B. Design:   | Pressure: gravity vented.<br>Temperature: 140 degrees F.                               |
| C. Pipe:     | Cast iron soil pipe, no-hub.   |
| D. Fittings: | Cast iron, no-hub.   |
| E. Joints:   | No-hub stainless steel medium duty, coupling assembly, with neoprene rubber gasket.    |
| F. Test:     | Pressure test at not less than 15 feet static head of water for two (2) hours minimum. |

22 20 02 PIPING MATERIAL SCHEDULE P-2

- A. Service: Domestic water, above grade.  
Includes cold water (CW), hot water (HW), hot water recirculating (HWR)
- B. Design: Pressure: 100 psig.  
Temperature: 180 degrees F. max. for hot water only.
- C. Pipe: Copper, hard drawn, seamless, type L.
  - 1. Fittings: Wrought copper, solder ends.
  - 2. Dielectric Isolation union/union flanges between Fittings: water piping and non-copper connections and at all equipment connections.
- D. Flanges: Cast bronze, 125 psi.
- E. Joints:  
All 95/5 Solder
- F. Valves: All valves shall be lead free.
  - 1. Shut-off/Service:  
3" and smaller Ball valve, bronze body, two piece, full port, stainless steel ball and trim.
  - 2. Balancing/Throttling:  
3" and smaller "Circuit Setter"
  - 3. Test: Hydrostatically pressure test at 150 psi for four (4) hours minimum.

## 22 30 00 DRAINS AND CLEANOUTS

### A. General

1. Furnish and install the following drains and cleanouts where shown on the Plans and as hereinafter specified. Drains and cleanouts shall have all options, body material, top size, top style, top material, and accessories as specified whether or not listed as a prefix, suffix, or catalog number.
- B. Drain and cleanout outlets shall be compatible with respective piping material and size. Outlets below grade shall be push type. Outlets above grade may be no-hub or push type at the Contractor's option. Tops shall be compatible with the flooring system.
- C. Provide deep seal P-traps for all floor drains.
- D. Provide full size cleanouts up to 4" size above the lowest floor line in all drainage risers, and where total of the fittings exceed 120 degrees and at changes in direction greater than 60 degrees in horizontal drainage lines, and at intervals of not greater than fifty (50) feet in straight piping runs 4" diameter and smaller, and one hundred (100) feet for piping over 4" diameter.
- E. Do not install cleanouts in electrical equipment rooms. Extend the cleanout to outside the room limits.
- F. Where cleanout is located in open ground, extend the cleanout to finished grade elevation and install a 16" x 16" x 8" deep concrete pad at grade to secure the cleanout.
- G. Submit with products, a room by room schedule indicating floor drains and cleanouts to be used including top size, shape, floor finish material, and setting height with respect to concrete slabs. Any drain body set prior to approval shall be performed with block-outs to allow correct tops and finished heights to be adjusted.

### 22 30 01 FLOOR DRAINS

#### A. Floor Drain: toilet room (FD-A):

Cast iron body with flashing flange, integral reversible clamping collar, seepage openings, 6" x 6" square adjustable satin nickel bronze, strainer top with vandal proof fasteners and be 3" outlet. Wade W-1103-G6-1-176, Zurn ZN-415-6S-VP, J.R. Smith 2000-B06NB-U-L, MIFAB F1100C-S6-1, or approved equivalent.

### 22 30 07 CLEANOUTS

#### A. Cleanout: interior finished floor (FCO):

Cast iron body, threaded adjustable housing, flanged ferrule with straight thread gasketed plug and square secured satin nickel bronze scoriated top, vandal proof, tops shall be for tile, carpet, ceramic tile, terrazzo tile as required. Wade W-6000-TS-179-118, Zurn Z-1400-T-BP-VP, J.R. Smith 4052-U, MIFAB C1100-S-1-6, or approved equivalent.

#### B. Cleanout: wall type for concealed riser in finished spaces (WCO):

Provide cleanout fitting with screwed plug opening and countersunk plug. Provide 8" x 8" square access covers with polished nickel bronze beveled edge frame with anchor lugs for over the wall installation, smooth stainless steel cover, and vandalproof screws. Wade 8480ST-179, Zurn ZANB-1462-8-VP, J.R. Smith 4730-U-NB, MIFAB C1460-S-3-6, or approved equivalent.

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## 22 40 00 PLUMBING FIXTURES

### A. General

1. Furnish and install the following plumbing fixtures where shown on the Plans and as hereinafter specified. Plumbing fixtures and accessories shall have all options, body material, water consumption, and accessories as specified where or not listed as a prefix, suffix, or catalog number. Include all necessary work in the related sections of the Specifications (subsection 22 00 03) and accessories to provide for complete installation and operation of the respective fixture.
2. All plumbing fixtures and non-metal accessories shall be white color, except where shown or specified otherwise.
3. Vitreous china fixtures, where specified, shall be best quality, non-absorbent. Warped or imperfect fixtures shall not be accepted. Enameled cast iron fixtures, where specified, shall be thoroughly fused and bonded to body without discoloration, chips, flaws or cracks. Finish all exposed surfaces.
4. Fixture trim shall be cast brass with polished chrome-plated finish on exposed surfaces, except where shown or specified otherwise.
5. Fixture traps shall be tubular wall type, minimum 17 gauge with integral cleanout plugs, polished chrome plated finish, except where shown or specified otherwise. Size to suit fixture tailpiece. Comply with local plumbing code.
6. All water closets, urinals, and lavatories shall be from the same manufacturer. All faucets, for lavatories, janitor sinks, sinks shall be from the same manufacturer. All supplies and stops for lavatories and sinks shall be from the same manufacturer.
7. Furnish accessories for fixtures requiring trim, carriers, brackets, back-up plates, specialties, etc. for respective complete installation.
8. Install all handicapped fixtures to respective ADA Standards requirements per Federal Register 28 CFR part 36, July 26, 1991.
9. Provide stops (valves) in all water supplies to all fixtures.
10. Provide escutcheon plates for all wall penetrations for exposed connections to fixtures.
11. Division 22 shall provide templates of openings required for countertop mounted fixtures to the General Contractor.
12. Connections between plumbing fixture outlets and respective waste piping shall be gas and watertight. Use suitable and approved setting compound or gasket; rubber gaskets or putty are not acceptable.
13. Acceptable manufacturers:
  - a. Fixtures - American Standard, Kohler, Eljer, Crane
  - b. Carrier - Wade, Zurn, J.R. Smith, Watts
  - c. Flush Valve – Sloan, Zurn no substitutions allowed.
  - d. Supplies, Strainer, Traps – McGuire, Dearborn, Brass Craft, Engineered Brass, American Standard, Kohler, Eljer.
  - e. Faucets: Chicago, no substitutions allowed.

22 40 01 WATER CLOSET: FLOOR MOUNTED (W-A):

A. Toilet:

Vitreous china elongated bowl, 1.28-1.6 gal/flush, siphon-jet, floor mounted 15" rim height, with 1-1/2" top inlet spud, High Efficiency Toilet (HET). Conforms to ANSI Standard A112.19.2M fixture dimensions. Water Closets shall be rated for bariatric. American Standard "FloWise" Elongated, Reight Height model 3641.001, or approved equivalent.

B. Seat:

Solid plastic, open front less cover for elongated bowl, integral bumpers and external check hinges with stainless steel bolts. Church #9500C. Bemis #1655C.

C. Flush Valve (Automatic Flush Valve):

Quiet, exposed diaphragm type, 1.6 gal/flush closet flushometer, infrared sensor, non-hold-open integral battery solenoid operator, 1" IPS screw driver angle stop with protective cap, adjustable tailpiece, vacuum breaker flush connection and spud coupling for 1-1/2" top spud, wall and spud flanges. Sloan Royal Model No. 110-ES-S (less transformer). (Sloan Regal Pro model 110-ES-S or Zurn ZEMS 6000AV-WS1).

22 42 01 LAVATORY: STANDARD COUNTERTOP (LV-A):

A. Lavatory:

Lavatory integral to casework.

B. Faucet:

Infrared sensor operated automatic lavatory faucet, adjustable run-time, adjustable sensor range, serviceable strainer, single battery solenoid valve, 1/2 gpm vandalproof spray head. All wires shall be metal jacketed. Thermostatic temperature mixing valve with hot and cold water supply check valves. Zurn Z6956-XL-F, Chicago 650-CP. Sloan ETF-80-A (less transformer).

C. Strainer

1-1/4" x 17 gauge cast brass grid strainer, integral spud and tailpiece.  
McGuire Mfg. catalog no. 155-A. Dearborn Brass catalog no. 760.

D. Supplies:

Loose keyed angle stops with lock shield caps and 1/2" (nominal) copper solder (5/8" ODS) inlet x 1/2" OD outlet x 12" long flexible risers. Provide cast brass escutcheons. Chicago Faucet no. 1027-CP with no. 1003 escutcheon.

E. Trap:

1-1/2" x 1-1/4" x 17 gauge tubular P-trap with clean-out, plug and wall escutcheon.  
McGuire Mfg. catalog no. 8902.

22 43 01 SINK: STAINLESS STEEL, SINGLE COMPARTMENT, COUNTERTOP WITH SWING SPOUT (SK-A):

A. Sink:

18 gauge, type 302 stainless steel, self-rim single bowl sink. Inside bowl dimensions: 16" x 13-1/2" x 10-1/8". Faucet deck with (3) holes on 4" centers. Elkay model #DLR-191910.

B. Faucet:

8" centers, 8" gooseneck swing spout, wristblade handles, aerator. Chicago Faucet no. 201-AGN8AE29-317AB.

C. Strainer:

Stainless steel crumb basket with rubber stop for 3-1/2" drain opening and 1-1/2" OD brass tailpiece. Elkay model no. LK-35, Just J-35.

D. Supplies:

Loose keyed angle stops with lock shield caps and 1/2" (nominal) copper solder (5/8" ODS) inlet x 1/2" OD outlet x 12" long flexible risers. Provide cast brass escutcheons. Chicago Faucet no. 1027-CP with no. 1003 escutcheon.

E. Trap:

1-1/2" x 17 gauge tubular P-trap with cleanout plug and wall escutcheon. McGuire Mfg. catalog no. 8902.

22 43 01 MOP SINK BASIN: (MSB):

A. Receptor (basin):

1. 24" x 24" x 12" high, precast terrazzo one-piece basin, ground smooth, grouted and sealed to resist stains. Top edge capped with 20-gauge type 302 stainless steel cast integrally on all four sides. Acorn model TSH-24-SSC-KH36-KWG, Fiat model TSB-100, or Stern Williams model "SERVICEPTOR" SB-900.

B. Faucet:

Vacuum breaker rigid spout with 3/4" hose thread outlet, polished chrome finish, wall brace and pail hook, 1/2" F union inlets on exposed valves on 6" centers, lever handles, indexed and tabbed for "HOT" and "COLD". Chicago Faucet no. 835 for overhead supplies. Chicago Faucet no. 897-CP or Zurn Z841M1 for supplies thru-the-wall.

C. Strainer:

Cast brass outlet with stainless steel strainer cast integrally into bottom of basin to provide for an inside caulk connection for a 3" waste pipe.

D. Splash Panels:

Provide 20 gauge 302 stainless steel sheet splash catcher panels on one or two sides as required.



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## **22 80 00 PLUMBING SPECIALTIES**

### **A. General**

1. Furnish and install the following plumbing specialties where shown on the Plans and as hereinafter specified. Include all necessary considerations in the related sections of the specifications (subsection 22 00 02) and accessories to provide for complete installation and operation of the respective item.
2. Specialties shall comply with the 2011 Reduction of Lead in Drinking Water Act. Components shall be “lead free” equivalent of model number specified regardless if manufacturer’s prefix and suffix have been included.

### **22 80 01 WATER HAMMER ARRESTORS**

- A. Furnish and install all stainless steel shock absorbers at all solenoid, remote operated or quick closing valves such as restroom devices for each battery of fixtures. Install on both domestic hot and cold water branch lines in an upright position. Install in ADA water closet stall with wall access panel. JR Smith 5005 to 5050 depending on manufacturer’s recommended sizing.

END OF SECTION

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## **23 00 00 HVAC PIPING AND EQUIPMENT**

### 23 00 01 GENERAL

- A. The Plans, the general provisions of the Contract including the General, Supplementary and/or Special Conditions and specification sections of Division 1 shall apply to Work of Division 20 of the Specifications.
- B. Provisions and conditions cited in this Section shall apply to Work for other sections of Division 20 of these Specifications.

### 23 00 02 REFERENCES, REGULATORY REQUIREMENTS

- A. Work for this Section of the Specifications shall be performed in accordance with the Codes, Standards, etc., as identified in Division 20.

### 23 00 03 REFERENCES, RELATED SECTIONS OF THE SPECIFICATIONS

Requirements of the following Sections of the Specifications apply to Work for this Section:

- 1. Division 20 - Basic Mechanical Conditions and Basic Mechanical Materials and Methods
- 2. Division 24 – Air Distribution
- 3. Division 25 - Temperature Controls

### 23 00 04 DEFINITIONS

(none)

### 23 00 05 WORK INCLUDED

- A. Furnish material, labor and services necessary for, and incidental to, installing the following systems where shown on the Plans and as hereinafter specified. Include all necessary work in the related sections of the Specifications (Sub-section 23 00 03 to provide for complete systems).
  - 1. Cooling system including, but not limited to, piping, piping specialties.
  - 2. Heating system including, but not limited to, piping, piping specialties, terminal heating coils.
  - 3. Air handling equipment including, but not limited to, terminal units.
  - 4. Draining, filling, and venting of all modified systems as required for the above work. This includes scheduling shutdowns with the Owner (Refer to Section 20 10 70).
  - 5. All seismic restraints for the above work (Refer to Section 20 10 40).
  - 6. Smoke stopping of all penetrations of pipes and ductwork, and firestopping of the same through fire rated partitions as shown on the Architectural drawings including, but not limited to stairways, shafts, corridors, floors, roofs, and required exits (Refer to Section 20 10 20).
  - 7. Cleaning and pressure testing equipment, piping, and accessories installed under this section of the specification. (Refer to Section 20 10 50).
  - 8. Provide sufficient labor and resources required for the testing and balancing (Refer to Section 20 10 80) and for the commissioning process.

9. Installing accessories specified under other sections of the specification referenced in Sub-section 23 00 05, including but not limited to, flow meters, control valves, thermowells, and taps for pressure sensors.

23 00 06 SUBMITTALS:

- A. The Contractor shall submit the following for approval in accordance with Subsection 20 00 43, Duties of the Contractor - Submittals.
  1. Piping materials, valves, and accessories as specified in Piping Materials Schedule(s) in this section of the specification.
  2. All specialties including, but not limited to, thermometers, gauges, relief valves, pressure regulators, backflow preventers, flow switches, and vacuum breakers.
  3. All HVAC equipment specified in this Division 23 including, but not limited to, chillers, boilers, boiler vent, heat exchangers, pumps, packaged equipment, air handling units, fans, terminal units and steam humidifier.
  4. All general items specified under Division 20 utilized in the installation of work required by this section of the specification.
- B. Provide manufacturer's technical product data of each material and accessory item with engineering support information, installation manual, operation and maintenance manual. Data shall be specific to product specified and clearly identified on all data sheets, which contains multiple models or sizes.
- C. At the point where the mechanical system has been installed and checked by the Contractor and the systems are ready for testing and adjusting, submit a letter to the Architect/Engineer stating such. Refer to Section 20 10 85.
- D. At the completion of the project, submit a letter stating all materials are asbestos free, and meet the specified ASTM E-84 flame/smoke rating of 25/50, and that all piping and duct penetrations are smoke or fire stopped as required by the Code.

**23 10 00 HYDRONIC PIPING**

- A. Itemization of the piping materials for specific system application are enumerated in the following sub-sections for the respective PIPING MATERIAL SCHEDULE. Specific requirements for materials shall be as listed in Division 20 Basic Materials and Methods.
- B. Manufacturer's mill reports and applicable documents to certify the validity of the procured piping materials shall be on file at the Contractor's office.
- C. Install all piping with pitch to vent or drain. Provide drain valves at low points and air vents at high points. Drain valves and air vents shall be  $\frac{3}{4}$ " bronze 2 piece body ball valves with  $\frac{3}{4}$ " hose end adapter, cap and chain. In  $\frac{1}{2}$ " through 2" pipe, contractor may use Webstone model T-drain. Use eccentric reducing fittings (installed top level) as required to avoid air pockets.
- D. Gaskets and packings containing asbestos are not acceptable.
- E. Where Pipe and accessories installed under this section of the specification tie-in to existing systems, Contractor shall verify existing for: sizes, direction of flow (via pressure or physical tracing of piping, not labels), materials, and elevations before installing new work. Contractor shall notify Architect/Engineer upon discovery of discrepancy. Work performed prior to verification will be corrected at no cost to Owner.

23 10 01 PIPING MATERIAL SCHEDULE, M-1

- A. Service: Chilled water supply and return for HVAC.  
Hot water (heating) supply and return for HVAC.
- B. Rating: 125 psig at 350°F  
175 psig at 150°F
- C. Pipe: (Refer to Section 20 10 11)
  - 1. 3" and smaller Copper, type L.
  - 2. Contractor has the option on piping 3" and smaller to use either copper or black carbon steel. Fittings shall be as scheduled below for the piping material chosen.
- D. Fittings: (Refer to Division 20 10 10)
  - 1. 3" and smaller Wrought copper, solder ends.
  - 2. 2-1/2" and smaller Cast iron, screwed.
- E. Joints in Steel Piping: (Refer to Division 20 10 30)
  - 1. 2-1/2" and smaller Screwed
  - 2. All sizes where concealed in chases or walls, or above

gyp/plaster  
ceilings                      Welded

F.     Joints in Copper Piping (Refer to Division 20 10 30):

1.     All                      95/5 solder

G.     Valves: (Refer to Division 20 10 10)

1.     Shut-off/service:

11.    3" and smaller   Ball valve: two piece, bronze body, stainless steel ball and trim.

2.     Balancing/Throttling:

21.    12" and smaller "Circuit Setter"

3.     Check valve – General Duty:

31.    All                      Class 125, swing check.

4.     Check Valve – Pump Discharge:

41.    2-1/2 and smaller                      Class 125, swing check

5.     Unions:

51.    3" and smaller                      Wrought copper, solder ends.

6.     Flanges:

61.    4" and smaller                      Cast copper companion type, solder end, class 125 ASME standard or class 150.

7.     Pressure Test:                      Hydrostatic test at 200 psi for two (2) hours minimum.

23 10 02   HYDRONIC SPECIALTIES

A.     Test Ports

1.     Provide pressure and temperature test plugs at locations shown on the plans, flow diagrams and details. Test ports shall be pressure and temperature test plugs. Plugs shall be self-sealing plugs. EPDM seals rated for the temperature, pressure and fluid associated with the application and shall be capable of accepting a needle type temperature or pressure probe and reclosing when the probe is removed. Furnish extensions for test ports installed in insulated piping. Plugs shall be provided with threaded protective caps. One temperature and pressure test kit suitable for the plugs used on the job shall be provided to the Owner on all installations where the plugs are used. Acceptable manufacturers and models are as follows:

Manufacturer	Model
--------------	-------

Peterson Engineering  
Trerice  
Sisco  
Bell and Gossett

Pete's Plug  
Pressure/Temperature Test Plug  
P/T Plugs  
Read-out Valve RV-125A

2. Alternatively, access fittings may be provided in place of the Pete's Plugs. In this case, the fittings shall be provided with a retained cap and shall be Mueller Brass A-17130 or equivalent.



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## **23 82 00 TERMINAL UNITS**

### 23 82 01 VARIABLE VOLUME UNIT WITH HOT WATER HEAT

- A. Unit casing shall be welded, galvanized steel. Leak rate shall be not more than 1% of rated capacity at 4" wg. Interior surface of unit casing shall be acoustically and thermally lined with 1/2 inch thick, minimum of 1.5 lb./cu. ft. density glass fiber with foil face. Insulation shall be UL listed and meets NFPA-90A and UL 181. Factory mounted, removable panel on bottom of unit providing access to air valve and entering airside of coil. Straight flange or slip and drive rectangular discharge duct connection.
- B. Factory mounted one or two row coil with maximum of 12 fins per inch. Full fin collars for accurate fin spacing and maximum tube-fin contact, 5/8 inch O.D. seamless copper tubes mechanically expanded into the fin collars, leak tested at 300 psig.
- C. Air valve shall be a 90° rotational damper flow control device with factory installed direct digital controls (DDC). All controls shall be furnished under Division 25 and mounted and wired in the factory by unit manufacturer. Manufacturer shall provide multiple point averaging flow sensing ring with high and low pressure pneumatic tubes compatible with DDC velocity pressure sensor. A calibration chart shall be provided on each unit.
- D. At the Contractor's option Division 25 may field mount controls at no additional cost to the Owner.
- E. Units shall be as manufactured by Titus, Trane, or Price.

### 23 82 02 VARIABLE VOLUME UNIT WITH VORTEX SHEDDING AIRFLOW MEASUREMENT

- A. Provide terminal units of the sizes and quantities as shown on the equipment schedules.
- B. Unit casing shall be welded, minimum 22 gauge galvanized steel. Unit shall be factory leak tested and sealed. Leak rate shall be not more than 1% of rated capacity at 4" wg. Straight flange or slip and drive rectangular discharge duct connection. VAV terminal units shall be ARI certified.
- C. Air valve shall incorporate vortex style airflow sensors. Unit shall include transmitter for vortex flowmeter and be provided with integral standard response speed actuator.
- D. Terminal unit shall be supplied without the manufacturer's controller. The unit controller will be supplied separately by the BAS vendor. Unit shall be configured to allow for controls wiring to connect to AFMS transmitter for airflow input to BAS, and controls wiring connection to actuator for damper command output from BAS.
- E. Unit shall include Bluetooth option for wireless configuration.
- F. Units shall be Accuvalve AVT4000.

END OF SECTION

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## **24 00 00 AIR DISTRIBUTION**

### 24 00 01 GENERAL

1. This Section specifies air distribution systems.
2. The Plans, the general provisions of the Contract including the General, Supplementary and/or Special Conditions and specification sections of Division 1 shall apply to Work of Divisions 20 - 29 of the Specifications.
3. Provisions and conditions cited in this Section shall apply to Work for other sections of Divisions 20 - 29 of these Specifications.

### 24 00 02 REFERENCES, REGULATORY REQUIREMENTS:

- A. Work for this section of the specifications shall be performed in accordance with the Codes, Standards, etc. as identified in Division 20 in addition to the following:
  1. ASHRAE, "Handbook 1997 Fundamentals"; Chapter 32 - Duct Design.
  2. ASHRAE, "Handbook 1996 Equipment"; Chapter 16 - Duct Construction.
  3. ASTM A90-81 (1991), "Test Method for Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles".
  4. ASTM A525-91b, "Spec for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process".
  5. ASTM A527/A527M-90, "Spec for Steel Sheet, Zinc-Coated (Galvanized) by Hot-Dip Process, Lock Forming Quality".
  6. SMACNA "HVAC Duct Construction Standard – Metal and Flexible" – Second Edition.

### 24 00 03 REFERENCES, RELATED SECTIONS OF THE SPECIFICATIONS

Requirements of the following Sections of the Specifications apply to Work for this Section:

- A. Division 20 - Basic Mechanical Conditions and Basic Mechanical Materials & Methods
- B. Division 23 – HVAC Piping and Equipment
- C. Division 25 - Temperature Control

### 24 00 04 DEFINITIONS

- A. The size of the ducts shown on the drawings and in this Section of the Specifications shall be the outside dimension of the ductwork which will take into account any internal acoustical lining thickness specified for duct system or sub-system.
- B. The term "**supply air**" where used in this Section of the Specifications shall mean downstream of a coil.
- C. The term "**outdoor air**" where used in this Section of the Specifications shall mean ambient air that has not been conditioned.
- D. The term "**return air**" where used in this Section of the Specifications shall mean conditioned air that is returned from the space.
- E. The term "**mixed air**" where used in this Section of the Specifications shall mean air streams that are a mixture of "**outdoor air**" and "**return air**".

- F. The term “**relief air**” where used in this Section of the Specifications shall mean excess return air that relieved from the building.
- G. The term “**exhaust air**” where used in this Section of the Specifications shall mean air that is removed due to contaminates, odors, or heat.

24 00 05 WORK INCLUDED

Furnish material, labor and services necessary for and incidental to the installation of the following systems where shown on the Plans and as hereinafter specified. Include all necessary considerations in the related sections of the Specifications (Sub-section 20 30 03) to perform the Work completely.

- A. Sheet metal ducts, sheet metal plenums, duct linings, flexible ductwork, dampers and accessories.
- B. Air devices including adjusting the pattern controllers.
- C. Installing accessories specified in referenced sections above.
- D. Smoke stopping of all penetrations of ductwork, and firestopping of the same through fire rated partitions as shown on the Architectural drawings including, but not limited to stairways, shafts, corridors, floors, roofs, and required exits (Refer to Section 20 10 20).
- E. Contractor shall coordinate his work with the work of other trades, and with the architectural and structural drawings.

24 00 06 SUBMITTALS

- A. The Contractor shall submit the following for approval in accordance with Subsection 20 00 43, Duties of Contractor - Submittals.
- B. Contractor shall submit coordination drawings to the Engineer for review prior to any fabrication or installation (Refer to Section 20 10 50).
- C. Submittals shall include drawings showing joining methods, location of duct transverse joints, and duct support locations.
- D. Submittals shall be required for all shop fabricated balancing dampers.
- E. At the completion of the project, submit a letter stating all materials are asbestos free, and meet the specified ASTM E-84 flame/smoke rating of 25/50, and that all piping and duct penetrations are smoke or fire stopped as required by the Code.

24 00 07 SPECIAL REQUIREMENTS

- A. Contractor shall inspect each component of the heating and air conditioning system to eliminate rattles, air whistles, vibration, and mechanical system sound transmission. Rough edges in ducts, insecure dampers, turning vanes, fire dampers, etc., shall be corrected to assure no recurrence of the noise source. Each vibration isolator and flexible connector shall be adjusted to limit transmission of sound to the occupied space.
- B. Where Ductwork and accessories installed under this section of the specification tie-in to existing systems, Contractor shall verify existing for: sizes, direction of flow (via pressure or physical tracing of ductwork, not labels), materials, and elevations before installing new work. Contractor shall notify Architect/Engineer upon discovery of discrepancy. Work performed prior to verification will be corrected at no cost to Owner.

24 00 08 AIR DISTRIBUTION CLEANLINESS

- A. Contractor shall implement procedures to maintain an “Advanced Level” of ductwork cleanliness per the latest addition of the SMACNA Duct Cleanliness for New Construction Guidelines.
1. Production and Site Delivery:
    - a. Self-adhesive labels for part of identification are to be applied to the external surfaces only.
    - b. During transportation, ductwork and air distribution components shall be sealed either by blanketing or capping the duct ends, bagging small fittings, surface wrapping or shrink wrapping.
  2. Site Storage:
    - a. Temporary storage shall be located away from high dust generating processes such as masonry, tile cutters, saws, drywall sanding, mortar and plaster mixers, roof pitch kettles, portable electric generators, and main walkways that will be constantly broom swept.
    - b. Temporary storage shall include pallets or blocking to keep ductwork and air distribution components above floor surface to prevent water damage.
    - c. Coverage should be used to protect stored materials at all times.
    - d. Duct open ends and air side of air distribution components shall be securely sealed at all times.
    - e. Seals shall be visually examined and if damaged, resealed with an appropriate material.
  3. Installation:
    - a. Before installation of individual duct sections and air distribution components, they are to be inspected to ensure that they are free from debris and shall be wiped clean if debris exists.
    - b. The working area shall be clean, dry, and the airside of ductwork and air distribution components protected from dust and moisture.
    - c. Protective coverings shall only be removed immediately before installation and inspected to determine if additional wipe down is necessary.
    - d. Open ends on completed ductwork shall be sealed immediately if left for an extended period of time (work breaks, overnight, etc.).

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## **24 31 00 SHEETMETAL DUCTWORK**

### 24 31 01 MATERIAL

- A. All ducts unless specified otherwise shall be constructed from sheets or rolls of G-90 or better-galvanized steel, LFQ, Chemtreat. Fiberglass ductboard is prohibited.
- B. All supply ductwork, unless specified otherwise, shall be constructed of gauges and reinforcement to 4" w.g. static pressure in SMACNA Duct Construction Standard – Latest Edition.
- C. All return, exhaust, outdoor air, relief, and supply ductwork downstream of terminal units shall be constructed of gauges and reinforcement to 2" w.g. static pressure in SMACNA Duct Construction Standard – Latest Edition. Panels in all ducts 12" and larger shall be cross-broken or beaded on 12" centers.
- D. Where local code requires gauges heavier than required by SMACNA then the local code shall govern.

### 24 31 02 CONSTRUCTION

- A. All ductwork shall be neatly constructed, stiffened, on the outside surfaces where necessary to prevent perceptible vibration or buckling. All ducts, housings, etc., shall be fabricated as detailed on the drawings and in the SMACNA Duct Construction Manual –Latest Edition.
- B. All rectangular ducts unless specified otherwise shall be "Pittsburgh Lock" longitudinal joints. Snaplock is not acceptable.
- C. All round ducts and flat oval ducts shall have spiral seams or continuously welded longitudinal seams.
- D. All transverse joints in rectangular ductwork 24" and larger shall be Ductmate, SMACNA T-25, or approved equivalent. All flanged ductwork, regardless of pressure class, shall use gaskets, corner closures, and be TEK screwed or riveted on 10" centers with a minimum of two (2) per side. Transverse joints in rectangular ductwork smaller than 24" shall be made in accordance with SMACNA suitable with the pressure class.
- E. All transverse joints in round and oval ductwork 24" and larger shall be Ductmate, or approved equivalent. Transverse joints in round and overall ductwork smaller than 24" shall be beaded sleeve joints.
- F. Ducts shall be securely supported in accordance with SMACNA Duct Construction Manual – Latest Edition and in no case less than double thickness 1" x #24 gauge galvanized metal. Cable hangers are not allowed.
- G. Ducts that are to be externally insulated shall not be supported on unistrut channel unless it required based upon loading. Hanger rods for trapeze bars shall be spaced to allow for insulation installation.

### 24 31 03 SEALING

- A. Duct sealant shall be flexible, water-based, adhesive sealant designed for use in 4" static pressure systems. Sealer shall be UL listed and conform to ASTM E84. Sealer shall be equal to Ductmate PROseal, United McGill Uni-Mastic, Duro-Dyne DSW, or equivalent.



- B. All supply ductwork unless specified otherwise shall be SMACNA's seal class A.
- C. All return, exhaust, outdoor air, relief and supply ductwork downstream of terminal units shall be SMACNA's seal class B.

24 31 04 FITTINGS

- A. Rectangular duct branch take-offs, or rectangular to round, shall be 45°-boot fittings, spin in fittings are not acceptable.
- B. Rectangular duct proportional splits shall be made the sizes as shown on the drawings. Where duct sizes are changed from the original design, Contractor shall proportion split equal to the split in airflow.
- C. Rectangular duct changes in direction:
  - 1. 90 degree elbows, refer to plans, shall be mitered with turning vanes; or radiused with centerline radius to width ratio of 0.75 (inside radius/width ratio 0.25 with curve ratio 0.585) with 2 splitter vanes.
  - 2. 45 degree and less elbows shall be mitered without vanes.
  - 3. Elbows other than above shall be radiused with centerline radius to width ratio of 1 without splitter vanes.
- D. Round or Oval elbows and changes in direction shall have a minimum centerline radius of 1-1/2 that of duct size. Round or oval branch take-off shall be 45 degree booted style similar to McGill Airflow Lo-Loss Tee.
- E. Only when approved by the Engineer and owner ducts may be notched at structural steel. The converging angle shall be no greater than 30°, the diverging angle shall be no greater than 15°.
- F. Only when approved by the Engineer and owner objects may penetrate a duct. An airfoil shape shall be placed around the object to minimize turbulence.

## **24 33 00 AIR DISTRIBUTION ACCESSORIES**

### 24 33 01 BALANCING DAMPER

- A. Furnish and install volume dampers at each main branch take-off and in such other locations where required to properly balance the air distribution systems.
- B. All dampers, except those located downstream from terminal units used to adjust individual grilles, shall have frames and bearings and shall have quadrant lock regulators with thread screw to allow damper to be securely locked into place.
- C. Balancing dampers downstream from terminal units that are apart of manufactured branch fitting shall be a minimum of 18-ga. plate, 3/8" continuous shaft with locking quadrant handle equal to Duro Dyne model Quadline.
- D. Rectangular dampers up to size 24" x 12" shall be Ruskin MD25, Nailor 1870, Arrow, Air Balance, NCA, or shop fabricated equal, approved by the Engineer.
- E. Round dampers up to size 20" diameter shall be Ruskin MDRS25, Nailor 1890, Arrow, Air Balance, NCA or shop fabricated equal, approved by the Engineer.
- F. Rectangular dampers larger than 24" x 12" shall be Ruskin MD35, Nailor 1820 or equivalent manufactured damper by NCA.
- G. Where volume dampers are to be adjusted through walls or ceilings, such dampers shall be operated by regulators designed for recessed installation and provided with a cover plate which shall be flush to the surface of the wall or ceiling. Concealed regulators, as manufactured by Duro Dyne Corporation or Elgen shall be of the indicator type. Regulator shall be provided with a spring washer for non-binding adjustment and hex lock nut in addition to wedge pin which shall be installed to prevent damper rattle. Cast alloy regulator housing, with "open to shut" range positioning markers, shall be secured with removable cover to expose regulator for adjustments.
- H. All automatic dampers and control dampers shall be as specified in Division 25, "Temperature Control". Dampers shall be furnished under Division 25 for installation under Division 23 30 00.
- I. Control Damper Installation
  - a. Dampers installed in walls shall be installed with wall sleeves to allow direct coupled actuator installation.
  - b. Large damper installations with multiple actuators shall be installed with 8" sheetmetal blank-off/spacers between them to allow direct coupled actuator installation. Provide structural supports as required for a straight, true, level and square installation.
  - c. Dampers shall be attached with fasteners on 6" centers with a minimum of 2 per side.

### 24 33 02 AIR TURNING VANES

- A. Furnish and install directional air turning vanes in ductwork at all 90 degree mitered elbows and 90 degree radiused elbows.
- B. Mitered 90 degree elbows vanes shall be:
  - 1. Single rolled type with a radius of 2" with 1.5" spacing.
  - 2. Single rolled type with a radius of 4-1/2" with 3.25" spacing.

3. Double thickness type with a radius of 4-1/2" with 3.25" spacing. Double thickness 2" radius is not allowed.
  4. Tie rods shall be used to limit the maximum unsupported width per the type of vane used per SMACNA.
  5. Vanes shall be solidly installed and rattle-free locked into each slot of preformed vane guide rails as manufactured by Duro Dyne Corporation or Elgen. Rails shall be constructed of 24 gauge galvanized steel, specially embossed for extra strength and sturdiness.
- C. Radiused 90 degree elbows shall have 2 vanes. Vanes shall be single thickness, Splitter Vanes for radius elbows shall be fabricated based on the "SMACNA HVAC Systems Duct Design Manual" using the appropriate curve ratio.

24 33 03 FLEXIBLE CONNECTORS

- A. Furnish and install flexible connections at the connections to air handling equipment as indicated on the plans. Flexible connections shall be U.L. listed fabric that meets NFPA 90A. It shall weigh not less than 24 oz per sq. yd and have a tensile strength of not less than 500 psi. Flexible connections shall be preassembled "Super Metal-Fab" with 6" fabric attached to 3" metal on either side by means of "Grip-Loc" seam. At least one inch of slack shall be allowed when making connection to insure that no vibration is transmitted from fan to ductwork. The flexible connectors shall be fastened to ductwork and equipment by screws, rivets or spot welding. Flexible connectors shall be No. MF6N as manufactured by Duro Dyne Corporation, or equivalent by Vent-Fabrics or Elgen.

24 33 04 ACCESS DOORS AND PANELS

- A. Access panels shall be provided at all duct mounted automatic control dampers, fire dampers, in front of duct mounted reheat coils, multizone dampers, and as shown on drawings.
1. 2" Pressure Class: Door shall be SMACNA Standard, 12" x 12", double skin, 1" fiberglass insulation, with underside duct to frame gasket for reduced leakage.  
  
Solid without window Ruskin ADH22, Nailor 08SH, Greenheck HAD-10, Ductmate FDH, or equivalent.
- B. For access panels required in ceiling, walls, etc. of the building construction, see Section 20 10 10.

24 33 05 FLEXIBLE DUCTWORK

- A. Flexible duct shall be factory-fabricated units constructed of galvanized steel formed and mechanically locked to fabric covering. The units shall have an inside bending radius of 3/4 of the inside dimension of the pipe, and the entire installed unit, using manufacturer's apparatus and installation methods shall be flexible duct assemblies shall be rated for working pressures of 6" w.g. positive and 1" w.g. negative. Flexible duct assemblies shall be U.L. 181, Class I air duct listed and shall meet fire resistive standards of NFPA 90A. Flexible ducts shall be factory insulated with 1-1/2" thick glass fiber insulation with flame resistant, metallic vapor barrier finish. Flexible ductwork shall be attached to ductwork and diffusers.
- B. Flexible duct length shall not exceed 5' for diffusers and 3' at VAV box inlets.
- C. Support flexible duct on 4' centers maximum with 1" metal strapping. Wire hangers not allowed.
- D. Flexible duct shall be attached with zinc plated or stainless steel worm drive duct hose clamps.

- E. Flexible duct shall be Flexmaster Type 8M, or approved equivalent.

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## **24 37 00 AIR DEVICES**

### 24 37 01 GENERAL

- A. Furnish and install diffusers, grilles, and registers as shown on the drawings and specified herein.
- B. Air devices shall be installed in the orientation and the pattern controllers adjusted as indicated on the plans, as indicated on the shop drawing, or through supplemental information.
- C. Submittal data for all distribution devices shall contain the following information:
  - 1) Room Number
  - 2) Room name
  - 2) Model Number
  - 3) Flow Rate
  - 4) Size: Neck and where applicable
  - 5) Throw in feet: Based on 50-fpm velocity
  - 6) Air patterns: Such as one-way, two-way opposite, corner, four-way, etc.
  - 7) Pressure drop in inches of water
  - 8) Sound rating
  - 9) Airflow factor: Such as K factor or as required for airflow rate measurements.
  - 10) Accessories: Such as volume dampers, deflectors, etc.
  - 11) Three-color charts and balance instructions shall be furnished with submittal data.
- D. Devices described below and indicated on the drawings are based on Titus. Similar design characteristics as manufactured by Price, Carnes, Metal Aire, Nailor, or Tuttle & Bailey will also be acceptable. Such substitute equipment shall be sized on the basis of ADPI performance, and shall be selected for a maximum of 0.05 inches w.c. static pressure drop and a maximum noise criterion curve of NC30. Return or exhaust devices shall not be smaller than sizes shown.
- E. Ceiling diffusers shall be of the type, service, size, and finish as scheduled on the drawings. Border types shall be coordinated by the Contractor to be suitable for ceiling types (grid width, tile types, drywall, plaster, concealed spline in which diffusers will be installed.)

### 24 37 02 LOUVERED CEILING DIFFUSERS

- A. In dry areas diffusers shall be steel construction, Titus TDC or equivalent.

### 24 37 03 PERFORATED CEILING

- A. Return or exhaust diffusers shall be perforated diffusers, Titus PAS/R-AA or equivalent.

### 24 37 04 SIDEWALL GRILLES

- A. Sidewall return/transfer grilles shall have fixed fins set at 38°/0° angle, separate one inch wide gasketed mounting flange frame. Grilles shall be similar to Titus Model 33RL/30RL.

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## **25 00 00 TEMPERATURE CONTROL SYSTEMS**

### 25 00 01 GENERAL

- A. University of Missouri Controls Specification.
- B. This section contains requirements for pneumatic, electric and digital control systems as indicated on the contract drawings.
- C. Contractor is responsible for providing, installing and connecting all sensors, pneumatic actuators, control valves, control dampers, electrical components and all interconnecting pneumatic tubing and electrical wiring between these devices and up to the Direct Digital Controller (DDC).
- D. DDC systems consist of Johnson Controls METASYS controllers. Contractor shall provide and install control enclosures. Owner will provide controllers for contractors to install. After all equipment has been installed, wired and piped, Owner will provide controller programming. Contractor will be responsible for all termination connections at the DDC controller's and for checking, testing, and start-up of the control system. Contractor must be on site at start-up to make any necessary hardware adjustments as required.
- D. DDC systems consist of Johnson Controls METASYS controllers. Contractor shall install owner provided control enclosures. Owner will provide and install controllers. After all equipment has been installed, wired and piped, Owner will be responsible for all termination connections at the DDC controller's and for checking, testing, programming and start-up of the control system. Contractor must be on site at start-up to make any necessary hardware adjustments as required.
- E. Once each mechanical system is completely operational under the new control system, contractor shall make any final connections and adjustments. For controls renovation jobs, contractor shall remove all unused sensors, operators, panels, wiring, tubing, conduit, etc. Owner shall have the option of retaining any removed pneumatic controls.

### 25 00 02 RELATED SECTIONS

- A. Drawings and general provisions of Contract, including General and Special Conditions apply to work of this section.

### 25 00 03 QUALITY ASSURANCE

- A. Contractor's Qualifications:
  - 1. Contractor shall be regularly engaged in the installation of digital control systems and equipment, of types and sizes required. Contractor shall have a minimum of five years' experience installing digital control systems. Contractor shall supply sufficient and competent supervision and personnel throughout the project in accordance with General Condition's section 3.4.1 and 3.4.4.
- B. Codes and Standards:
  - 1. Electrical Standards: Provide electrical components of control systems which have been UL-listed and labeled, and comply with NEMA standards.
  - 2. NEMA Compliance: Comply with NEMA standards pertaining to components and devices for control systems.
  - 3. NFPA Compliance: Comply with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems" where applicable to controls and control



- sequences.
4. NFPA Compliance: Comply with NFPA 70 "National Electric Code."

#### 25 00 04 SUBMITTALS

- A. Shop Drawings: Submit shop drawings for each control system, containing the following information:
- B. Product data for each damper, valve, and control device.
- C. Schematic flow diagrams of system showing fans, pumps, coils, dampers, valves, and control devices.
- D. Label each control device with setting or adjustable range of control.
- E. Indicate all required electrical wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.
- F. Provide details of faces on control panels, including controls, instruments, and labeling.
- G. Include written description of sequence of operation.
- H. Provide wiring diagrams of contractor provided interface and I/O panels.
- I. Provide field routing of proposed network bus diagram listing all devices on bus.

#### **25 10 00 PRODUCTS**

##### 25 10 01 MATERIALS AND EQUIPMENT

- A. Room Temperature Sensor
  1. Sensor/thermostat shall be 10,000-ohm thermistor with an accuracy of +/-0.36°F. Room temperature sensor covers shall all match on project.
  2. Type T1 shall be temperature sensors with temperature adjustment only.
- B. Conduit and Raceway:
  1. Electrical Metallic Tubing: EMT and fittings shall conform to ANSI C80.3.
  2. Surface Metal Raceway and Fittings: Wiremold 500, Ivory, or approved equal.
  3. Flexible Metal Conduit: Indoors, per National Electric Code for connection to moving or vibrating equipment.
  4. Liquidtight Flexible Conduit: Outdoors, per National Electric Code for connection to moving or vibrating equipment.
- C. Control Valves: Provide factory fabricated pneumatic or electric control valves of type, body material, and pressure class as indicated on the drawings. Butterfly style control valves are not acceptable except for two position applications. Equip control valves with heavy-duty actuators, with proper shutoff rating for each individual application.
  1. Valve actuator requirements shall be as follows.
    - a) Torque rating shall be based on the valve manufacturers operating torque requirements at the design flows and pressure drops or shall be based on the manufacturers required shut-off torque to achieve 100% flow shut off at pump shut off head on the system in which they are installed, whichever is greater.
    - b) Actuators shall be installed to maximize the linearity between actuator stroke and actuated device travel.
    - c) For power-failure/safety applications, a mechanical, spring return mechanism shall be used. Non-mechanical forms such as battery back-up and capacitor discharge,

- are not acceptable. The normal position is the position that the actuator must fail to upon loss of control signal or power.
- d) In general the following types of valves shall be used unless otherwise indicated: Hydronic heating valves shall be ball valves for 3" and smaller.
  - e) Ball valves shall be Belimo or Siemens. Ball valves shall be threaded bronze body, chrome plated ball, blowout proof stem, teflon seat, rated at 600-psi W-O-G working pressure, and 35-psi differential pressure.
  - f) Electrical actuated valves shall be provided with Belimo, Bray or Siemens actuators. Actuators shall have current limiting circuitry incorporated in its design to prevent damage to the actuator. A gear release shall be provided on the motor to allow for manual override. Modulating actuators shall be rated for a 0-10V input signal. Actuators shall be rated for 24 vac power. The units shall have visual mechanical position indication showing output shaft and valve position.
2. Modulating valve sizing shall be based on the following conditions.
- a) Water Valves:
    - (1) Minimum pressure drop - 3 psi or equivalent to the waterside pressure drop of the coil it is associated with, whichever is greater.
    - (2) Maximum pressure drop - 5 psi
  - b) Two position valves shall be the full size of the pipe they are associated with unless otherwise specified.
  - c) Two-way valve actuators shall be sized to close off tight against the full pump shut off head on the system in which they are installed.
  - d) Flow rates for valve sizing shall be based upon the flow rates indicated on the equipment schedules on the drawings.
  - e) Valve sizing shall consider the valve cavitation coefficient. In no case shall a valve be sized so that the pressure drop through the valve causes cavitation with fluid temperatures and pressures encountered in the system during start up or normal operation.
3. Hydronic Chilled Water and Heating Water
- a) The flow through the valve shall not vary more than +/- 5% due to system pressure fluctuations across the valve in the selected operating range. The control valve shall accurately control the flow from 1 to 100% full rated flow.
  - b) The valve bodies shall be of cast iron, steel or bronze and rated for 150 PSI working pressure. All internal parts shall be stainless steel, steel, Teflon, brass, or bronze.
  - c) DeltaP Valves manufactured by Flow Control Industries, Belimo, Danfoss Series, or approved equal.
  - d) The valves shall have pressure taps across the valve for measuring the pressure drop across the valve. The pressure taps shall have 1/2-inch extensions for accessibility.
  - e) Control valves shall be installed with unions or flanges as necessary for easy removal and replacement.
  - f) Valve Tag shall include the model number, AHU being served, design flow, and maximum flow for that valve.
  - g) The control valves shall be delivered preset to the scheduled design flow and should be capable of reaching 110% of the design flow to allow for field adjustment for capacity changes.
- D. Control Dampers: Greenheck VCD, Ruskin CD-50 or approved equal.
- 1. Provide opposed airfoil blades for modulating control.
  - 2. Dampers shall be low leakage design with blade and edge seals.
  - 3. Provide multiple sections and operators as required by opening size and sequence of operations, as indicated on the contract drawings.

**Addendum #1**

- E. Electric Actuators: Johnson Controls, Bray, Belimo, TAC or approved equal. KMC actuators

are not approved. Size electric actuators to operate their appropriate dampers or valves with sufficient reserve power to provide smooth modulating action or 2-position action as specified. If mixed air AHU has return air, exhaust air and outside air dampers that are not mechanically linked then static safety switch must be installed and wired to safety circuit. Spring return actuators should be provided on heat exchanger control valves or dampers or as specified on the drawings. Control signal shall be 0 to 10 VDC unless otherwise specified on drawings. Actuators with integral damper end switch are acceptable. For VAV reheat valves, actuators shall have a manual override capability to aid in system flushing, startup, and balancing.

F. Air and Hot Water Electronic Temperature Sensors:

1. All electronic temperature sensors shall be compatible with Johnson METASYS systems.
2. Sensors shall be 1,000 ohm platinum, resistance temperature detectors (RTDs) with two wire connections. Duct mounted sensors shall be averaging type. Contractor may install probe type when field conditions prohibit averaging type, but must receive permission from Owner's Representative.
3. Coordinate thermowell manufacturer with RTD manufacturer. Thermowells that are installed by the contractor, but are to have the RTD installed by owner, must be Johnson Controls Inc. series WZ-1000.

G. Electronic Temperature Sensors and Transmitters:

1. Chilled Water, Heating Hot Water
  - a) General: The RTD/Temperature Transmitter/Thermowell assembly shall come as a complete assembly from a single manufacturer. The Assembly shall be suitable for use in the accurate measurement of Chilled/Tower/Hot Water and steam temperatures in a mechanical room environment.
  - b) Calibration: Each RTD must be match calibrated to the Transmitter via NIST traceable calibration standards. Results are to be programmed into the transmitter. Results are to be presented on report as after condition at the specified calibration points. Assembly shall not be approved for installation until Owner has received all factory calibration reports.
  - c) RTD:
    - (1) RTD type: 2-wire or 3-wire 100 ohm platinum class A
    - (2) Outside Diameter: 0.25 inch
    - (3) Tolerance: +/- 0.06% Type A
    - (4) Stability: +/- 0.1 % over one year.
    - (5) TCR: 0.00385 (ohm/ohm/°C).
    - (6) RTD shall be tip sensitive.
    - (7) Resistance vs. Temperature table for the RTD must be provided to the Owner.
  - d) Transmitter:
    - (1) Transmitter shall be match calibrated to the RTD and assembled as a matched pair.
    - (2) Type: 2 wire (loop powered)
    - (3) Input: 2 or 3 wire 100 ohm platinum class A or class B RTD
    - (4) Output: Output shall be a 4-20 mA signal linear to temperature
    - (5) Calibrated Span:
      - (a) Chilled Water: 30 °F to 130 °F.
      - (b) Tower Water: 30 °F to 130 °F.
      - (c) Hot Water: 100 °F to 250 °F.
      - (d) Steam: 150 °F to 450 °F
    - (6) Calibration Accuracy, including total of all errors, of the Transmitter & RTD matched pair over the entire span shall be within +/- 0.2% of the calibrated span or +/- 0.18 °F, whichever is greater.
    - (7) Supply Voltage: 24 VDC.
    - (8) Ambient Operating Temp.: 32 to 122 °F

- (9) Epoxy potted for moisture resistance.
- (10) Mounting: Transmitter shall be mounted in the RTD connection head.
- e) Thermowell
  - (1) Thermowell shall be suitable for immersion in chilled/hot water and steam.
  - (2) Thermowell shall be reduced tip.
  - (3) Thermowell shall be one piece stainless steel machined from solid bar stock.
  - (4) Thermowell shall have 1/2" NPT process connection to pipe thread-o-let.
  - (5) Thermowell Insertion depth shall be 1/2 the inside pipe diameter but not to exceed 10".
- f) Assembly:
  - (1) Assembly configuration: Spring loaded RTD with thermowell-double ended hex-connection head.
  - (2) Connection head shall be cast aluminum with chain connecting cap to body, have 1/2" NPT process and 3/4" NPT conduit connections, and a sealing gasket between cap and body.
- g) RTD/Temperature Transmitter/Thermowell assembly shall be the following or approved equal:
  - (1) Manufacturer: Pyromation, Inc.
  - (2) Chilled Water: RAF185L-S4C[length code]08-SL-8HN31,TT440-385U-S(30-130)F with calibration SMC(40,60)F
  - (3) Tower Water: RAF185L-S4C[length code]08-SL-8HN31,TT440-385U-S(5130)F with calibration SMC(55,85)F
  - (4) Hot Water: RAF185L-S4C[length code]08T2-SL-8HN31,TT440-385U-S(100-250)F with calibration SMC(140,180)F
  - (5) Steam: RAT185H-S4C[length code]08T2-SL-8HN31,TT440-385U-S(150-450)F with calibration SMC(300,350)F
- H. Occupant Override: Provide wall mounted occupant override button in locations shown on drawings.
- I. Low Limit Controllers: Provide unit-mounted low limit controllers, of rod-and-tube type, with an adjustable set point and a manual reset. Capillary shall be of adequate length to horizontally traverse face of cooling coil every 12". Multiple low limit controllers may be required for large coils. Controller shall have an extra set of contactors for connection to control panel for alarm status. Locate the thermostat case and bellows where the ambient temperature is always warmer than the set point.
  - 1. Freeze Stats: Johnson Controls model A70HA-1 or approved equal.
- J. Humidistats: Humidistats must be contamination resistant, capable of ±2% RH accuracy, have field adjustable calibration and provide a linear proportional signal.
  - 1. HD20K-T91 or equivalent.
- K. Humidity High Limit
  - 1. Multi-function device that can function as a high limit or proportional override humidity controller, as stand-alone proportional controller, or a stand-alone two-position controller.
    - a) Johnson Controls TRUERH HL-67N5-8N00P or approved equal.
- L. Carbon Dioxide Sensor:
  - 1. Wall Mount: ACI Model ESENSE-R.
  - 2. Duct Mount: ACI Model ESENSE-D.
- M. Fan/Pump Status: Status points for fan or pump motors with a VFD must be connected to the terminal strip of the VFD for status indication.  
Current switches: Current switches are required for fan and pump statuses that are not connected to a VFD. The switches must have an adjustable trip setpoint with LED indication

- and be capable of detecting broken belts or couplings. Units shall be powered by monitored line, UL listed and CE certified, and have a five year warranty.
1. Kele, Hawkeye or approved equal.
- N. Relays Used for Fan and Pump Start/Stop: Must have LED indication and be mounted externally of starter enclosure or VFD.
1. Kele, RIBU1C or approved equal.
- O. Power Supply Used to Provide Power to Contractor-Provided Control Devices: Shall have adjustable DC output, screw terminals, overload protection and 24 VAC and 24 VDC output.
1. Kele, DCPA-1.2 or approved equal.
- P. Pressure Differential Switch:
1. Fans: NECC model DP222 or approved equal.
- Q. Differential Pressure Transmitter: Provide units with linear analog 4-20mA output proportional to differential pressure, compatible with the Johnson METASYS Systems.
1. **Water:** Units shall be wet/wet differential pressure capable of a bi-directional pressure range of +/- 50 psid. Accuracy shall be +/- 0.25% full scale with a compensated temperature range of 30 to 150 deg F and a maximum working pressure of 250 psig.
  2. Install transmitter in a pre-manufactured assembly with shut off valves, vent valves and a bypass valve.
    - a) Setra model 230 with Kele model 3-VLV, three valve manifold or approved equal.
  3. **Air: Units shall be capable of measuring a differential pressure of 0 to 5 in. WC. Accuracy shall be +/- 1.0% full scale with a compensated temperature range of 40 to 149 deg F and a maximum working pressure of 250 psig.**
    - a) **Setra model 267, or approved equal.**
    - b) **Shall be installed in control panel and piped 2/3 down the duct unless shown otherwise or approved by owners representative.**
- R. Building Static Pressure: Transducer shall utilize a ceramic capacitive sensing element to provide a stable linear output over the specified range of building static pressure. Transducer shall be housed in a wall-mounted enclosure with LCD display. Transducer shall have the following capabilities:
1. Input Power: 24 VAC
  2. Output: 0-10 VDC
  3. Pressure Range: -0.25 to +0.25 inches w.g.
  4. Display: 3-1/2 digit LCD, displaying pressure in inches w.g.
  5. Accuracy: +/- 1.0% combined linearity and hysteresis
  6. Temperature effect: 0.05% / deg C
  7. Zero drift (1 year): 2.0% max
  8. Zero adjust: Push-button auto-zero and digital input
  9. Operating Environment: 0 to 140 deg F, 90% RH (non-condensing)
  10. Fittings: Brass barbs, 1/8" O.D.
  11. Enclosure: High-impact ABS plastic
  12. Outside Air Sensor Pickup Port: UV stabilized thermoplastic or aluminum "can" enclosure to shield outdoor pressure sensing tube from wind effects. BAPI ZPS-ACC10-rooftop mount, wall mount, or equivalent.
  13. Transducer shall be Veris Industries Model PXPLX01S, equivalent from Setra, or approved equal.
- S. High Static Pressure Limit Switch: Provide pressure high limit switch to open contact in fan circuit to shut down the supply fan when the inlet static pressure rises above the set point. Provide with an adjustable set point, a manual reset button, 2 SPST (normally closed) contacts, and 1/4" compression fittings.

1. Kele model AFS-460-DDS, or approved equal.

T. AIRFLOW/TEMPERATURE MEASUREMENT DEVICES

1. Provide airflow/temperature measurement devices where indicated on the plans. Fan inlet measurement devices shall not be substituted for duct or plenum measurement devices indicated on the plans.
2. The measurement device shall consist of vortex shedding airflow measuring device with one or more sensor probe assemblies and a single, remotely mounted, microprocessor-based transmitter. Each sensor probe assembly shall contain one or more independently wired sensor housings. The airflow and temperature readings calculated for each sensor housing shall be equally weighted and averaged by the transmitter prior to output. Pitot tubes and arrays are not acceptable.
3. All Sensor Probe Assemblies
  - a) Each sensor housing shall be manufactured of a U.L. listed engineered thermoplastic.
  - b) Each sensor housing shall utilize two hermetically sealed, bead-in-glass thermistor probes to determine airflow rate and ambient temperature. Devices that use “chip” or diode case type thermistors are unacceptable. Devices that do not have 2 thermistors in each sensor housing are not acceptable.
  - c) Each sensor housing shall be calibrated at a minimum of 16 airflow rates and have an accuracy of +/-2% of reading over the entire operating airflow range. Each sensor housing shall be calibrated to standards that are traceable to the National Institute of Standards and Technology (NIST).
    - (1) Devices whose accuracy is the combined accuracy of the transmitter and sensor probes must demonstrate that the total accuracy meets the performance requirements of this specification throughout the measurement range.
  - d) The operating temperature range for the sensor probe assembly shall be -20° F to 160 F. The operating humidity range for the sensor probe assembly shall be 0-99% RH (non-condensing).
  - e) Each temperature sensor shall be calibrated at a minimum of 3 temperatures and have an accuracy of +/-0.15° F over the entire operating temperature range. Each temperature sensor shall be calibrated to standards that are traceable to the National Institute of Standards and Technology (NIST).
  - f) Each sensor probe assembly shall have an integral, U.L. listed, plenum rated cable and terminal plug for connection to the remotely mounted transmitter. All terminal plug interconnecting pins shall be gold plated.
  - g) Each sensor assembly shall not require matching to the transmitter in the field.
  - h) A single manufacturer shall provide both the airflow/temperature measuring probe(s) and transmitter at a given measurement location.
4. Duct and Plenum Sensor Probe Assemblies
  - a) Sensor housings shall be mounted in an extruded, gold anodized, 6063 aluminum tube probe assembly. Thermistor probes shall be mounted in sensor housings using a waterproof marine grade epoxy resin. All wires within the aluminum tube shall be Kynar coated.
  - b) The number of sensor housings provided for each location shall be as follows:

(1) Area (sq.ft.)	Sensors
<2	4
2 to <4	6
4 to <8	8
8 to <16	12
>=16	16
  - c) Probe assembly mounting brackets shall be constructed of 304 stainless steel. Probe assemblies shall be mounted using one of the following options:
    - (1) Insertion mounted through the side or top of the duct.
    - (2) Internally mounted inside the duct or plenum.

- (3) Standoff mounted inside the plenum.
- d) The operating airflow range shall be 0 to 5,000 FPM unless otherwise indicated on the plans.
- 5. Fan Inlet Sensor Probe Assemblies
  - a) Sensor housings shall be mounted on 304 stainless steel blocks.
  - b) Mounting rods shall be field adjustable to fit the fan inlet and constructed of nickel plated steel.
  - c) Mounting feet shall be constructed of 304 stainless steel.
  - d) The operating airflow range shall be 0 to 10,000 FPM unless otherwise indicated on the plans.
- 6. Transmitters
  - a) The transmitter shall have a 16 character alpha-numeric display capable of displaying airflow, temperature, system status, configuration settings and diagnostics. Configuration settings and diagnostics shall be accessed through a pushbutton interface on the main circuit board. Airflow shall be field configurable to be displayed as a velocity or a volumetric rate.
  - b) The transmitter shall be capable of independently monitoring and averaging up to 16 individual airflow and temperature readings. The transmitter shall be capable of displaying the airflow and temperature readings of individual sensors on the LCD display.
  - c) The transmitter shall have a power switch and operate on 24 VAC (isolation not required). The transmitter shall use a switching power supply fused and protected from transients and power surges.
  - d) All interconnecting pins, headers and connections on the main circuit board, option cards and cable receptacles shall be gold plated.
  - e) The operating temperature range for the transmitter shall be -20° F to 120° F. The transmitter shall be protected from weather and water.
  - f) The transmitter shall be capable of communicating with the host controls using one of the following interface options:
    - (1) Linear analog output signal: Field selectable, fuse protected and isolated, 0-10VDC and 4-20mA (4-wire).
    - (2) RS-485: Field selectable BACnet-MS/TP, ModBus-RTU and Johnson Controls N2 Bus.
    - (3) 10 Base-T Ethernet: Field selectable BACnet Ethernet, BACnet-IP, ModBus-TCP and TCP/IP.
    - (4) LonWorks Free Topology.
  - g) The transmitter shall have an infra-red interface capable of downloading individual sensor airflow and temperature data or uploading transmitter configuration data to a handheld PDA (Palm or Microsoft Pocket PC operating systems).
- 7. The measuring device shall be UL listed as an entire assembly.
- 8. The manufacturer's authorized representative shall review and approve placement and operating airflow rates for each measurement location indicated on the plans. A written report shall be submitted to the consulting mechanical engineer if any measurement locations do not meet the manufacturer's placement requirements.
- 9. Manufacturer
  - a) Primary flow elements, sensors, meters and transducers shall be Accutrol VTD, no exceptions.
  - b) The naming of any manufacturer does not automatically constitute acceptance of this standard product nor waive their responsibility to comply totally with all requirements of the proceeding specification.

**U. Electrical Requirements: Provide electrical devices, and relays that are UL-listed and of type which meet current and voltage characteristics of the project. All devices shall be of industrial/ commercial grade or better. Residential types will be rejected.**

- 1. EP Switches: Landis & Gyr Powers, Inc. Series 265 - Junction Box Type or approved

- equal.
2. Relays: Relays shall have an LED status indicator, voltage transient suppression, Closed-Open-Auto switch, plastic enclosure, and color coded wires. Kele model RIBU1C or approved equal.

## **25 20 00 TEMPERATURE CONTROL SYSTEMS**

### **25 20 01 INSTALLATION OF CONTROL SYSTEMS**

- A. General: Install systems and materials in accordance with manufacturer's instructions, roughing-in drawings and details shown on drawings.
- B. Raceway: Raceway is to be installed in accordance with the National Electric Code. Use of flexible metal conduit or liquidtight flexible conduit is limited to 36" to connect from EMT to devices subject to movement. Flexible raceway is not to be used to compensate for misalignment of raceway during installation.
- C. Control Wiring: Install control wiring in raceway, without splices between terminal points, color-coded. Install in a neat workmanlike manner, securely fastened. Install in accordance with National Electrical Code.
  1. Install circuits over 25-volt with color-coded No. 12 stranded wire.
  2. Install electronic circuits and circuits under 25-volts with color-coded No. 18 stranded twisted shielded pair type conductor.
  3. N2 communications bus wire shall be 18 AWG, plenum rated, stranded twisted shielded, 3 conductor, with blue outer casing, described as 18-03 OAS STR PLNM NEON BLU JK distributed by Windy City Wire, constructed by Cable-Tek, or approved equivalent.
    - a) Metastat wiring shall be minimum 20 AWG, plenum rated, stranded, 8 conductor stranded wire.
  4. FC communications bus wire shall be 22 AWG, plenum rated, stranded twisted shielded, 3 conductor, with blue outer casing, described as 22-03 OAS STR PLNM NEON BLU JK distributed by Windy City Wire, constructed by Cable-Tek, or approved equivalent.
    - a) Network sensor wiring (SA Bus) shall be 22 gauge plenum rated stranded twisted wire, 4 conductor.
  5. All control wiring at control panel shall be tagged and labeled during installation to assist owner in making termination connections at control panel. Label all control wires per bid documents.
- D. All low voltage electrical wiring shall be run as follows:
  1. Route electrical wiring in concealed spaces and mechanical rooms whenever possible.
  2. Provide EMT conduit and fittings in mechanical rooms and where indicated on drawings.
  3. Low voltage electrical wiring routed above acoustical ceiling is not required to be in conduit, but wire must be plenum rated and properly supported to building structure.
  4. Provide surface raceway, fittings and boxes in finished areas where wiring cannot be run in concealed spaces. Route on ceiling or along walls as close to ceiling as possible. Run raceway parallel to walls. Diagonal runs are not permitted. Paint raceway and fittings to match existing conditions. Patch/repair/paint any exposed wall penetrations to match existing conditions.
- E. All devices shall be mounted appropriately for the intended service and location.
  1. Adjustable thermostats shall be provided with base and covers in occupied areas and mounted 48" above finished floor to the top of the device. Tubing and/or wiring shall be concealed within the wall up to the ceiling where ever possible. Surface raceway may only be used with approval of Owners Representative. Wall mounted sensors such as CO2, RH, and non-adjustable temperature sensors shall be mounted 54" above finished floor. Duct mounted sensors shall be provided with mounting brackets to accommodate



- insulation. Mounting clips for capillary tubes for averaging sensors are required.
  2. All control devices shall be tagged and labeled for future identification and servicing of control system.
  3. Preheat and mixed air discharge sensors must be of adequate length and installed with capillary tube horizontally traversing face of coil, covering entire coil every 24 inches bottom to top.
  4. All field devices must be accessible or access panels must be installed.
- F. Install magnehelic pressure gage across each air handling unit filter bank. If the air handling unit has a prefilter and a final filter, two magnehelic pressure gages are required.

#### 25 20 02 ADJUSTING AND START-UP

- A. Start-Up: Temporary control of Air Handling Units shall be allowed only if approved by the owner's representative to protect finishes, etc., AHUs may be run using caution with temporary controls installed by contractor early in the startup process. All safeties including a smoke detector for shut down must be operational. Some means of discharge air control shall be utilized and provided by the contractor such as a temporary temperature sensor and controller located and installed by the Contractor.
- B. The start-up, testing, and adjusting of pneumatic and digital control systems will be conducted by owner. Once all items are completed by the Contractor for each system, Contractor shall allow time in the construction schedule for owner to complete commissioning of controls before project substantial completion. This task should be included in the original schedule and updated to include the allotted time necessary to complete it. As a minimum, the following items are required to be completed by the Contractor for Owner to begin controls commissioning.
1. Process Control Network
    - a) The control boards and enclosures need to be installed in the mechanical rooms.
    - b) The fiber optic conduit and box for the process control network needs to be installed. Once in place, Owner needs to be contacted so the length of the owner provided fiber cable can be determined and ordered, if required. Coordinate with Owner to schedule the pull in and termination of the fiber cable. Power should be in place at that time. (Fiber for the process control network is required to allow metering of utilities prior to turn on.)
  2. Heating System
    - a) Pumps, heat exchangers, steam pressure reducing station, piping, control valves, steam and/or hot water meter, feeder conduit and wire, VFDs, control panels and control wiring installed in the mechanical room. The house keeping pads must be poured before pump operation. All must be in place in working order (pumps aligned, VFDs set up by vendor, motors checked for rotation, steam regulators set to required pressure, condensate pumps operational, heating system ready to circulate (all piping pressure tested, flushed, and insulated) with differential pressure sensors in place.
  3. Cooling System
    - a) Pumps, heat exchangers, piping, control valves, chilled water meter, feeder conduit and wire, VFDs, control panels and control wiring installed in the mechanical room. The house keeping pads must be poured before pump operation. All must be in place in working order (pumps aligned, VFDs set up by vendor, motors checked for rotation, cooling system ready to circulate (all piping pressure tested, flushed, and insulated) with differential pressure sensors in place.
  4. VAVs-First Pass
    - a) Power, (FC or N2 bus), and control wire installed before owner can make first commissioning pass. First pass includes installation of VAV controller, termination of power, control and network communication wiring.
  5. Blower Coils
    - a) Prior to owner commissioning, at a minimum, the following items shall be

complete: Power wiring, motor rotation check, fire/smoke dampers open, control wiring including all safeties, IO cabinet, air handler cleaned, and filters installed as required. To protect the systems from dirt, outside air with no return will be used until the building is clean enough for return air operation.

6. VAVs-Second Pass
  - a) After the air handlers are running and under static pressure control and the heating water system is operating, a second pass can be made on the VAVs to download the control program and commission controllers to verify the VAV dampers, thermostat, and reheat control valves are working properly.
7. Exhaust and Energy Recovery Systems
  - a) Exhaust fans need to be operational and under control before labs can be commissioned.
8. Some balance work can be done alongside the control work as long as areas are mostly complete and all diffusers are in place.

#### 25 20 03 CLOSEOUT PROCEDURES

- A. Contractor shall provide complete diagrams of the control system including flow diagrams with each control device labeled, a diagram showing the termination connections, and an explanation of the control sequence. The diagram and sequence shall be framed and protected by glass and mounted next to controller.
- B. Contractor shall provide as built diagram of network bus routing listing all devices on bus, once wiring is complete prior to scope completion.

END OF SECTION

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## **DIVISION 26 - ELECTRICAL**

### **26 00 00 ELECTRICAL**

#### 26 00 01 GENERAL

- A. The Plans, the general provisions of the Contract including the General, Supplementary and/or Special Conditions and specification sections of Division 1 shall apply to Work of Division 26 of the Specifications.
- B. Provisions and conditions cited in this Section shall apply to Work for other sections of Division 26 of these Specifications.
- C. The organization of the Specifications into Divisions, Sections and Subsections, and the arrangement of the Plans shall not in and of itself divide the Work among the Contractors and Subcontractors nor establish the Work to be performed by any trade. The “Scope of Work” and “Work Included” under each respective sectional heading, nevertheless, attempts to segregate the Work by known contracting activities. In the final analysis, the General Contractor shall be responsible for scoping the work for each trade based on local practice to include all the Work of a given type in the related proposal, regardless of where and how identified in the Bid Documents.

#### 26 00 02 SCOPE OF WORK

- A. This project is for renovations to UMTH 2 West into a material handling and teams room at the University of Missouri Teaching Hospital.
- B. The Electrical Work for this project shall include all material, labor and services necessary for and incidental to providing the following systems (respective Sections of the Specifications are noted in the right hand column):
  - 1. Basic Electrical Requirements 26 00 00
  - 2. Common Work Results for Electrical 26 05 00
  - 3. Low Voltage Electrical Transmission 26 20 00
  - 4. Lighting 26 50 00
  - 5. Communications and Systems 27 00 00
  - 6. Electronic Safety and Security 28 00 00

#### 26 00 03 REFERENCES, RELATED SECTIONS of the SPECIFICATIONS

- A. The Plans, the general provisions of the of the Contract, including the General, Supplementary and/or Special Conditions and specification sections of Division 1 shall apply to Work of Division 26 of the Specifications.
- B. All provisions and conditions cited in this Section shall apply to Work for all other sections of Division 26 of these Specifications.
- C. Requirements of the following Sections of the Specifications apply to Work for this Section:
  - 1. Division 27 – Communications
  - 2. Division 28 – Electronic Safety and Security

#### 26 00 04 REFERENCES, REGULATORY REQUIREMENTS

- A. All material and equipment shall be listed, labeled or certified by Underwriters Laboratories, Inc., where relevant standards have been established (see also Paragraph 26 00 60). Material and equipment, which are not covered by UL Standards, will be acceptable provided they meet safety requirements of a nationally recognized testing laboratory. Products which no nationally recognized testing laboratory accepts, lists, labels, certifies or determines to be safe will be considered if inspected or tested in accordance with national industrial standards such as NEMA or ANSI. Evidence of compliance shall include test reports and definitive submittals.
- B. Definitions:
1. **“Listed”**: A product is “listed” if of a kind mentioned in a list which: Is published by a nationally recognized laboratory which makes periodic inspections of such production. States that such product meets nationally recognized standards or has been tested and found safe for use in a specified manner.
  2. **“Labeled”**: The product is “labeled” if: It embodies a valid label or other identifying mark of a nationally recognized testing laboratory such as UL, Inc. Production is inspected periodically by a nationally recognized testing laboratory. The labeling indicates compliance with nationally recognized standards or tests to determine safe use in a specified manner.
  3. **“Certified”**: The product is “certified” if: The product has been tested and found by a nationally recognized testing laboratory to meet nationally recognized standards or to be safe for use in specific manner. Production is inspected periodically by a nationally recognized testing laboratory. The product bears a label, tag or other record of certification.

26 00 05 DEFINITIONS

- A. The term **“Work”** used in this Division shall be the furnishing of material, labor and/or services necessary for and reasonably incidental to providing specific component(s), consideration(s) and/or system(s) of the design for the mechanical facilities for this Project as hereinafter defined by the Project Documents.
- B. The term **“Project Documents”** used in this Division shall be the compilation of the Specifications, the Plans and any Attachment and Addendum which collectively define the design and the intent of the Work to construct the Project.
- C. The terms **“Architect”** and **“Engineer”** as used in this Division of the Specifications shall be the professional individual and/or company developing the respective portion(s) of the Project Documents and administering the responsibility for the adherence to the intent of these documents. The “Architect/Engineer” is the agent of the “Owner” and shall represent and discharge authority on all matters unless the matter is referred to the Owner or the Owner elects to perform in their own behalf.
- D. The term **“General Contractor, Construction Manager, or Prime Contractor”** as used in Division 26 shall mean the Contractor who has the prime contract with the Owner and who is responsible for general conditions of the project and is responsible for seeking experienced and qualified Trade Subcontractors to perform the Work.
- E. The terms **“Contractor”** and **“Subcontractor”** where used in this Division shall mean any Company, regularly in business, to perform the type of work for which the Contract was sought, who has contracted with the Owner or General Contractor to perform the work included in and defined by this section and any other section or sections of this Division.
- F. The term **“submittal”** as used in this Section of the Specifications shall be construed to be information in various forms compiled by the Contractor to transmit to the Architect/Engineer

- for review, comment and/or approval and return same to the Contractor with notice to react. The information shall support and/or substantiate that the given product complies with the intent of the Project Documents, should be incorporated in the Work and therefore, warrants approval to permit proceeding with that Work. The information may be any form or accepted practice of shop drawings, data, published catalogs, etc. that sufficiently provide the Architect/Engineer with basis of making a determination.
- G. The term “**unfinished space**” as used in Division 26 - 28 of the Specifications shall be a mechanical or electrical equipment room. These are rooms that are generally unpainted and accessible only to building maintenance personnel.
- H. The term “**finished space**” as used in Division 26 - 28 of the Specifications shall mean any space not defined as “unfinished space” (i.e. occupied rooms, corridors, stairways, closets, etc.).
- I. The term “**exterior**” or “**outdoors**” as used in Division 26 - 28 of the Specifications shall mean exposed to atmospheric weather conditions.
- J. The term “**interior**” or “**indoors**” as used in Division 26 - 28 of the Specifications shall mean not exposed to atmospheric weather conditions.
- K. The term “**concealed**” as used in Division 26 - 28 of the Specifications shall mean anything that is not visible in a “finished space”.
- L. The term “**inaccessible**” as used in Division 26 - 28 of the Specifications shall mean located within walls or above non-lay-in ceiling (i.e., drywall, plaster).
- M. The term “**packaged**” as used in Division 26 - 28 of the Specifications shall be construed to be a factory manufactured piece of equipment for which all components are totally assembled, pre-piped and prewired within its own structure and ready to operate when connected to proper external mechanical and electrical services.

26 00 06 CODES, STANDARDS, etc.

- A. The material, workmanship and systems for Work of this Division shall comply with all applicable codes, standards, regulations and laws of the legal governmental jurisdiction at the project site.
- B. Should the Contractor perform any work that does not comply with the requirements of the applicable codes, standards, regulations, statutes, laws, acts, or which does not receive the approval of the responsible inspection authority, Contractor shall bear all costs arising in correcting the deficiencies.
- C. Applicable requirements of the current and accepted edition of the following codes shall apply to the Work for Divisions 26 - 28:
- International Building Code – 2018
  - International Plumbing Code - 2018
  - International Mechanical Code – 2018
  - International Existing Building Code – 2018 (Level 1 & Level 2 Alterations only with pre-approval of AHJ)
  - International Fire Code - 2018
  - International Fuel Gas Code – 2018
  - International Swimming Pool and Spa Code - 2018
  - National Electric Code/NFPA 70 – 2011 & 2017
  - NFPA 110 – 2010 & 2016

- NFPA 101 – 2012
- NFPA 99 – 2012
- NFPA 96 – 2011 & 2017
- NFPA 90A – 2012 & 2018
- NFPA 72 – 2010 & 2016
- NFPA 51B - 2014
- NFPA 45 – 2011 & 2015
- NFPA 20 - 2016
- NFPA 14 – 2010 & 2016
- NFPA 13 – 2010 & 2016
- ASHRAE 90.1 – Energy Standard for Buildings – 2016
- ASHRAE 170 – Ventilation of Health Care Facilities - 2013
- ASME A17.1 – Safety Code for Elevators and Escalators (per State of Missouri)
- Americans with Disabilities Act – Standards for Accessible Design 2010
- Facility Guidelines Institute - 2018

- D. Applicable requirements of the current and accepted edition of the following industry standards, codes and specifications shall apply to the Work for Division 26-28:

ANSI	American National Standards Institute
ASTM	American Society of Testing and Materials
IEEE	Institute of Electrical & Electronic Engineers
IPCEA	Insulated Power Cable Engineers Association
NIST	Institute of Science and Technology
NEC	National Electric Code, including amendments by local authority having jurisdiction
NEMA	National Electrical Manufacturers Association
NIOSH	National Institute of Occupational Safety and Health
OSHA	Occupational Safety and Health Act
UL	Underwriters Laboratory, Inc.

- E. Applicable requirements of all the relevant Federal laws including current and accepted edition of the Americans with Disabilities Act (ADA).

**26 00 10 CONDITIONS, BID**

26 00 11 REQUEST for PROPOSAL

- A. The terms for Contractor's proposal shall be as described in the General Conditions, Supplementary and/or Special Conditions and Specification Sections of Division 1.

26 00 14 PERMITS and FEES

- A. The respective Contractor or Subcontractor shall coordinate so as to be included as part of the GBA permitting process, including, but not limited to:
1. The Contractor shall coordinate and provide reasonable scheduling and access to the Work for the Owner's Inspection.
  2. Re-inspection of work as a result of either failed inspection or work not ready as scheduled may be at the Contractor's expense.
- B. Any deficiency arising from the improper administering or complying with requirements for permits, fees, or inspections shall be corrected by the Contractor without additional compensation.

## **26 00 30 PROJECT DOCUMENTS**

### 26 00 31 GENERAL

- A. The Plans and the Specifications are intended to define complete and satisfactorily functioning systems. The Contractor shall be responsible for providing all necessary material, labor and services to provide the completed, operating systems at no additional compensation even though each and every element thereof is not specifically identified.
- B. The Plans are diagrammatic and indicate general arrangements, approximate sizes and relative locations of principal equipment and materials to provide for the design and intent of the Electrical Work and shall be followed as closely as actual building and site conditions and work of other trades will permit. The Work shall conform to the requirements and intent of the Project Documents. Because of the scale of the drawings, the Plans do not represent every offset, fitting, accessory, etc. that may be required for the conduit or other appurtenances, nor is it implied that all conflicts between elements of the Work or building components have been resolved. The Contractor shall prepare details and/or coordination drawings where it may be required and submit to the Architect/Engineer for approval before proceeding with the Work.
- C. To the extent contained in the Project Documents, elevations, sections, typical details, and schematic diagrams are included for instructions to the craftsman. If any additional diagrams are desired and/or required for further instruction to the craftsman, for permit applications, or for any other reason, the Contractor shall develop the drawings.
- D. Significant discrepancies and/or changes required to accomplish the intent of the Project Documents, in the opinion of the Contractor, shall be identified and submitted to the Architect/Engineer for approval before proceeding with the Work in question. Changes originated by the Architect/Engineer shall be processed under the subsection heading "Changes in the Work".
- E. The Plans and the Specifications are mutually complementary. Work required by one, but not the other, shall be performed as if required by both.
- F. In the event of conflict between the Plans and the Specifications, the Contractor shall notify the Engineer for clarification. Prior to clarification, the Contractor shall assume that the stricter requirements apply.

### 26 00 33 SPECIFICATIONS

- A. Referenced sections of other Divisions whether attached or in separate volumes or binders shall be a part of the Contract Documents.

### 26 00 34 ADDENDA

- A. The Architect/Engineer may issue revisions, modifications, attachments or other documentation in the form of addenda to the Project (Bid) Documents during the bidding phase only to change, detail or clarify the scope of the Work.
- B. The addenda shall become a part of the Contract Documents.

### 26 00 35 INTERPRETATIONS



- A. The electrical Engineer shall be the sole source of interpretation of the electrical design and intent of the Project Documents.

26 00 37 AS-BUILT DRAWINGS

- A. The Contractor shall maintain a separate set of plans at the jobsite, and mark thereon as an As-Built of Work as the construction proceeds. These As-Built, “redline” drawings shall include exact locations and relevant details (i.e. elevations, sizes, dimensions related to building lines, etc.) of all underground work, concealed feeders, pull/junction boxes, cable tray, all considerations requiring periodic attention and access thereto.
- B. At the completion of the project, the Contractor shall provide the “redline”, As-Built drawings and/or scanned color PDF of the As-Built, flattened to the Engineer.
- C. At the completion of the project, the Architect/Engineer will provide PDF drawings (including all issued revisions to the Contract) for the Contractor’s use to transfer all of the information from the As-Built drawings to a final, clean set.
- D. At the completion of the project, the Architect/Engineer will provide Contractor CAD files for the Contractor’s use to transfer the information on the drawings to CAD. The layering system on the drawings provided shall be strictly adhered to. The Contractor for their representation and accuracy of the final installation conditions shall certify these As-Built drawings. The As-Built CAD drawings shall be submitted to the Engineer digitally via thumb drive, shared cloud drive, etc. for review.

**26 00 40 DUTIES OF CONTRACTOR**

26 00 41 GENERAL (Pursuit of Work)

- A. The Contractor shall thoroughly examine all Bid Documents before submitting a bid/proposal for the Work. If, in the opinion of the Contractor, there are any deficiencies in the Documents, that might impact the intent or the scope of the work, the Contractor shall bring the matter to the attention of the Architect/Engineer for clarification. If in the judgment of the Architect/Engineer clarification is warranted, an addendum to the Documents will be issued. If the Contractor fails to request clarification or otherwise submits a bid without qualifications, the Contractor thereby agrees to install a complete and functional system with no change in the contract price.
- B. The Contractor shall be responsible for changes required for compliance with codes, standards, regulations, ordinances, etc. and implementing any such change at no change in contract price. In the event of conflict with the Project Documents or other requirements, the more stringent shall apply. The Contractor shall promptly notify the Architect/Engineer of any discrepancy.
- C. The Contractor shall perform the Work to comply with all terms, conditions and intentions, whether explicit or implicit, of this Section and applicable requirements of other Sections of Division 26, the Plans and any other documentation so identified. Should the Contractor perform any Work that does not comply with the Project Documents or is not in accordance with common trade practices, the Contractor shall bear all costs, at no change in contract price, arising in correcting the Work.
- D. The Contractor shall be responsible for all aspects of the Work for their respective contractual agreement. The Work of the respective suppliers and subcontractors shall be administered properly to assure that all elements thereof have been provided for complete and functioning system(s).

26 00 43 SUBMITTALS for APPROVAL

- A. Prior to submitting shop drawings, Contractor shall verify equipment delivery for compliance with the overall project schedule. Any delays due to delivery or due to submittals being late, inadequate, or incorrect and therefore rejected by the Architect/Engineer shall be the responsibility of the Contractor making said submittal. The Contractor shall bear all cost for expediting charges or obtaining materials from another vendor to meet the overall project schedule.
- B. The Engineer may take up to two (2) weeks to review a complete and properly processed submittal from the time it arrives at the Engineer's office until the time it is returned to the Architect. Resubmittals will be reviewed within two (2) weeks for a complete and properly processed resubmittal from the time they arrive at the Engineer's office until the time they are returned to the Architect.
- C. The submittals shall include shop drawings, engineering data and support information to sufficiently substantiate compliance with the Project Documents. All submittals must include the following information in order to be considered for review. Submittals found to be lacking may be rejected without review.
  1. Shop drawing shall be derived from manufacturers original documents. Reproductions shall be of sufficient quality to accommodate a review.
  2. Stamped date of receipt by the Contractor(s).
  3. Identification of the project name and/or Owner's project number.
  4. Indication that the Contractor has reviewed the submittal and is satisfied that it complies with the Project Documents.
  5. Identification of the Specification section or subsection that specifies the submitted item.
  6. Identification of the submitted item by the same description that is used in the Project Documents.
- D. Submittals shall be delivered to the Engineer digitally via email, thumb drive, shared cloud drive, or other agreed upon means for review. Submittals or submittal notices that are emailed shall be sent to [CA@mcclureeng.com](mailto:CA@mcclureeng.com) at a minimum.
- E. The approval of the submittal shall not relieve the Contractor from complying with all of the terms and conditions of the Project Documents. The Contractor shall be responsible for all physical and performance requirements of equipment provided, including any differences in the cost of installation for variations from these requirements.
- F. Include the manufacturer's installation instructions and maintenance manual with the equipment submittal for approval for inclusion in the Operations and Maintenance Manuals as specified in Subsection 26 00 46.
- G. In general, all items purchased by Contractor for installation where a make and model is specified shall require submittals. Items required for the Work such as screws, bolts, clips, etc. which are not specified are not required to be submitted unless specifically requested.
- H. The following shall be submitted under this Division of the specifications:
  1. Catalog Data
  2. Operating and maintenance manuals.

3. As-built drawings.
4. Contractor developed details and coordination drawings (when applicable).

Division 26

1. Wiring Devices
2. Seismic, Sway Bracing, Anchorage Details/Drawings
3. Disconnect Switches
4. Distribution Panelboards
5. Surge Protective Devices
6. Variable Frequency Drives
7. Light Fixtures
8. Lighting Control Device
9. Cable Tray and accessories

Division 28

1. Fire Alarm System
- J. At the completion of the project provide a single PDF document containing only those shop drawings that were approved and incorporated into the project.

26 00 44 CHANGES IN WORK

- A. The only condition under which a change in the contract price will be considered is if there is to be a change in the scope of intent of the project requirements. Such changes would be limited to revisions in the project initiated by the Owner. The Architect/Engineer will issue a proposal for the new scope of work for the Contractor to prepare a price. After approval, the Architect/Engineer will prepare change order or change orders to adjust the contract sum and/or the contract time as necessary to carry out the changes.
- B. No claim for an addition to the Contract Sum will be valid unless authorized as aforesaid in writing by the Owner. Any work completed by the Contractor outside the original project scope without written approval from the Owner will be deemed as a waiver by the Contractor for additional compensation for said work.
- C. **No requests for change orders will be reviewed or considered for approval that are not submitted with all of the following information. No cost associated with labor burden or manpower inefficiencies will be approved for a change order without documentation of the present labor burden, manpower requirements, and the critical path nature of the scope change.**
  1. **A complete and detailed line item takeoff of materials and equipment.**
  2. **A unit cost identified for each line item with material cost, labor hours, and labor rate identified separately for each line item.**

**3. All fringes and mark-ups identified separately.**

- D. Where major subcontracts are involved, the respective subcontractor's calculation, including all of the above data, shall be included with the Contractor's request.
- E. Where there are net differences, the above data shall be included for all items added and for all items deducted with the net calculation clearly identified. Mark-ups shall be applied only after net differences are calculated.
- F. The overhead charged by the Contractor shall be considered to include, but not limited to, performance bond, insurance, job site office expense, normal hand tools, man-lifts, incidental job supervision, field supervision, safety training, general office overhead, and cost associated with the preparation of design documents, layout drawings, shop drawings, or as-built drawings.
- G. In evaluating the value of the contractor's request, for comparison purposes, the Architect/Engineer may use cost and unit data from the current edition of the R. S. Means Company's Cost Data, or information from appropriate suppliers or vendors of the respective materials or equipment.
- H. Any requests submitted without the above details will be returned without review for resubmittal in the proper form.

26 00 45      COMPLETION and ACCEPTANCE

- A. If, at the Owner's direction, a portion of the building is to be occupied or a portion of the Electrical System is utilized for beneficial use by the Owner prior to completion and acceptance of the Project, the start of the warranty shall begin with the "beneficial use" of the related Work.
- B. The Engineer shall inspect the portion of the system for approval prior to acceptance of the system or subsystem.
- C. The Contractor shall prepare a certificate of acceptance for approval by the Owner for that portion of the Work and submit a copy to the Architect/Engineer for record purposes.

26 00 46      OPERATIONS AND MAINTENANCE MANUALS

- A. As a part of the contractual agreement, the Contractor shall submit and receive approval for the following. This information shall be submitted as soon as practical and while the Contractor is on site.
  - 1. Provide digital PDF documents containing information on installation operation and maintenance for each piece of equipment supplied. Operation and Maintenance Manuals shall be the manufacturers original PDF documents.
  - 2. The Electrical Operations and Maintenance Manuals shall be submitted as separate files per specification section to the Engineer digitally via thumb drive, shared cloud drive, etc. for review.
  - 3. The information shall list any maintenance requirements and schedule for required maintenance.
  - 4. The information shall show all parts and part numbers of available replacement parts available for each piece of equipment.
  - 5. A cross-index of material and equipment furnished containing:
    - a. An alphabetical listing of material and equipment.

- b. An alphabetical listing by manufacturer's name, address and contact person of the local sales representative.
- c. An alphabetical listing of all subcontractors including name, address, contact person, and specific work performed.

**26 00 48 CLOSE-OUT REQUIREMENTS**

- A. As a part of the contractual agreement, the Contractor shall submit and receive approval for the following before final payment will be released. This information shall be submitted prior to project completion:
  - 1. Equipment tag list.
  - 2. Installed Arc-Flash Labels
  - 3. Equipment Name Plates
  - 4. Operation and Maintenance Manuals
  - 5. As-built drawings.
  - 6. At the completion of the project, all contractors/subcontractors shall submit a letter stating all materials are asbestos free, and meet the specified ASTM E-84 flame/smoke rating of 25/50, and that all penetrations are smoke or fire stopped as required by the Code.

**26 00 50 PAYMENTS**

- A. See General Conditions Article – Payment to the Contractor, and General Conditions – Contractor's Payment to the Subcontractor.

**26 00 60 MATERIAL AND EQUIPMENT**

- A. All equipment and materials furnished and installed by Contractor shall be new. The equipment to be furnished and installed shall be standard cataloged products of manufacturers regularly engaged in the production of this type of equipment and shall be of the latest design. Equipment of the same general type shall be of the same make throughout the Project.
- B. Manufacturers shall have been in business for two (2) consecutive years operating under the same name.
- C. Products shall be in production at time of the bid date. A scheduled release of a new product during construction is not acceptable. Prototype, alpha or beta products shall not be used.
- D. Products for which fewer than 100 units have been produced and which have been in service for less than one year shall be submitted in writing to the Engineer for approval prior to the bid date.
- E. The Contractor shall be responsible for the physical fit and configuration of the equipment to suit the space available and the intent of the Work. Due consideration shall be included for external connections and service maintenance access to the equipment.
- F. The Contractor shall verify in the course of preparing the submittal that the respective material and equipment comply with the following criteria of the Project Documents:
- G. The performance ratings meet the specified requirements.
- H. The mechanical and electrical physical characteristics meet the specified requirements.
- I. The identification of the material or equipment to catalog data is correct and proper.

- J. Confirm (or establish) the quantity required.
- K. The application of the material or equipment is acceptable to the manufacturer and to the intent of the scope of Work.
- L. Any inability of material and/or equipment to comply with the aforementioned criteria shall be promptly brought to the attention of Architect/Engineer.

26 00 61 EQUIPMENT MANUFACTURERS

- A. The equipment manufacturer may be specified in any one of the following manners. Equivalent shall mean, equivalent in the opinion of the Engineer. Where equipment is scheduled on the drawings, the scheduled manufacturer is what the design is based upon:
  - 1. Single manufacturer named, “No substitution allowed”:
  - 2. Single manufacturer named followed by “or approved equivalent”:  
The design has been based on this particular make and model for acceptable physical characteristics, performance and quality. Any other comparable and equivalent product may be substituted in accordance with procedures for submittals and approvals (Subsection 26 00 43) and conditions of Subsection 26 00 62, Equipment substitution.
  - 3. Limited multiple manufacturers named:  
The design has been based on the first named manufacturer for acceptable physical characteristics, performance and quality. Any one of the other limited named manufacturers is equally acceptable in quality and may be substituted in accordance with procedures for submittals and approvals (Subsection 26 0043) and conditions of Subsection 26 00 62, Equipment substitution.
  - 4. Limited multiple manufacturers named followed by “or approved equivalent”:  
The design is based on the first named manufacturer for acceptable physical characteristics, performance and quality. Any one of the other limited named manufacturers is equally acceptable in quality and along with other comparable and equivalent product may be substituted in accordance with procedures for submittals and approvals (Subsection 26 00 43) and conditions of Subsection 26 00 62, Equipment substitution.
  - 5. List of “Acceptable Manufacturers”:  
Where a specific product from a manufacturer is listed along with the words “Acceptable Manufacturers” and a list of manufacturers this equal product(s) of any of the limited list may be submitted without concern from Subsection 26 00 62.
- B. The Contractor shall follow the option specified from above as applied to each respective material and equipment specification subsection. The Contractor shall indicate within the options allowed the respective supply source(s) for the listing requested in Subsection 26 00 43. The Contractor shall assume all responsibilities and liabilities of “or equivalent” substitutions (see Subsection 26 00 62).
- C. The Contractor shall prepare and transmit submittals for approval, even for the option of Subsection 26 00 61.1.

26 00 62 EQUIPMENT SUBSTITUTION

- A. General: As previously stated, the design has been based on a single manufacturer and model. Substitution, where permitted (as described above), may cause consequential effects that may impact on the Project. These effects may take various forms and may require changes in the design. These changes and any additional costs associated therewith are the responsibility of the Contractor proposing the substitution; no additional compensation shall be provided to the Contractor.
- B. A possible change in design may result from the proposed substitution from one or more of, but not limited to, the following conditions:
1. Architectural: different physical configuration, size or fit, aesthetics effected.
  2. Structural: different bearing or heavier loading.
  3. Capacity: different performance, lesser output is unacceptable.
  4. Mechanical: change in flow rates (air, water, etc.), different configuration and size of external piping or ductwork connections.
  5. Electrical: different horsepower requirements, effect on distribution.
  6. Controls: interconnections with control devices and equipment, additional requirements.
  7. Impact on environmental or energy efficiency issues.
  8. Departure from intent of original design or Project Documents.
- C. Changes in loading, sizing and/or performance of the proposed substitution shall consider the total requirements served or needed by the particular equipment. A revised design to accommodate the substitution shall be extended to the point where the change has no effect on the parameters used in the original design.
- D. An equipment substitution requiring a change in the design shall be processed as follows:
1. The Contractor shall prepare and submit to the Architect/Engineer for review, a proposal to provide a substitution that shall require a change in the design. Substantiate that the substitution complies with the intent of the Project Documents and include sufficient information of the changes required so that a judgment may be rendered.
  2. Proposal shall include an original drawing originated by the Contractor, and shall not be a catalog cut, assembly manual, or other generic documented printed by the manufacturer or their representative. The design shall show the intended installation to the same level of detail as that of the original design.
  3. Prior to submitting the proposal, the Contractor shall notify all other contractors whose work may be affected and request details and pricing for their respective changes. This information along with the Contractor's details shall be transmitted to the Architect/Engineer for approval.
  4. The Contractor in preparing the proposal recognizes that they shall compensate other trades that are affected by said proposal.
  5. If the proposal and the substitution are acceptable, the Architect/Engineer will approve the submittal and initiate a change order, at no additional compensation, and a notice to proceed.
- E. Equipment that was listed as a multiple manufacturer with a model number shall be submitted as a shop drawing. Contractor shall be responsible for all other provisions of Section 26 00 52. If, and only if, the material or equipment substitution requires no design change, the Work shall proceed in accordance with the Product Documents.
- F. Equipment that is being proposed as 'or equivalent' or was listed as a multiple manufacturer without a model number shall be in the form of a written proposal before the shop drawing phase. 'Or equivalent' shall mean or equivalent in the opinion of the Architect/Engineer and

they shall have sole discretion to determine whether or not a proposed substitute manufacturer and/or model is to be considered as acceptably equivalent and may be submitted in the form of shop drawings. If, and only if, the material or equipment substitution requires no design change, the Work shall proceed in accordance with the Project Documents.

- G. If changes are in fact required or a delay in work occurs because of the material or equipment substitution which were not properly processed, the Contractor initiating the substitution shall be liable for all consequential effects and expenses to accommodate the change or delay.

**26 00 64 ACCESS DOORS**

- A. Openings in building components for access to concealed mechanical work shall be furnished by the Contractor and installed with the building construction work. Access doors shall be located as indicated on the Plans or as strategically required for inspection, maintenance, and service. The model and style shall fit the building construction, fire rating requirements and provide adequate size and function.
- B. Access doors shall be sized as shown on the drawings or shall be a minimum size of 18" x 18" and otherwise shall be large enough for purpose intended and shall be fabricated of heavy gauge steel frames and door panels with double action concealed spring hinges, 1/4 turn flush screwdriver operated cam locks and prime coat paint finish. Access doors for various applications shall be as follows:

**Building Construction:**

Flush door in dry wall construction (walls and ceilings)  
Flush door in masonry or tile walls with exposed frame flange  
Flush door in plaster construction (walls and ceilings)  
Recessed door in acoustical plaster ceiling  
Recessed door in suspended drywall ceiling  
Flush door in suspended drywall ceiling  
Door in suspended drywall ceiling  
Fire rated separation (walls and ceilings)

**Milcor Access Door:**

Style DW  
Style M (steel), Style MS (stainless)  
Style K  
Style AP  
Style CT (aluminum - wet locations)  
Style CF (aluminum – wet locations)  
Style ATR (fire resistive door)  
Fire Rated Door

- C. Access doors are not required for Work above lay-in panel ceilings.
- D. Submittals shall indicate schedule of locations, sizes, types, adjacent building construction, finish, fire rating including thickness and type of insulation, conformance to UL requirements and associated labeling, metal and gauge of fabrication. Access door shall be as manufactured by Karp Associates, Milcor, or Higgins Mfg. Company.

**26 00 70 BASIC ELECTRICAL METHODS - GENERAL**

**26 00 71 COORDINATION OF WORK**

- A. The Contractor shall compare the electrical drawings and specifications with the site conditions, drawings and specifications of other trades and shall report any discrepancies between them to the Architect and obtain from him written permission for changes necessary in the electrical work. The Contractor at no addition to the contract price shall perform any such changes required. The electrical work shall be installed in cooperation with other trades installing interrelated work. Before installation, the Contractor shall make proper provisions to avoid interference in a manner approved by the Architect. All changes required in the work of the Contractor caused by his neglect to properly coordinate the work shall be made by him at his own expense.
- B. In new construction, anchor bolts, sleeves, inserts and supports required for the electrical work shall be furnished under the same Section of the Specifications as the respective items to be



supported; and they shall be installed, except as otherwise specified, by the trade furnishing them in cooperation with the trade furnishing and installing the material in which they are to be located. It shall be the responsibility of the Contractor who locates the anchor bolts, sleeves, inserts and supports to also ensure that they are properly and safely installed.

- C. Slots, chases, openings, and recesses through floors, walls, ceilings, partitions, and roofs shall be provided as the building is erected. It shall be the responsibility of the Contractor or trade requiring and providing the opening to verify the size and location of openings required and to furnish necessary sleeves, boxes, etc., for the equipment to be supplied. Patching of oversize openings and finished thereof shall be the responsibility of the trade or Contractor requiring the opening. All patching and finishing shall be done to match the adjacent materials as described in other respective divisions and sections of the specifications. No openings shall be cut in structural members without prior written approval of the Architect.
- D. Locations of conduits, electrical raceways, switches, panels, equipment, fixtures, etc., shall be adjusted to accommodate the work to interferences anticipated and encountered. The Contractor shall determine the exact route and location of each conduit, duct and electrical raceway prior to fabrication. If the Contractor fails to do so, any relocation and reinstallation required will be directed by the Architect and must be implemented by the Contractor at no cost to the Owner.
- E. Right-of-way: Lines which pitch shall have the right of way over those which do not pitch. Lines whose elevations cannot be changed shall have the right of way over lines whose elevations can be changed. Offsets, transitions and changes in direction in pipes and buss ducts shall be made as required to maintain proper head room and pitch of sloping lines whether or not indicated on the drawings. The Contractor shall furnish and install all elbows, pullboxes, turns, fittings, supports, etc., as required to effect these offsets, transitions and changes in direction.

#### 26 00 72 STORAGE AND INSTALLATION OF EQUIPMENT AND ACCESSORIES

- A. Equipment and materials shall be delivered to the site, stored in location(s) approved by the Architect, and suitably sheltered from the weather, but readily accessible for inspection by the Owner. All items subject to moisture damage shall be stored in dry, heated spaces. All equipment shall be covered and protected against dirt, water and chemical or mechanical injury in a manner approved by the manufacturer and against theft, during storage, installation, and construction. Damage or defects developing before acceptance of the work shall be made good at the Contractor's expense.
- B. Manufacturer's directions shall be followed completely in the delivery, storage, protection and installation of all equipment and materials. The Contractor shall promptly notify the Architect in writing of any conflict between any requirement of the contract documents and the manufacturer's directions. They shall obtain the Architect's written instruction before proceeding with the work. In case of a difference between the installation instructions of the manufacturer and the instructions in the contract documents, the most stringent shall govern. Any costs related to changes required due to manufacturer's instructions differing from the contract documents shall be borne by the Contractor at no cost to the Owner.
- C. Should the Contractor perform any work that does not comply with the manufacturer's directions, any written instructions from the Architect, or which shall cause a significant deviation from the drawings which has not been by the Architect they shall bear all costs arising in correcting the deficiencies in a manner directed by the Architect.
- D. Where switchgear, motor controls, transformers, or other electrical equipment is located in a space with a concrete or other type of paved flooring, it shall be set on a raised concrete pad. Unless otherwise noted on drawings or elsewhere in these specifications, concrete pads and bases shall be furnished and installed by the Contractor furnishing the equipment. This

Contractor shall establish sizes and location of the various concrete bases required and shall provide all necessary anchor bolts together with templates for holding these bolts in position. Anchor bolts shall be placed in steel pipe sleeves to allow for adjustment, with a suitable plate at bottom end of sleeve to hold the bolt. Each concrete base shall be not less than 9" high, unless noted otherwise, which shall project 1-1/2" beyond the equipment on all sides.

- E. Where equipment is located in a space where it does not rest on a concrete or similar paved floor, it shall be supported from or on the available structure on a structural frame made of suitable channels, wide flange members or angles. The structural frames shall allow no deflection with the loads imposed and the respective supporting points, shall distribute the load equally to two or more major building structural elements, and shall be designed to carry all loads into the major building structural members, creating no measurable deflection on these members nor importing any vibration into the building structure.
- F. All machinery which contains rotating or reciprocating parts or which is connected to other machinery with such parts shall be provided with vibration isolation mounts which shall be selected at a maximum transmissibility of 0.03 (isolation efficiency of 97%) at the lowest anticipated operating speed of the device.
- G. The Contractor shall support plumb, rigid and true-to-line all work and equipment furnished under each section. The Contractor shall study thoroughly all general, structural, mechanical and electrical drawings, shop drawings and catalog data to determine how equipment, fixtures, etc., are to be supported, mounted or suspended and shall provide steel bolts, inserts, pipe stands, brackets, and accessories for proper support whether or not shown on drawings. When directed by the Architect, the Contractor shall submit drawings showing supports for approval.
- H. All conduit connecting to switchgear, panels, motors, and other equipment shall be installed without strain at the connections. The Contractor may be required, as directed, to disconnect conduits piping to demonstrate that they have been so connected.
- I. The Contractor shall install all electrical work to permit removal (without damage to other parts) of switches, contactors, motors, drawout circuit breakers, belt guards, sheaves and drives and all other parts requiring periodic replacement and maintenance. The Contractor shall provide conduits, pullboxes, junction boxes, bus ducts, switchgear, raceways and equipment to permit ready access to components and to clear the openings of swinging and overhead doors and of access panels.
- J. The Contractor shall change the routing of conduits and buss ducts when required to meet job conditions. The Contractor shall secure approval of Owner prior to fabrication of equipment requiring such changes.

**26 00 80 BASIC ELECTRICAL METHODS – RELATED WORK**

26 00 81 DEMOLITION

A. Work Included:

- 1. The Owner shall keep possession of the designated equipment, including switchgear, transformers, motors, generators, panelboards, light fixtures, etc., as shown on the Plans, or as indicated during construction, or as hereinafter specified. The Contractor shall deliver, off-load and store this property as directed by the Owner. Machinery components not to be retained by the owner, including the above type of equipment and conduit, wire, hangers, brackets, insulation, wiring devices, etc., must be disconnected and removed from the premises, to be disposed of by the Contractor.

2. Contractor shall disconnect and remove all existing machinery, equipment, and apparatus to the extent shown on the drawings or otherwise described herein.
  3. The Contractor shall legally dispose of the designated equipment, and/or apparatus. Any cost of removal or salvage value shall be credited to the Contractor's account and shall be considered accordingly in the Contractor's bid.
- B. Work Not Included:
1. The removal and disposal of asbestos based insulation or other hazardous materials applied to, or contained in, the mechanical equipment, and material designated to be demolished shall not be included in the scope of the work regardless if known ahead of time or discovered in the course of performing the Work. In the latter case, the Contractor shall notify the Architect/Engineer and shall not pursue that portion of the Work until others have removed the asbestos-based material. The removal and disposal of asbestos-based material shall be arranged by and to the account of the Owner, and conducted separately from the demolition work.
- C. Miscellaneous:
1. Where items are specifically identified to be abandoned, all loose ends of the system shall be trimmed clear and appropriately capped or sealed in a safe and secure manner as approved by the Architect/Engineer.

#### 26 00 82 CUTTING AND PATCHING

- A. The basic premise of this Sub-section is that the cutting and patching (where required) are performed in existing building components. In "new" construction, the premise is that the building component is already in place.
- B. The Contractor requiring the penetration of or the access way in the building structure to fulfill the intent of the Project Documents for his Work shall be responsible for the cutting and the subsequent patching in accordance with the following criteria:
  1. No structural component of the building shall be cut or violated without express approval of the Architect/Engineer.
  2. The Contractor shall verify the presence of any concealed utility or service within the structure (walls, roof, floor, etc.) in question, and shall be responsible for maintaining continuity and/or replacing it.
- C. Cutting of work-in-place in "new" construction because of error, neglect or damage inflicted shall be the responsibility of the Contractor precipitating the issue.
- D. "Patching" shall be construed as the repairing or replacing of the building structure to return it to an original or new condition, in the opinion of the Owner and/or Architect/Engineer, as existed prior to the cutting.
- E. Patching and finishing work shall be the responsibility of the Contractor requiring the cutting. The patching shall match all the substantive and visual aspects of the structure and adjacent surfaces. Restoration and finishes shall be as specified and executed in the respective sections, schedules and/or details of the Project Documents for the general construction work. Completed work and any special requirements shall be subject to approval by and satisfaction of the Architect/Engineer.

#### 26 00 83 LUBRICATION

- A. This Contractor shall provide all oil for the operation of all equipment furnished by him until acceptance. Run in all bearings, and after they are run in, drain all oil from the bearings, flush

out all bearings, and refill with new oil. The Electrical Contractor and Subcontractors shall be held responsible for all damage to bearings while the equipment is being operated by them up to the date of acceptance of the equipment. Protect all bearings during installation and thoroughly grease steel shafts and other unpainted steel surfaces to prevent corrosion. All motors and other equipment shall be provided with covers as required for proper protection during construction.

**26 00 90 TESTING AND ADJUSTING**

26 00 91 INSTRUCTIONS OF OWNER'S REPRESENTATIVE

- A. Instruct the designated representative of the Owner in the proper operation and maintenance of all elements of the electrical systems. A competent representative of the Contractor shall provide such formal instruction and shall spend such additional time as directed by Architect/Engineer to fully prepare Owner to operate and maintain the electrical systems.

26 00 92 TESTING AND ADJUSTING

- A. Contractor shall, at the conclusion of the project, performance test and adjust all of the electrical systems to provide performance of all systems and subsystems installed and in all areas of the building. All power systems, communication systems, control systems and other related devices and subsystems shall be operated by the Contractor for a period of no less than seventy-two (72) hours and shall be systematically tested for proper sequencing, control, connection, phasing, rotation and calibration of control devices.
- B. Testing shall be systematic and thorough, and the results of these tests shall be submitted to the Architect/Engineer prior to final acceptance of the work. The format of this testing and adjusting effort, including all measurement techniques and methods, shall be submitted sixty (60) days prior to the completion of the work. After agreement with the Architect/Engineer on the format of the testing and adjusting work, the Contractor shall perform the work and resolve any and all deficiencies as they appear during the testing. It shall be the responsibility of the Contractor to provide any and all devices required for the successful testing and adjusting of the system.

## 26 05 00 COMMON WORK RESULTS FOR ELECTRICAL

- A. Extent: The work in this division consists of furnishing material and labor required to completely execute the electrical work for this project as per drawings and as specified herein.
- B. Interface with Other Trades: This contractor shall connect some items furnished in place by others such as prewired mechanical control assemblies. This will require coordination and cooperation with the other contractors. The extent of the required electrical work is shown on the drawings.

### 26 05 19 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

#### A. Material

- 1. Provisions for Wiring: Wire and cable of the sizes and types shown on the plans and/or hereinafter specified shall be furnished and installed by the Contractor. All wire and cable shall be new soft drawn copper and shall conform to all the latest requirements of the National Electrical Code IPCEA, and meet the specifications of the ASTM.
- 2. For conductors No. 10 AWG, provide stranded type THWN-2 or THHN. For conductors No. 12 AWG, provide solid type THWN-2 or THHN.
- 3. Power Conductors: All feeder and branch circuit wire shall be 600V 90°C insulated of the THHN & THWN-2 type unless shown or specified to be otherwise **No wire less than No. 12 AWG shall be used except for control circuits or low voltage wiring.** All wire sizes shown are American Wire Gauge sizes.
  - a. 20A Branch Circuit Homeruns shall be sized as follows:
    - 120V: 0 – 100 feet shall be #12AWG wire minimum
    - 101 – 200 feet shall be #10AWG wire minimum
    - In excess of 200 feet shall be #8AWG wire minimum
    - 277V: 0 – 250 feet shall be #12AWG wire minimum
    - In excess of 250 feet shall be #10AWG wire minimum
- 4. Control Conductors: Control circuit wiring shall be No. 12 AWG or smaller stranded wire. Stranded control wire shall be provided with crimp type spade terminators. Control circuit wiring shall be color-coded or numbered using an identical number on both ends of the conductor.

#### B. Installation

- 1. All 120V and 277V single phase circuits require a dedicated neutral conductor. The neutral conductor shall be numbered and identified with associated phase conductor at the panelboard as well as all junction boxes.
- 2. Where circuit runs are combined, upsize conduit and conductors to accommodate for conduit fill and conductor derating respectively.
- 3. Metal Clad (MC) Cable
  - a. **Type MC cable is only permitted for lighting fixture whips, which shall be limited to 5 feet or less, and must be concealed above ceiling.**
- 4. BX/AC Cable

- a. Type BX/AC cable is not permitted.

#### 26 05 26 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

##### A. Material

1. Contractor shall extend the existing equipment grounding system in accordance with the National Electrical Code and shall use only UL listed grounding clamps and connectors.

##### B. Installation

1. The equipment grounding system shall consist of a continuous conduit installation and a green insulated equipment grounding conductor. This grounding conductor shall be installed in every conduit or raceway with the feeder or branch circuit conductors. **This grounding conductor shall be extended from the housing of every electrical load, through panelboard equipment grounding busses, to the equipment grounding bus in the main panel. The grounding bus shall be bonded to the grounded neutral bar inside the main panel using a Main Bonding Jumper.**

#### 26 05 33 RACEWAY FOR ELECTRICAL SYSTEMS

##### A. General Requirements

1. Minimum conduit size shall be 3/4" trade size for branch circuits. Conduits shall be colored from factory as shown below (Conduits cannot be painted by contractor):
  - a. Red = Life Safety Branch
  - b. Orange = Critical Branch
  - c. Yellow = Equipment Branch
  - d. Red Conduit with Red J-boxes = Fire Alarm
2. A bushing shall be used where conduit enters a panel box or equipment enclosure.
3. Grounding Bushings shall be used to bond conduits entering a panel box or equipment that are not mechanically connected.
4. Expansion fittings shall be provided at all conduits across building expansion joints. Fittings shall be Type "AX" or "TX" as made by O-Z Electric Company, or approved equivalent. Provide copper bonding jumper at each expansion fitting.
5. Conduit bends shall be made with standard benders of proper size; radius of bends to be at least 6 times the diameter of the conduit. Runs between outlets shall not contain more than the equivalent of three 90-degree bends. Conduit runs shall be continuous from outlet to outlet, outlet to cabinet, etc.
6. All exposed conduits shall be installed parallel or perpendicular to the building walls or floors.
7. Conduits shall be securely fastened to or supported from the building structure. Conduits not fastened directly to building structure shall be supported by a rigid assembly, free of sway and adequately braced, connected directly to the building structure. The use of 'pencil' wire, ceiling wire, and cable hangers shall not be permitted.

8. Anchor or stake down all direct burial conduits to prevent shifting during grading and concrete pours. Spacers shall be provided for trenches with 2 or more conduits with any conduit 2" or larger.
  9. Install #12AWG pull wires for tracing for all underground non-metallic empty conduits with a minimum of 12 inches of slack on each end. Pull strings shall be used for empty above grade or metallic conduits.
  10. All raceways installed within 1½" of the roof deck shall be GRS or IMC. Boxes shall be offset below the 1½".
  10. Conduits installed horizontally in finished spaces without ceilings shall be installed above the roof deck. These spaces include gymnasium, multi-purpose rooms and natatoriums. Conduit type for this application to be GRS or IMC in accordance with Article 300.4 of the National Electrical Code. Vertical drops from the roof deck shall be EMT and be routed along and attached to the structural steel.
  11. All exposed raceways installed in a finished space will be painted to match the background, unless noted otherwise. Finished spaces include all areas open to the general public. Spaces such as storage, mechanical, IT, and electrical rooms and other similar areas only accessible to qualified personnel are considered unfinished.
  12. All penetrations through not rated walls shall be sealed for draft stopping with caulk, putty, etc. designed for this use.
  13. Fire / Smoke seals:
    - a. All penetrations through fire rated walls and floors shall be fire sealed in accordance with ASTM E814/UL1479 or manufacturer's recommendations.
    - b. Materials and installation details shall be submitted for approval.
- B. Electrical Metallic (EMT) Conduit
1. EMT conduit shall be installed for all work concealed in partitions or in concrete block walls and for all conduits run in ceiling plenums and exposed runs, except where noted otherwise.
  2. EMT couplings and connectors shall be steel or diecast, set screw or compression type.
- C. Jacketed Flexible Steel Conduit
1. Jacketed flexible steel conduit ('Sealtite') shall be used in wet areas where flexible conduit connections are required and on all motorized equipment and motors in all locations.
- D. Flexible Steel Conduit
1. Flexible steel conduit ('Greenfield') shall be used where vibration isolation is required, including all transformers and uninterruptible power systems.

#### 26 05 34 BOXES FOR ELECTRICAL SYSTEMS

- A. Outlet Boxes, Junction Boxes, Fittings
1. Mounting: Outlets must be centered with regard to paneling, furring, trim, etc. Outlets shall be set plumb or horizontal and shall extend to finished surface of wall, ceiling, or floor

- without projecting beyond or behind finished surface. Outlet boxes shall not be installed “back-to-back”.
2. Attaching: Boxes shall be attached by fastener designed for the purpose and shall provide adequate mechanical strength for future maintenance.
    - a. Boxes installed in metal stud partitions shall be secured to the metal studs using appropriate clips, fasteners, hangers, or supports as required, and shall provide adequate far side box support to fulfill the intent of all applicable codes.
  3. Pull boxes and junction boxes shall be installed where indicated on the drawings or where required to facilitate wire installation.
    - a. Size: Outlet, junction, and pull boxes not dimensioned shall be 4 inch square by 2-1/8” deep minimum and comply with sizing as required by Article 314 of the National Electrical Code.
  4. In fire rated drywall walls, 24” spacing must be maintained between boxes on opposite sides of walls. Moldable fire protective putty pads, firestopping coverplate gaskets, internal fire rated pads or other acceptable fire sealing means shall be installed on outlet boxes where the 24” spacing cannot be maintained.
  5. Steel faceplates must be used on fire rated drywall walls and painted to match device color. Faceplates shall be Mulberry Metal Products or equivalent.

#### 26 05 36 CABLE TRAYS FOR ELECTRICAL SYSTEMS

##### 26 05 36 Wire Basket

- A. Cable tray shall be stainless steel sized as indicated on the drawings.
  1. Cable tray shall be installed in such a manner and with proper parts to maintain an equipment ground path. Bond cable tray where non-continuous. Bond tray to the nearest effectively grounded material.
  2. Furnish cable tray with all required accessories for a complete installation.
  3. Supports shall be wall brackets or center hangers as indicated on the drawings. Adequate bracing shall be provided to prevent twisting of the tray when loaded.
  4. Bond wire basket cable tray where non-continuous. Bond tray to the nearest effectively grounded material.
  5. Cable tray shall be B-Line Flextray, Hubbell Wire Basket Tray System, Cablofil Wire Basket Tray, Monosystems Mono-Mesh or equivalent.
- B. Submittal
  1. Catalog Cutsheets including all accessories, parts, and components for a complete installation.
  2. Installation instructions.
  3. Shop drawings to include Manufacturer’s layout in [PDF],



26 05 48 SEISMIC RESTRAINT

- A. All materials and workmanship shall specifically comply with the above listed Building Code with respect to seismic requirements for the support and anchorage of all electrical, communications and electronic safety and security systems and equipment as installed on this project. Lateral forces to be restrained shall be as required by IBC Section 1621 Architectural, Mechanical, and Electrical Component Seismic Design Requirements and ASCE 7-02 Section 9.6 Architectural, Mechanical, and Electrical Components and Systems with the following design parameters with the design parameters as shown on the drawings:
- C. All conduit support and restraint details and practices shall conform to the publication “Seismic Restraint Systems Guidelines” by Cooper B-line-TOLCO.
- D. Seismic restraint submittals shall be provided for engineer review and include, but not be limited to, detailed drawings showing seismic restraint types, anchor type and attachment details, calculations and spacing requirements of unique equipment and conduit for this specific project. Submittals shall include floor plan drawings indicating equipment, ductwork and piping to be restrained, restraint locations and restraint component types. All submittals and floor plan drawings shall bear the seal of a licensed structural engineer of the State of Missouri.

26 05 48 SEISMIC RESTRAINT

- A. All materials and workmanship shall specifically comply with the above listed Building Code with respect to seismic requirements for the support and anchorage of all electrical, communications and electronic safety and security systems and equipment as installed on this project. Lateral forces to be restrained shall be as required by IBC Section 1621 Architectural, Mechanical, and Electrical Component Seismic Design Requirements and ASCE 7-02 Section 9.6 Architectural, Mechanical, and Electrical Components and Systems with the following design parameters with the design parameters as shown on the drawings:
- C. All conduit support and restraint details and practices shall conform to the publication “Seismic Restraint Systems Guidelines” by Cooper B-line-TOLCO.
- E. Seismic restraint submittals shall be provided for engineer review and include, but not be limited to, detailed drawings showing seismic restraint types, anchor type and attachment details, calculations and spacing requirements of unique equipment and conduit for this specific project. Submittals shall include floor plan drawings indicating equipment, ductwork and piping to be restrained, restraint locations and restraint component types. All submittals and floor plan drawings shall bear the seal of a licensed structural engineer of the State of Missouri.

## **26 09 00 INSTRUMENTATION AND CONTROL FOR ELECTRICAL SYSTEMS**

### 26 09 23 LIGHTING CONTROL DEVICES

#### A. OCCUPANCY SENSORS

1. Ceiling mounted occupancy sensors shall be dual-technology and white in color unless otherwise noted. A low voltage momentary toggle switch shall be installed with all ceiling mounted occupancy sensors.

#### B. DIMMERS

1. Provide dimmer switches as shown on drawings.
2. Contractor is responsible for providing and installing dimmer compatible with LED driver of fixtures.
3. Dimmers to be manufactured by WattStopper.
4. 0-10V LED dimmers requiring 'manual-on' shall be WattStopper #DLV2 or approved equivalent.

#### C. Switches

1. Switches shall be programmed for functionality shown on the drawings. Functionality shall be approved by Engineer and Owner prior to beginning programming.
2. Switches shall be factory engraved per the direction of the owner/architect.

### 26 09 43 WATTSTOPPER DLM SYSTEM

#### A. SYSTEM

1. Furnish and install a complete low voltage lighting control system consisting of relay packs, switches, sensors and wiring to provide control as shown on the drawings.
2. Manufacturer shall submit specific connection diagrams and riser diagrams related to this project for approval.
3. System shall consist of a 'Digital Lighting Management' lighting control system as manufactured by Wattstopper/Legrand.

**26 20 00 LOW-VOLTAGE ELECTRICAL TRANSMISSION**

**26 27 00 LOW-VOLTAGE DISTRIBUTION EQUIPMENT**

26 27 26 WIRING DEVICES

A. General: Furnish and install wiring devices as scheduled in Table 1 below, in types, characteristics, grades, colors, and electrical ratings for applications indicated which are UL listed and which comply with NEMA and FedSpec standards.

1. Provide ivory color devices and nylon wall plates except as otherwise indicated. All devices shall be hospital grade.

2. Provide devices in colors as follows:

Space:	Device:	Coverplate:
Emergency	Red	Red

B. Listings and Standards:

Switches - UL20, FedSpec WS896-E

Receptacles - UL948, FedSpec WC-596F, NEMA WD-1 and WD-6

GFI – UL943

Hospital Grade Receptacles - UL498, FedSpec WC-596F, NEMA WD-1 and WD-6

TABLE NO. 1

Receptacles	Hubbell	Leviton	Cooper	P & S
Hospital Grade	HBL8300I	8300-I	8300V	8300-I
Hospital Grade GFI	GF8300HI	8898-HGI	VGFH20V	2094-HGI

Switches	Hubbell	Leviton	Cooper	P & S
20A Single	1221I	1221-2I	AH2221V	PS20ACI-I
20A 3-way	1223I	1223-2I	AH2223V	PS20AC3-I

Nylon Plates	Hubbell	Leviton	Cooper	P & S
Duplex	NP8I	80703-I	5132V	TP8-I
Quadplex	NP82I	80716-I	5150V	TP82-I
Single Toggle	NP1I	80701-I	5134V	TP1-I
2-Gang Toggle	NP2I	80709-I	5139V	TP2-I
GFI	NP26I	80401-N1	5151V	TP26-I

C. All receptacles coverplate shall be engraved with the panel and branch circuit number supplying power to the receptacle.

**26 28 00 LOW-VOLTAGE CIRCUIT PROTECTIVE DEVICES**

26 28 16 DISCONNECT SWITCHES

- A. Type of Switch: Furnish and install disconnect switches as specified where shown on the drawings.
1. All disconnect switches shall be classed Heavy Duty and enclosed as required by NEMA Standards. Switch sizes and fusing shall be as shown on the drawings.
  2. Switch shall have a quick make, quick break mechanism operating through the box and not the cover. The switchblades shall be visible when the hinged door is open.
  3. The cover shall be interlocked with the operating handle to prevent opening door when switch is "ON" and a means provided to lock switch in the "OFF" position. This mechanism shall be capable of being defeated.
  4. Provide a 4" wide x 1½" high phenolic nameplate reading the following for each switch:

<b>EQUIPMENT IDENTIFICATION</b>	<b>(3/8" Lettering)</b>
<b>SERVICE DISCONNECT</b>	<b>(3/8" Lettering)</b>
<b>FED FROM SOURCE NAME</b>	<b>(1/4" Lettering)</b>

- B. Manufacturer: Switches shall be by Siemens, Square D, Eaton Cutler Hammer, or General Electric by ABB.

## **26 50 00 LIGHTING**

### **26 51 00 LIGHT FIXTURES AND LAMPS**

#### **26 51 13 INTERIOR LIGHTING FIXTURES, LAMPS, AND BALLASTS**

##### **A. LIGHT FIXTURES**

1. Furnish and install light fixtures as shown on the drawings and described herein. Fixtures shall be furnished complete with all auxiliaries, hardware, lenses, lamps, sockets, wiring, supports, etc.
2. LED drivers shall be 0-10V dimming, 1-100% unless otherwise indicated. LED drivers shall have Class 'A' sound rating, UL Class 2, RoHS compliance.
3. Electronic fluorescent ballasts shall be high frequency type with no detectable flicker, UL Class P, FCC and NEMA compliance with regard to EMI and RFI, meet all applicable ANSI and IEEE standards regarding harmonic distortion and surge suppression, high power factor, lamp current crest factor not more than 1.6, sound rating "A", and designed for specified lamp types. Ballasts shall be by Advance, Universal/Magnetek, or Osram/Sylvania.
4. All fixtures installed in plaster or drywall ceilings shall be provided with metal plaster frames. All fixtures in acoustic tile ceilings shall be installed symmetrically in pattern, at center of tile or as noted on drawings. Fixture trim shall be installed to prevent cutting, denting, deforming, or otherwise damaging the ceiling tile.
5. Complete units and all electrical components for all lighting fixtures shall bear the Underwriters' Laboratories and Electrical Testing Laboratory Labels.
6. All fixtures shall be rigidly supported. Fixtures installed in acoustic tile ceilings shall be rigidly mounted to ceiling frame or structure above in accordance with the NEC and ASTM E580. Fixtures mounted in plaster or gypsum board ceilings shall be secured to the ceiling structure. Fixture mountings to concrete slabs shall be with Phillips "Red Head" expansion anchors or equivalent.
7. All fixtures located in fire-rated ceilings shall be so installed as to protect the integrity of the fire-rated ceiling.
8. The actual locations of light fixtures in mechanical rooms shall be adjusted to avoid interference with mechanical equipment ductwork, and piping.

##### **B. LAMPS**

1. All LED fixtures shall have replaceable lamps/light engines for 10 years after installation date.

END OF SECTION

## **27 00 00 COMMUNICATIONS**

### 27 00 01 GENERAL

- A. The Plans, the general provisions of the Contract including the General, Supplementary and/or Special Conditions and specification sections of Division 1 shall apply to Work of Division 27 of the Specifications.
- B. Provisions and conditions cited in this Section shall apply to Work for other sections of Division 27 of these Specifications.

### 27 00 02 REFERENCES, REGULATORY REQUIREMENTS

- A. Work for this Section of the Specifications shall be performed in accordance with the Codes, Standards, etc., as identified in Division 27.

### 27 00 03 REFERENCES, RELATED SECTIONS of the SPECIFICATIONS

- A. Requirements of the following Sections of the Specifications apply to Work for this Section:
  - Division 26 – Electrical
  - Division 28 – Electronic Safety and Security

### 27 00 04 DEFINITIONS

- A. Refer to Section 26 00 05 – Definitions.

### 27 00 05 WORK INCLUDED

- A. Furnish material, labor and services necessary for, and incidental to, installing the following systems where shown on the Plans and as hereinafter specified. Include all necessary work in the related sections of the Specifications to provide for complete systems.
- B. Refer to the Low Voltage Responsibility Matrix shown on the drawings for more information.

### 27 00 06 SUBMITTALS:

- A. The Contractor shall submit the following for approval in accordance with Subsection 20 00 43, Duties of the Contractor - Submittals.
- B. Provide manufacturer's technical product data of each material and accessory item with engineering support information, installation manual, operation and maintenance manual. Data shall be specific to product specified and clearly identified on all data sheets, which contains multiple models or sizes.

## **27 05 00 COMMON WORK RESULTS FOR COMMUNICATIONS**

### 27 05 28 PATHWAYS FOR COMMUNICATIONS SYSTEMS

- A. All cabling shall be as shown on plans, and per specifications.

- C. Cabling may be run as open-type plenum rated cable concealed above lay-in ceiling spaces and shall be run in new j-hooks spaced no more than 5 feet apart.
- D. Non plenum rated cabling shall be installed in conduit. Cabling shall be installed in conduit in all exterior locations and in all exposed or inaccessible locations including all open to structure, cloud ceilings, inside wall partitions or above drywall, wood, and other inaccessible ceilings.
- C. Cables shall be continuous from outlet to termination equipment.
- D. Specified Technologies, Inc. EZ Path 4x4.in all walls which cable runs pass through.
- E. Furnish and install a minimum of (1) one cable pathway device through fire rated partitions and floors, and where indicated on the drawings. Device shall be Specified Technologies, Inc. EZ Path 4x4.
- F. Refer to 26 05 29 for fire sealing of penetrations through fire rated walls.
- G. Provide access panels as necessary for cable routing.

#### 27 05 28.29 HANGERS AND SUPPORTS FOR COMMUNICATIONS SYSTEMS

- A. Cables shall be supported with “J-Hooks” a minimum of every five feet. Bridal rings can be used when supporting (other than Cat 6) a maximum of six wires. Support devices are to be attached to existing permanent structure.
- B. Cables shall be installed in cable tray where available.
- C. Cables and supports shall be installed at a readily accessible location above ceilings.

#### 27 05 28.33 CONDUITS AND BACKBOXES FOR COMMUNICATIONS SYSTEMS

- A. Furnish and install conduit rough-ins at all outlets locations where shown on drawings. Rough-in shall consist of a two-gang outlet box, single gang trim ring, and a minimum 1” conduit stubbed above an accessible ceiling. Plastic bushings shall be installed on both ends of conduit. Install blank covers on all unused rough-ins.
- C. All conduits serving telephone/data communication outlets shall be 1” minimum. Conduits for all other system cable runs shall be sized for 40% maximum fill, or as shown on the drawings. Redundant paths shall be installed where fill exceeds 40%.
- D. Provide pull strings in all conduits.
- E. Conduit bends shall accommodate radius requirements of fiber cable as necessary.

### 27 15 00 COMMUNICATIONS HORIZONTAL CABLING

#### 27 15 13 COMMUNICATIONS COPPER HORIZONTAL CABLING

- A. Description of Work
  - 1. Refer to the Low Voltage Responsibility Matrix on the drawings for more information.
  - 2. The Contractor shall be trained and certified by the equipment manufacturer.

3. The Contractor shall attend coordination meetings with the Owner and Engineer prior to installation.

B. Acceptable Manufacturers

1. Subject to compliance with requirements, provide telephone/data cabling system components from the following manufacturers:

Homaco  
Panduit  
Hoffman

C. Rough-Ins

1. Furnish and install rough-ins where shown on drawings. Rough-in shall consist of a two-gang outlet box, single gang trim ring, and a minimum 1” conduit stubbed above an accessible ceiling. Install blank covers on all unused rough-ins.
2. Maximum fill of conduit is not to exceed forty percent.
3. Furnish and install minimum 2” sleeve through fire rated partitions.
4. Refer to 260529 for fire sealing of penetrations through fire rated walls.

END OF SECTION



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## **28 00 00 ELECTRONIC SAFETY AND SECURITY**

### 28 00 01 GENERAL

- A. The Plans, the general provisions of the Contract including the General, Supplementary and/or Special Conditions and specification sections of Division 1 shall apply to Work of Division 28 of the Specifications.
- B. Provisions and conditions cited in this Section shall apply to Work for other sections of Division 28 of these Specifications.

### 28 00 02 REFERENCES, REGULATORY REQUIREMENTS

- A. Work for this Section of the Specifications shall be performed in accordance with the Codes, Standards, etc., as identified in Division 28.

### 28 00 03 REFERENCES, RELATED SECTIONS of the SPECIFICATIONS

- A. Requirements of the following Sections of the Specifications apply to Work for this Section:  
  
Division 26 – Electrical  
Division 27 – Communications

### 28 00 04 DEFINITIONS

- A. Refer to Section 26 00 05 – Definitions.

### 28 00 05 WORK INCLUDED

- A. Furnish material, labor and services necessary for, and incidental to, installing the following systems where shown on the Plans and as hereinafter specified. Include all necessary work in the related sections of the Specifications to provide for complete systems.

### 28 00 06 SUBMITTALS:

- A. The Contractor shall submit the following for approval in accordance with Subsection 20 00 43, Duties of the Contractor - Submittals.
- B. Provide manufacturer's technical product data of each material and accessory item with engineering support information, installation manual, operation and maintenance manual. Data shall be specific to product specified and clearly identified on all data sheets, which contains multiple models or sizes.

## **28 05 00 COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY**

### 28 05 28 PATHWAYS FOR ELECTRONIC SAFETY AND SECURITY SYSTEMS

- A. All requirements listed in 27 05 28 shall apply for Electronic Safety and Security low voltage cabling unless noted below.
- B. Cabling for the following systems shall be installed in conduit:
  - 1. Fire Alarm – Red conduit and red boxes

## **28 30 00 ELECTRONIC DETECTION AND ALARM**

### **28 31 00 FIRE DETECTION AND ALARM**

#### A. Description of Work

1. Install a complete and operational extension to the existing fire alarm system as indicated by drawings, schedules, and riser diagrams.
2. The equipment supplier must be the local factory authorized representative and must also be factory authorized, trained and certified to perform warranty service for the equipment being supplied.
3. Firm shall be regularly engaged in manufacturer of fire alarm systems of types, sizes, and electrical characteristics required, and whose products have been in satisfactory use in similar service for not less than 5 years.
4. Firm with at least 5 years of successful experience on projects with fire alarm systems work similar to that required for this project providing local factory authorized service and spare parts inventory.
5. For a period of one year from date of Owner's first beneficial use, the system shall be under service contract, as authorized by the manufacturer. During that period, replacement components and labor shall be readily available during standard business hours. After the one-year guarantee period, the supplier warrants that he is capable of providing service on a 24 hour, 7-day a week basis for at least five (5) additional years.
6. The Contractor and (equipment supplier) shall perform conductor testing in accordance with NFPA 72, table 7-2.2, Items 11a-d, prior to installation of devices. Test results shall be submitted to the Engineer.
7. Provide shop drawings showing manufacturer's technical product data, including specifications and installation instruction, for each type of fire alarm system equipment. Project specific point-to-point drawings, wiring diagrams, fire alarm matrix, device addresses and voltage drop and battery calculations shall be provided. Partial submittal packages may be returned without being reviewed.
8. Sealed fire alarm drawings required for permit application are the responsibility of the Contractor and fire alarm system supplier.
9. The Contractor shall provide as-built drawings with final project specific point-to-point wiring diagrams, device addresses and battery calculations. The contractor shall provide all as-builts showing manufacturer's technical product data, including specifications and installation instruction, for each type of fire alarm system equipment. Refer to specification section 26 00 38 for all other as-built requirements.

#### B. Acceptable Manufacturers

1. Subject to compliance with requirements, provide fire alarm components from Siemens.

C. Initiating Devices

1. Photoelectric Detectors: Intelligent photoelectric smoke detectors shall use the photoelectric (light-scattering) principal to measure smoke density. Sensitivity shall be continuously monitored and reported to the panel. Detector shall be capable of performing a calibrated sensitivity and performance test without generating smoke. Detector shall meet UL 268 7<sup>th</sup> Edition. Provide a detector at control panel and each annunciator and remote power supply. Provide standard bases model. Provide a detector at control panel and each annunciator and remote power supply.
2. Relay Modules: Addressable relay modules with LED indicator light.
3. Control Modules: Addressable control modules with LED indicator light.
4. Monitor Modules: Addressable monitor modules with LED indicator light.
5. All initiating devices shall be identified with a black-on-clear (1/4" text minimum) printed adhesive label affixed to the device. This label shall include the device address.

D. Signal Devices

1. Audible/Visual and Visual Signal Devices

Wall Mounted Selectable Candela Audible/Visual Signals: Horn shall have 84 dB output at 10 feet on the high setting. Strobes shall have 15, 15/75, 30, 75, 110, and 115 candela output.

Wall Mounted Selectable Candela Visual Signals: Strobe shall have 15, 15/75, 30, 75, 110 and 115 candela output.

2. Signals shall meet the requirements of the Americans With Disabilities Act.
3. The visual section shall be polarized Xenon strobe in various candela ratings. The visual candela rating shall be as indicated on the drawings.
4. Audible signals and/or audible sections of combination signals shall be electronic multi-tone units and shall not require vibrating solenoids or contacts. The audible section shall provide for a high/medium/low setting providing different dB levels meeting the requirements of the particular room or space. Tone selection shall be continuous tones or the temporal pattern based on the ANSI S3.41 Standard shall be field selectable. Set audible signals to temporal pattern for this project and volume at high. Adjust volume for small rooms as required.
5. Visual and audible devices shall be synchronized.
6. The signals shall operate on 24 VDC polarized and meet UL 1971, UL464 and ADA. The signal shall be able to test circuit supervision without disconnecting wires.
7. There shall be FIRE lettering clearly visible from both sides. Red or white device color to be coordinated with Architect.
8. Provide remote power supplies as necessary. Provide dedicated 20A, 120V circuit to each remote power supply.

E. System Wiring

1. All wiring will be as required by the Equipment Supplier. Wire color-coding and the color shall remain the same throughout the system. In general, all initiating devices such as manual stations, thermal detectors, ionization detectors and all modules will be installed across a common #18AWG twisted shielded pair. The signal circuits, door release circuits, fan shut down, etc., shall require #14AWG.
2. No conduit or raceway system will include Class I or non-power limited fire protection signaling circuits with Class II or power limited fire protection signaling circuits in accordance with N.E.C. Article 725 or 760.
3. All conduit and wiring to flow switches, tamper switches, etc., shall be furnished and installed as part of this work.
4. Test results shall be submitted to Engineer.
5. Wiring may be run as concealed open-type plenum rated cable. Exposed or inaccessible wiring shall be installed in conduit. Where possible wiring/conduit shall be concealed. Provide sleeves in all walls which cable runs pass through. Refer to 26 05 29 for fire sealing of penetrations through fire rated walls. Provide access panels as necessary for cable routing. Support devices are to be attached to existing permanent structure.

F. Sequence of Operations

1. Fire alarm system to evacuate entire building in the event of an alarm.
2. The following will occur upon activation of any alarm initiating device (smoke detector, heat detector, manual pull station and water flow monitor module):
  - a. Activate remote station connection modules. Three distinct outputs must be provided: 1) Alarm, 2) Supervisory, 3) Trouble.
  - b. Sound audible signals and flash visual signals.
  - c. Display status information on the fire alarm control panel and each remote annunciator LCD screen.
3. The following to occur upon activation of a trouble signal (open circuit, ground fault, low battery, loss of AC power, etc.):
  - a. Annunciate zone at fire alarm control panel and remote annunciator.

END OF SECTION