

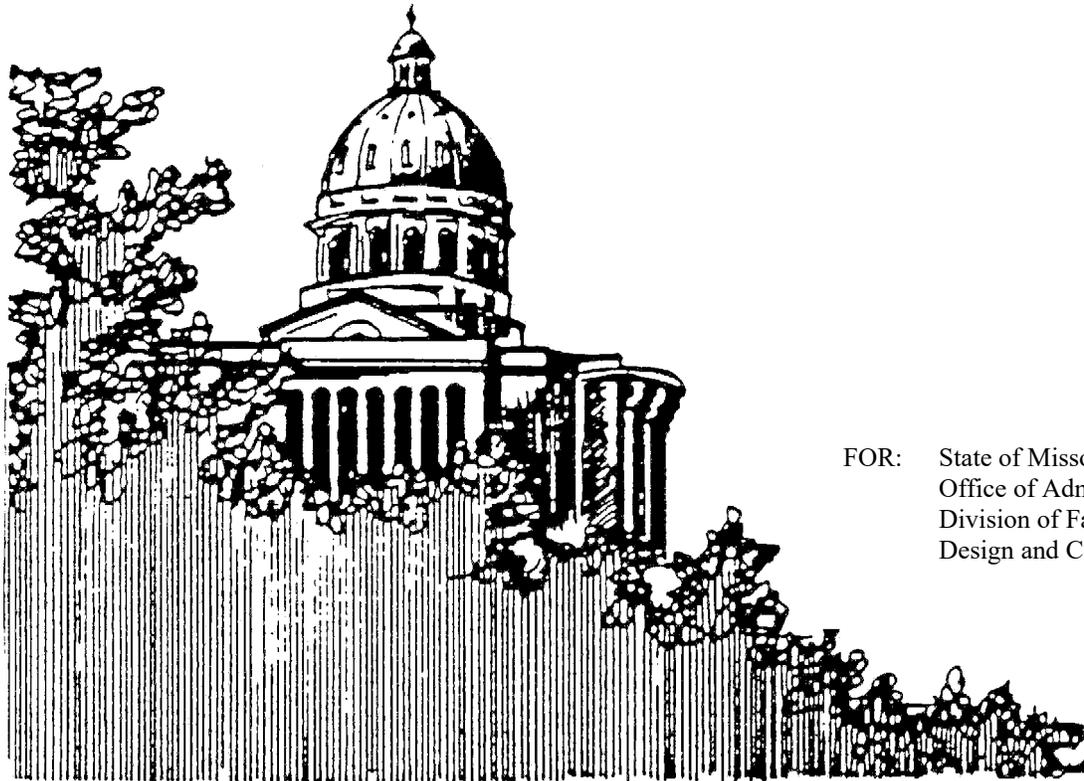
# PROJECT MANUAL

## Replace Roof Systems, Multiple Assets Farmington Correctional Center Farmington, Missouri

DESIGNED BY: L2e Solutions  
20 South Sarah St.  
St. Louis, MO 63108

DATE ISSUED: 2/7/2020

PROJECT NO.: C1922-01



FOR: State of Missouri  
Office of Administration  
Division of Facilities Management,  
Design and Construction

**SECTION 000107 - PROFESSIONAL SEALS AND CERTIFICATIONS**

**PROJECT NUMBER:** (C1922-01 – Replace Roof Systems, Multiple Assets)

**THE FOLLOWING DESIGN PROFESSIONALS HAVE SIGNED AND SEALED THE ORIGINAL PLANS AND SPECIFICATIONS FOR THIS PROJECT, WHICH ARE ON FILE WITH THE DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION:**

Elaine Lewis, RA, LEED BD+C  
L2e Solutions  
1834 Kennett Place  
St. Louis, MO 63104



Signed Electronically

Katherine M. Goldberg, SE, PE, LEED AP  
IMEG Corp.  
15 Sunnen, Suite 104  
St. Louis, MO 63143



Zachary Carter, PE, LEED BD+C  
IMEG Corp.  
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## SECTION 000115 – LIST OF DRAWINGS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section provides a comprehensive list of the drawings that comprise the Bid Documents for this project.

### PART 2 - PRODUCTS (NOT APPLICABLE)

### PART 3 - EXECUTION

#### 3.1 LIST OF DRAWINGS

- A. The following list of drawings is a part of the Bid Documents:

	<u>TITLE</u>	<u>SHEET #</u>	<u>DATE</u>	<u>CAD #</u>
1.	COVER SHEET	G000	08/27/19	G000
2.	PROJECT INFORMATION	G001	08/27/19	G001
3.	BUILDING #17 DEMO ROOF PLAN	AD102	08/27/19	AD100
4.	BUILDING #16 ROOF PLANS	A101	08/27/19	A100
5.	BUILDING #17 ROOF PLAN	A102	08/27/19	A100
6.	BUILDING #18 ROOF PLANS	A103	08/27/19	A100
7.	BUILDING #19 ROOF PLANS	A104	08/27/19	A100
8.	BUILDING #31 ROOF PLANS	A105	08/27/19	A100
9.	BUILDING #32 ROOF PLANS	A106	08/27/19	A100
10.	BUILDING #33 ROOF PLANS	A107	08/27/19	A100
11.	DETAILS	A500	08/27/19	A500
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18.	ROOF FRAMING PLAN – BUILDING 33	S104	08/27/19	S104
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23.	BLDG 18 ROOF PLANS – MECHANICAL & ELECTRICAL	ME202	08/27/19	ME202
24.	BLDG 19 ROOF PLANS – MECHANICAL & ELECTRICAL	ME203	08/27/19	ME203
25.	BLDG 31 ROOF PLANS – MECHANICAL & ELECTRICAL	ME204	08/27/19	ME204
26.	BLDG 32 ROOF PLANS – MECHANICAL & ELECTRICAL	ME205	08/27/19	ME205
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28.	MECHANICAL & ELECTRICAL DETAILS	ME300	08/27/19	ME300
29.	MECHANICAL & ELECTRICAL SCHEDULES	ME500	08/27/19	ME500

**END OF SECTION 000115**

## SECTION 001116 - INVITATION FOR BID

### 1.0 OWNER:

- A. The State of Missouri  
Office of Administration,  
Division of Facilities Management, Design and Construction  
Jefferson City, Missouri

### 2.0 PROJECT TITLE AND NUMBER:

- A. Replace Roof Systems, Multiple Assets  
Farmington Correctional Center  
Farmington, Missouri  
**Project No.: C1922-01**

### 3.0 BIDS WILL BE RECEIVED:

- A. Until: 1:30 PM, Tuesday, March 31, 2020
- B. **Only electronic bids on MissouriBUYS shall be accepted: <https://missouribuys.mo.gov>. Bidder must be registered to bid.**

### 4.0 DESCRIPTION:

- A. Scope: The project includes The Project consists of the complete tear-off of the existing shingle roofing system, removal of existing dormers, repair of existing wood soffits and fascia and installation of a new standing seam metal roofing system at seven (7) buildings located at Farmington Correctional Center (FCC). The buildings included in this project include the following: Medical Building #16, Food Service Building #17 A-side, Education Building #18, Library Building #19, Boot Camp Building #31, Chapel Building #32 B-Side, and Warehouse Building #33 B-Side.
- B. Estimate: \$1,488,000 to \$2,046,000
- C. MBE/WBE/SDVE Goals: MBE 10.00%, WBE 10.00%, & SDVE 3.00%. **NOTE: Only MBE/WBE firms certified by a State of Missouri public entity as of the date of bid opening, or SDVE(s) meeting the requirements of Section 34.074, RSMo and 1 CSR 30-5.010, can be used to satisfy the MBE/WBE/SDVE participation goals for this project.**
- D. **\*\*NOTE:** Bidders are provided new Good Faith Effort (GFE) forms on MissouriBUYS.

### 5.0 PRE-BID MEETING:

- A. Place/Time: 10:00 AM; Tuesday, March 17, 2020; Farmington Correctional Center, 1012 W. Columbia St., Administration Building in the Missouri Conference Room.
- B. Access to State of Missouri property requires presentation of a photo ID by all persons

### 6.0 HOW TO GET PLANS & SPECIFICATIONS:

- A. View Only Electronic bid sets are available at no cost or paper bid sets for a deposit of \$100 from American Document Solutions (ADS). MAKE CHECKS PAYABLE TO: American Document Solutions. Mail to: American Document Solutions, 1400 Forum Blvd., Suite 7A, Columbia, Missouri 65203. Phone 573-446-7768, Fax 573-355-5433, <https://www.adsplanroom.net>. NOTE: Prime contractors will be allowed a maximum of two bid sets at the deposit rate shown above. Other requesters will be allowed only one bid set at this rate. Additional bid sets or parts thereof may be obtained by any bidder at the cost of printing and shipping by request to American Document Solutions at the address shown above. **Bidder must secure at least one bid set to become a planholder.**
- B. **Refunds: Return plans and specifications in unmarked condition within 15 working days of bid opening to American Document Solutions, 1400 Forum Blvd., Suite 7A, Columbia, Missouri 65203. Phone 573-446-7768, Fax 573-355-5433. Deposits for plans not returned within 15 working days shall be forfeited.**
- C. Information for upcoming bids, including downloadable plans, specifications, Invitation for Bid, bid tabulation, award, addenda, and access to the ADS planholders list, is available on the Division of Facilities Management, Design and Construction's web site: <https://oa.mo.gov/facilities/bid-opportunities/bid-listing-electronic-plans>.

### 7.0 POINT OF CONTACT:

- A. Designer: L2e Solutions, Elaine Lewis, phone # 314-730-2779
- B. Project Manager: Frank Cunningham, phone # 573-526-3309

### 8.0 GENERAL INFORMATION:

- A. The State reserves the right to reject any and all bids and to waive all informalities in bids. No bid may be withdrawn for a period of 20 working days subsequent to the specified bid opening time. The contractor shall pay not less than the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed, as determined by the Missouri Department of Labor and Industrial Relations and as set out in the detailed plans and specifications.
- B. Bid results will be available at <https://oa.mo.gov/facilities/bid-opportunities/bid-listing-electronic-plans> after it is verified that at least one bid is awardable and affordable.

## Very Important MissouriBUYS Instructions to Help Submit a Bid Correctly

- A. The bidder shall submit his or her bid and all supporting documentation on MissouriBUYS eProcurement System. No hard copy bids shall be accepted. Go to <https://missouribuys.mo.gov> and register. The bidder must register before access is granted to the solicitation details and bidding is possible, however, the bidder can review a summary of the project by selecting “Bid Board” and then checking off “Open” under “Status” and “OA-FMDC-Contracts Chapter 8” under “Organization” in the boxes shown on the left margin.
- B. Once registered, log in.
1. Under “Solicitation” select “View Current Solicitations.” A new screen will open.
  2. Under “Filter by Agency” select “OA-FMDC-Contracts Chapter 8.”
  3. Under “Filter by Opp. No.” type in the State Project Number. Select “Submit.”
  4. Above the dark blue bar, select “Other Active Opportunities.”
  5. To see the Solicitation Summary, single click the Opp. No. (Project Number) and the summary will open. Single quick click each blue bar to open detailed information.
- C. Here are simplified instructions for uploading the bid to MissouriBUYS:
1. Find the solicitation by completing Steps 1 through 4 above.
  2. Select the three dots under “Actions.” Select “Add New Response.”
  3. When the Quote box opens, give the response a title and select “OK.”
  4. The detailed solicitation will open. Select “Check All” for the Original Solicitation Documents, open each document, and select “Accept.” If this step is not completed, a bid cannot be uploaded. Scroll to the bottom of the page and select “Add Attachments.” If you do not see this command, not all documents have been opened and accepted.
  5. The Supplier Attachments box will open. Select “Add Attachment” again.
  6. The Upload Documents box will open. Read the instructions for uploading. Disregard the “Confidential” check box.
  7. Browse and attach up to 5 files at a time. Scroll to bottom of box and select “Upload.” The Supplier Attachments box will open. Repeat Steps 5 through 7 if more than 5 files are to be uploaded.
  8. When the Supplier Attachments box opens again and uploading is complete, select “Done.” A message should appear that the upload is successful. If it does not, go to the Bidder Response tab and select “Submit.”
  9. The detailed solicitation will open. At the bottom select “Close.”
- D. Any time a bidder wants to modify the bid, he or she will have to submit a new one. FMDC will open the last response the bidder submits. The bidder may revise and submit the bid up to the close of the solicitation (bid date and time). Be sure to allow for uploading time so that the bid is successfully uploaded prior to the 1:30 PM deadline; we can only accept the bid if it is uploaded before the deadline.
- E. If you want to verify that you are uploading documents correctly, we encourage you to submit a fake bid early. Label the fake bid as such to distinguish it from the real bid. The contracts person you contact will let you know if your “bid” was received successfully. Please contact Drew Henrickson: 573-751-8128, [drew.henrickson@oa.mo.gov](mailto:drew.henrickson@oa.mo.gov); Kelly Copeland: 573-522-2283, [kelly.copeland@oa.mo.gov](mailto:kelly.copeland@oa.mo.gov)., or Paul Girouard: 573-751-4797, [paul.girouard@oa.mo.gov](mailto:paul.girouard@oa.mo.gov).
- F. If you are experiencing login issues, please contact Web Procure Support (Proactis) at 866-889-8533 anytime from 7:00 AM to 7:00 PM Central Time, Monday through Friday. If you try using a userid or password several times that is incorrect, the system will lock you out. Web Procure Support is the only option to unlock you! If you forget your userid or password, Web Procure Support will provide a temporary userid or password. Also, if it has been a while since your last successful login and you receive an “inactive” message, contact Web Procure (Proactis). If you are having a registration issue, you may contact Cathy Holliday at 573-751-3491 or by email: [cathy.holliday@oa.mo.gov](mailto:cathy.holliday@oa.mo.gov).

# IMPORTANT INFORMATION REGARDING REQUIREMENT FOR OEO CERTIFICATION

## SPECIFICATION CHANGES:

A. SECTION 002113 – INSTRUCTIONS TO BIDDERS: Article 14.0, Section B.1. (bottom of page 6 of 8): Delete: “an MBE or WBE must be certified by the State of Missouri, Office of Equal Opportunity and”.

To allow MBE, WBE, or MBE/WBE contractors, subcontractors, and suppliers to have ample time to register with the Office of Equal Opportunity, this requirement will not take effect until July 1, 2020. Until then, we will continue to accept certifications from the Office of Equal Opportunity and other Missouri certifying agencies.

## **SECTION 002113 – INSTRUCTIONS TO BIDDERS**

### **1.0 - SPECIAL NOTICE TO BIDDERS**

- A. If awarded a contract, the Bidder's employees, and the employees of all subcontractors, who perform the work on the project, will be required to undergo a fingerprint background check and obtain a State of Missouri identification badge prior to beginning work on site. The Bidder should review the information regarding this requirement in Section 013513 – Site Security and Health Requirements prior to submitting a bid.
- B. The Bidder's prices shall include all city, state, and federal sales, excise, and similar taxes that may lawfully be assessed in connection with the performance of work, and the purchased of materials to be incorporated in the work. THIS PROJECT IS NOT TAX EXEMPT.

### **2.0 - BID DOCUMENTS**

- A. The number of sets obtainable by any one (1) party may be limited in accordance with available supply.
- B. For the convenience of contractors, sub-contractors and suppliers, copies of construction documents are on file at the office of the Director, Division of Facilities Management, Design and Construction and on the Division's web site - <https://oa.mo.gov/facilities/bid-opportunities/bid-listing-electronic-plans>.

### **3.0 - BIDDERS' OBLIGATIONS**

- A. Bidders must carefully examine the entire site of the work and shall make all reasonable and necessary investigations to inform themselves thoroughly as to the facilities available as well as to all the difficulties involved in the completion of all work in accordance with the specifications and the plans. Bidders are also required to examine all maps, plans and data mentioned in the specifications. No plea of ignorance concerning observable existing conditions or difficulties that may be encountered in the execution of the work under this contract will be accepted as an excuse for any failure or omission on the part of the contractor to fulfill in every detail all of the requirements of the contract, nor accepted as a basis for any claims for extra compensation.
- B. Under no circumstances will contractors give their plans and specifications to another contractor. Any bid received from a contractor whose name does not appear on the list of plan holders may be subject to rejection.

### **4.0 - INTERPRETATIONS**

- A. No bidder shall be entitled to rely on oral interpretations as to the meaning of the plans and specifications or the acceptability of alternate products, materials, form or type of construction. Every request for interpretation shall be made in writing and submitted with all supporting documents not less than five (5) working days before opening of bids. Every interpretation made to a bidder will be in the form of an addendum and will be sent as promptly as is practicable to all persons to whom plans and specifications have been issued. All such addenda shall become part of the contract documents.
- B. Approval for an "acceptable substitution" issued in the form of an addendum as per Paragraph 4A above, and as per Article 3.1 of the General Conditions; ACCEPTABLE SUBSTITUTIONS shall constitute approval for use in the project of the product.
- C. An "acceptable substitution" requested after the award of bid shall be approved if proven to the satisfaction of the Owner and the Designer as per Article 3.1, that the product is acceptable in design, strength, durability, usefulness, and convenience for the purpose intended. Approval of the substitution after award is at the sole discretion of the Owner.
- D. A request for "Acceptable Substitutions" shall be made on the Section 006325 Substitution Request Form. The request shall be sent directly to the project Designer. A copy of said request should also be mailed to the Owner, Division of Facilities Management, Design and Construction, Post Office Box 809, Jefferson City, Missouri 65102.

### **5.0 - BIDS AND BIDDING PROCEDURE**

- A. Bidders shall submit all submission forms and accompanying documents listed in SECTION 004113 – BID FORM, Article 5.0, ATTACHMENTS TO BID by the stated time or their bid will be rejected for being non-responsive.

Depending on the specific project requirements, **the following is a GENERIC list** of all possible bid forms that may be due with bid submittals and times when they may be due. Please check for specific project requirements on the proposal form (Section 004113). ***Not all of the following bid forms may be required to be submitted.***

**Bid Submittal – due before stated date and time of bid opening (see IFB):**

004113	Bid Form (all pages are always required)
004322	Unit Prices Form
004336	Proposed Subcontractors Form
004337	MBE/WBE/SDVE Compliance Evaluation Form
004338	MBE/WBE/SDVE Eligibility Determination for Joint Ventures
004339	MBE/WBE/SDVE GFE Determination
004340	SDVE Business Form
004541	Affidavit of Work Authorization

- B. All bids shall be submitted without additional terms and conditions, modification or reservation on the bid forms with each space properly filled. Bids not on these forms will be rejected.
- C. All bids shall be accompanied by a bid bond executed by the bidder and a duly authorized surety company, certified check, cashier's check or bank draft made payable to the Division of Facilities Management, Design and Construction, State of Missouri, in the amount indicated on the bid form, Section 004113. Failure of the contractor to submit the full amount required shall be sufficient cause to reject his bid. The bidder agrees that the proceeds of the check, draft or bond shall become the property of the State of Missouri, if for any reason the bidder withdraws his bid after closing, or if on notification of award refuses or is unable to execute tendered contract, provide an acceptable performance and payment bond, provide evidence of required insurance coverage and/or provide required copies of affirmative action plans within ten (10) working days after such tender.
- D. The check or draft submitted by the successful bidder will be returned after the receipt of an acceptable performance and payment bond and execution of the formal contract. Checks or drafts of all other bidders will be returned within a reasonable time after it is determined that the bid represented by same will receive no further consideration by the State of Missouri. Bid bonds will only be returned upon request.

**6.0 - SIGNING OF BIDS**

- A. A bid from an individual shall be signed as noted on the Bid Form.
- B. A bid from a partnership or joint venture shall require only one signature of a partner, an officer of the joint venture authorized to bind the venture or an attorney-in-fact. If the bid is signed by an officer of a joint venture or an attorney-in-fact, a document evidencing the individual's authority to execute contracts should be included with the bid form.
- C. A bid from a limited liability company (LLC) shall be signed by a manager or a managing member of the LLC.
- D. A bid from a corporation shall have the correct corporate name thereon and the signature of an authorized officer of the corporation manually written. Title of office held by the person signing for the corporation shall appear, along with typed name of said individual. Corporate license number shall be provided and, if a corporation organized in a state other than Missouri, a Certificate of Authority to do business in the State of Missouri shall be attached. In addition, for corporate proposals, the President or Vice-President should sign as the bidder. If the signator is other than the corporate president or vice president, the bidder must provide satisfactory evidence that the signator has the legal authority to bind the corporation.
- E. A bid should contain the full and correct legal name of the Bidder. If the Bidder is an entity registered with the Missouri Secretary of State, the Bidder's name on the bid form should appear as shown in the Secretary of State's records.
- F. The Bidder should include its corporate license number on the Bid Form and, if the corporation is organized in a state other than Missouri, a Certificate of Authority to do business in the State of Missouri shall be attached to the bid form.

## **7.0 - RECEIVING BID SUBMITTALS**

- A. It is the bidder's sole responsibility to assure receipt by Owner of bid submittals by the date and time specified in the Invitation for Bid. Bids received after the date and time specified shall not be considered by the Owner.
- B. Bids must be submitted through the MissouriBUYS statewide eProcurement system (<https://www.missouribuys.mo.gov/>) in accordance with the instructions for that system. The Owner shall only accept bids submitted through MissouriBUYS. Bids received by the Owner through any other means, including hard copies, shall not be considered and will be discarded by the Owner unopened.
- C. To respond to an Invitation for Bid, the Bidder must first register with MissouriBUYS by going through the MissouriBUYS Home Page (<https://www.missouribuys.mo.gov/>), clicking the "Register" button at the top of the page, and completing the Vendor Registration. Once registered, the Bidder accesses its account by clicking the "Login" button at the top of the MissouriBUYS Home Page. Enter your USERID and PASSWORD, which the Bidder will select. Under Solicitations, select "View Current Solicitations." A new screen will open. Under "Filter by Agency" select "OA-FMDC-Contracts Chapter 8." Under "Filter by Opp. No." type in the State Project Number. Select "Submit." Above the dark blue bar, select "Other Active Opportunities." To see the Solicitation Summary, single click the Opp. No. (Project Number) and the summary will open. Single quick click each blue bar to open detailed information. The Bidder must read and accept the Original Solicitation Documents and complete all identified requirements. The Bidder should download and save all of the Original Solicitation Documents on its computer so that the Bidder can prepare its response to these documents. The Bidder should upload its completed response to the downloaded documents as an attachment to the electronic solicitation response.
- D. Step-by-step instructions for how a registered vendor responds to a solicitation electronically are provided in Section 001116 – Invitation For Bid.
- E. The Bidder shall submit its bid on the forms provided by the Owner on MissouriBUYS with each space fully and properly completed, including all amounts required for alternate bids, unit prices, cost accounting data, etc. The Owner may reject bids that are not on the Owner's forms or that do not contain all requested information.
- F. No Contractor shall stipulate in his bid any conditions not contained in the specifications or standard bid form contained in the contract documents. To do so may subject the Contractor's bid to rejection.
- G. The completed forms shall be without interlineations, alterations or erasures.

## **8.0 - MODIFICATION AND WITHDRAWAL OF BIDS**

- A. Bidder may withdraw his bid at any time prior to scheduled closing time for receipt of bids, but no bidder may withdraw his bid for a period of twenty (20) working days after the scheduled closing time for receipt of bids.
- B. The Bidder shall modify his or her original bid by submitting a revised bid on MissouriBUYS.

## **9.0 - AWARD OF CONTRACT**

- A. The Owner reserves the right to reject any and/or all bids and further to waive all informalities in bidding when deemed in the best interest of the State of Missouri.
- B. The Owner reserves the right to let other contracts in connection with the work, including but not by way of limitation, contracts for the furnishing and installation of furniture, equipment, machines, appliances and other apparatus.
- C. In awarding the contract the Owner may take into consideration the bidder's skill, facilities, capacity, experience, responsibility, previous work record, financial standing and the necessity of prompt and efficient completion of work herein described. Inability of any bidder to meet the requirements mentioned above may be cause for rejection of his bid. However, no contract will be awarded to any individual,

partnership or corporation, who has had a contract with the State of Missouri declared in default within the preceding twelve months.

- D. Award of alternates, if any, will be made in numerical order unless all bids received are such that the order of acceptance of alternates does not affect the determination of the low bidder.
- E. No bid shall be considered binding upon the Owner until the written contract has been properly executed, a satisfactory bond has been furnished, evidence of required insurance coverage, submittal of executed Section 004541, Affidavit of Work Authorization form, documentation evidencing enrollment and participation in a federal work authorization program has been received and an affirmative action plan submitted. Failure to execute and return the contract and associated documents within the prescribed period of time shall be treated, at the option of the Owner, as a breach of bidder's obligation and the Owner shall be under no further obligation to bidder.
- F. If the successful bidder is doing business in the State of Missouri under a fictitious name, he shall furnish to Owner, attached to the Bid Form, a properly certified copy of the certificate of Registration of Fictitious Name from the State of Missouri, and such certificate shall remain on file with the Owner.
- G. Any successful bidder which is a corporation organized in a state other than Missouri shall furnish to the Owner, attached to the Bid Form, a properly certified copy of its current Certificate of Authority to do business in the State of Missouri, such certificate to remain on file with the Owner. No contract will be awarded by the Owner unless such certificate is furnished by the bidder.
- H. Any successful bidder which is a corporation organized in the State of Missouri shall furnish at its own cost to the Owner, if requested, a Certificate of Good Standing issued by the Secretary of State, such certificate to remain on file with the Owner.
- I. Transient employers subject to Sections 285.230 and 285.234, RSMo, (out-of-state employers who temporarily transact any business in the State of Missouri) may be required to file a bond with the Missouri Department of Revenue. No contract will be awarded by the Owner unless the successful bidder certifies that he has complied with all applicable provisions of Section 285.230-234.
- J. Sections 285.525 and 285.530, RSMo, require business entities to enroll and participate in a federal work authorization program in order to be eligible to receive award of any state contract in excess of \$5,000. Bidders should submit with their bid an Affidavit of Work Authorization (Section 004541) along with appropriate documentation evidencing such enrollment and participation. Section-004541, Affidavit of Work Authorization is located on the MissouriBUYS solicitation for this project. Bidders must also submit an E-Verify Memorandum before the Owner may award a contract to the Bidder. Information regarding a E-Verify is located at <https://www.uscis.gov/e-verify/>. The contractor shall be responsible for ensuring that all subcontractors and suppliers associated with this contract enroll in E-Verify.

#### **10.0 - CONTRACT SECURITY**

- A. The successful bidder shall furnish a performance/payment bond as set forth in General Conditions Article 6.1 on a condition prior to the State executing the contract and issuing a notice to proceed.

#### **11.0 - LIST OF SUBCONTRACTORS**

- A. If required by "Section 004113 – Bid Form," each bidder must submit as part of their bid a list of subcontractors to be used in performing the work (Section 004336). The list must specify the name of the single designated subcontractor, for each category of work listed in "Section 004336 - Proposed Subcontractors Form." If work within a category will be performed by more than one subcontractor, the bidder must provide the name of each subcontractor and specify the exact portion of the work to be done by each. Failure to list the Bidder's firm, or a subcontractor for each category of work identified on the Bid Form or the listing of more than one subcontractor for any category without designating the portion of work to be performed by each shall be cause for rejection of the bid. If the bidder intends to perform any of the designated subcontract work with the use of his own employees, the bidder shall make that fact clear, by listing his own firm for the subject category. **If any category of work is left vacant, the bid shall be rejected.**

#### **12.0 - WORKING DAYS**

- A. Contract duration time is stated in working days and will use the following definition in determining the actual calendar date for contract completion:

1. Working days are defined as all calendar days except Saturdays, Sundays and the following State of Missouri observed holidays: New Year's Day, Martin Luther King, Jr. Day, Lincoln Day, Washington's Birthday, Truman Day, Memorial Day, Independence Day, Labor Day, Columbus Day, Veterans Day, Thanksgiving Day and Christmas Day.

### **13.0 - AMERICAN AND MISSOURI - MADE PRODUCTS AND FIRMS**

- A. By signing the bid form and submitting a bid on this project, the Bidder certifies that it will use American and Missouri products as set forth in Article 1.7 of the General Conditions. Bidders are advised to review those requirements carefully prior to bidding.
- B. A preference shall be given to Missouri firms, corporations or individuals, or firms, corporations or individuals that maintain Missouri offices or places of business, when the quality of performance promised is equal or better and the price quoted is the same or less.
- C. Pursuant to Section 34.076, RSMo, a contractor or Bidder domiciled outside the boundaries of the State of Missouri shall be required, in order to be successful, to submit a bid the same percent less than the lowest bid submitted by a responsible contractor or Bidder domiciled in Missouri as would be required for such a Missouri domiciled contractor or Bidder to succeed over the bidding contractor or Bidder domiciled outside Missouri on a like contract or bid being let in the person's domiciliary state and, further, the contractor or Bidder domiciled outside the boundaries of Missouri shall be required to submit an audited financial statement as would be required of a Missouri domiciled contractor or Bidder on a like contract or bid being let in the domiciliary state of that contractor or Bidder.

### **14.0 - MBE/WBE/SDVE INSTRUCTIONS**

#### **A. Definitions:**

1. "MBE" means a Minority Business Enterprise.
2. "MINORITY" has the same meaning as set forth in 1 C.S.R. 10-17.010.
3. "MINORITY BUSINESS ENTERPRISE" has the same meaning as set forth in section 37.020, RSMo.
4. "WBE" means a Women's Business Enterprise.
5. "WOMEN'S BUSINESS ENTERPRISE" has the same meaning as set forth in section 37.020, RSMo.
6. "SDVE" means a Service-Disabled Veterans Enterprise.
7. "SERVICE-DISABLED VETERAN" has the same meaning as set forth in section 34.074, RSMo.
8. "SERVICE-DISABLED VETERAN ENTERPRISE" has the same meaning as "Service-Disabled Veteran Business" set forth in section 34.074, RSMo.

#### **B. MBE/WBE/SDVE General Requirements:**

1. For all bids greater than \$100,000, the Bidder shall obtain MBE, WBE and SDVE participation in an amount equal to or greater than the percentage goals set forth in the Invitation for Bid and the Bid Form, unless the Bidder is granted a Good Faith Effort waiver by the Director of the Division, as set forth below. If the Bidder does not meet the MBE, WBE and SDVE goals, or make a good faith effort to do so, the Bidder shall be non-responsive, and its bid shall be rejected.
2. The Bidder should submit with its bid all of the information requested in the MBE/WBE/SDVE Compliance Evaluation Form for every MBE, WBE, or SDVE subcontractor or material supplier the Bidder intends to use for the contract work. The Bidder is required to submit all appropriate

MBE/WBE/SDVE documentation before the stated time and date set forth in the Invitation for Bid. If the Bidder fails to provide such information by the specified date and time, the Owner shall reject the bid.

3. The Director reserves the right to request additional information from a Bidder to clarify the Bidder's proposed MBE, WBE, and/or SDVE participation. The Bidder shall submit the clarifying information requested by the Owner within two (2) Working Days of receiving the request for clarification.
4. Pursuant to section 34.074, RSMo, a Bidder that is a SDVE doing business as Missouri firm, corporation, or individual, or that maintains a Missouri office or place of business, shall receive a three-point bonus preference in the contract award evaluation process. The bonus preference will be calculated and applied by reducing the bid amount of the eligible SDVE by three percent of the apparent low responsive bidder's bid. Based on this calculation, if the eligible SDVE's evaluation is less than the apparent low responsive bidder's bid, the eligible SDVE's bid becomes the apparent low responsive bid. This reduction is for evaluation purposes only, and will have no impact on the actual amount(s) of the bid or the amount(s) of any contract awarded. In order to be eligible for the SDVE preference, the Bidder must complete and submit with its bid the Missouri Service Disabled Veteran Business Form, and any information required by the form. The form is available on the MissouriBUYS solicitation for this project.

**A. Computation of MBE/WBE/SDVE Goal Participation:**

1. A Bidder who is a MBE, WBE, or SDVE may count 100% of the contract towards the MBE, WBE or SDVE goal, less any amounts awarded to another MBE, WBE or SDVE. (NOTE: A MBE firm that bids as general contractor must obtain WBE and SDVE participation; a WBE firm that bids as a general contractor must obtain MBE and SDVE participation; and a SDVE firm that bids as general contractor must obtain MBE and WBE participation.) In order for the remaining contract amount to be counted towards the MBE, WBE or SDVE goal, the Bidder must complete the MBE/WBE/SDVE Compliance Evaluation Form (Section 004337) identifying itself as an MBE, WBE or SDVE.
2. The total dollar value of the work granted to a certified MBE, WBE or SDVE by the Bidder shall be counted towards the applicable goal.
3. Expenditures for materials and supplies obtained from a certified MBE, WBE, or SDVE supplier or manufacturer may be counted towards the MBE, WBE and SDVE goals, if the MBE, WBE, or SDVE assumes the actual and contractual responsibility for the provision of the materials and supplies.
4. The total dollar value of the work granted to a second or subsequent tier subcontractor or a supplier may be counted towards a Bidder's MBE, WBE and SDVE goals, if the MBE, WBE, or SDVE properly assumes the actual and contractual responsibility for the work.
5. The total dollar value of work granted to a certified joint venture equal to the percentage of the ownership and control of the MBE, WBE, or SDVE partner in the joint venture may be counted towards the MBE/WBE/SDVE goals.
6. Only expenditures to a MBE, WBE, or SDVE that performs a commercially useful function in the work may be counted towards the MBE, WBE and SDVE goals. A MBE, WBE, or SDVE performs 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 or providing supplies or manufactured materials.

**B. Certification of MBE/WBE/SDVE Subcontractors:**

1. In order to be counted towards the goals, an MBE or WBE must be certified by the State of Missouri, Office of Equal Opportunity and an SDVE must be certified by the State of Missouri, Office of Administration, Division of Purchasing and Material Management or by the Department of Veterans Affairs.

2. The Bidder may determine the certification status of a proposed MBE or WBE subcontractor or supplier by referring to the Office of Equal Opportunity (OEO)'s online MBE/WBE directory (<https://apps1.mo.gov/oeo/>). The Bidder may determine the eligibility of a SDVE subcontractor or supplier by referring to the Division of Purchasing and Materials Management's online SDVE directory (<http://oa.mo.gov/purchasing/vendor-information/missouri-service-disabled-veteran-business-enterprise-sdve-information>) or the Department of Veterans Affairs' directory (<https://www.vip.vetbiz.gov/>).
3. Additional information, clarifications, etc., regarding the listings in the directories may be obtained by calling the Division at (573)751-3339 and asking to speak to the Contract Specialist of record as shown in the Supplementary Conditions (Section 007300).

**C. Waiver of MBE/WBE/SDVE Participation:**

1. If a Bidder has made a good faith effort to secure the required MBE, WBE and/or SDVE participation and has failed, the Bidder shall submit with its bid the information requested in MBE/WBE/SDVE Good Faith Effort (GFE) Determination form. The GFE forms are located on the MissouriBUYS solicitation for this project. The Director will determine if the Bidder made a good faith effort to meet the applicable goals. If the Director determines that the Bidder did not make a good faith effort, the bid shall be rejected as being nonresponsive to the bid requirements. Bidders who demonstrate that they have made a good faith effort to include MBE, WBE, and/or SDVE participation will be determined to be responsive to the applicable participation goals, regardless of the percent of actual participation obtained, if the bid is otherwise acceptable.
2. In determining whether a Bidder has made a good faith effort to obtain MBE, WBE and/or SDVE participation, the Director may evaluate the factors set forth in 1 CSR 30-5.010(6)(C) and the following:
  - a. The amount of actual participation obtained;
  - b. How and when the Bidder contacted potential MBE, WBE, and SDVE subcontractors and suppliers;
  - c. The documentation provided by the Bidder to support its contacts, including whether the Bidder provided the names, addresses, phone numbers, and dates of contact for MBE/WBE/SDVE firms contacted for specific categories of work;
  - d. If project information, including plans and specifications, were provided to MBE/WBE/SDVE subcontractors;
  - e. Whether the Bidder made any attempts to follow-up with MBE, WBE or SDVE firms prior to bid;
  - f. Amount of bids received from any of the subcontractors and/or suppliers that the Bidder contacted;
  - g. The Bidder's stated reasons for rejecting any bids;
3. If no bidder has obtained any participation in a particular category (MBE/WBE/SDVE) or made a good faith effort to do so, the Director may waive that goal rather than rebid.

**D. Contractor MBE/WBE/SDVE Obligations**

1. If awarded a contract, the Bidder will be contractually required to subcontract with or obtain materials from the MBE, WBE, and SDVE firms listed in its bid, in amounts equal to or greater than the dollar amount bid, unless the amount is modified in writing by the Owner.
2. If the Contractor fails to meet or maintain the participation requirements contained in the Contractor's bid, the Contractor must satisfactorily explain to the Director why it cannot comply

with the requirement and why failing meeting the requirement was beyond the Contractor's control. If the Director finds the Contractor's explanation unsatisfactory, the Director may take any appropriate action including, but not limited to:

- a. Declaring the Contractor ineligible to participate in any contracts with the Division for up to twelve (12) months (suspension); and/or
  - b. Declaring the Contractor be non-responsive to the Invitation for Bid, or in breach of contract and rejecting the bid or terminating the contract.
3. If the Contractor replaces an MBE, WBE, or SDVE during the course of this contract, the Contractor shall replace it with another MBE, WBE, or SDVE or make a good faith effort to do so. All MBE, WBE and SDVE substitutions must be approved by the Director.
  4. The Contractor shall provide the Owner with regular reports on its progress in meeting its MBE/WBE/SDVE obligations. At a minimum, the Contractor shall report the dollar-value of work completed by each MBE, WBE, or SDVE during the preceding month and the cumulative total of work completed by each MBE, WBE or SDVE to date with each monthly application for payment. The Contractor shall also make a final report, which shall include the total dollar-value of work completed by each MBE, WBE, and SDVE during the entire contract.

**STATE OF MISSOURI  
DIVISION OF FACILITIES MANAGEMENT,  
DESIGN AND CONSTRUCTION  
*MBE/WBE/SDVE DIRECTORY***

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The MBE/WBE Directory for goods and services is maintained by the Office of Equal Opportunity (OEO). The current Directory can be accessed at the following web address:

<https://apps1.mo.gov/MWBCertifiedFirms/>

Please note that you may search by MBE, WBE, or both as well as by region, location of the business by city or state, as well as by commodity or service.

The SERVICE DISABLED VETERAN ENTERPRISE (SDVE) Directory (s) may be accessed at the following web addresses:

<https://oa.mo.gov/sites/default/files/sdvelisting.pdf>

<https://www.vip.vetbiz.va.gov>



# State of Missouri Construction Contract

THIS AGREEMENT, made (DATE) by and between:

## *Contractor Name and Address*

hereinafter called the "Contractor,"

and the **State of Missouri**, hereinafter called the "**Owner**", represented by the Office of Administration, Division of Facilities Management, Design and Construction, on behalf of the Department of Corrections.

WITNESSETH, that the Contractor and the Owner, for the consideration stated herein agree as follows:

## **ARTICLE 1. STATEMENT OF WORK**

The Contractor shall furnish all labor and materials and perform all work required for furnishing and installing all labor, materials, equipment and transportation and everything necessarily inferred from the general nature and tendency of the plans and specifications for the proper execution of the work for:

**Project Name:** **Replace Roof Systems, Multiple Assets  
Farmington Correctional Center  
Farmington, Missouri**

**Project Number:** **C1922-01**

in strict accordance with the Contract Documents as enumerated in Article 7, all of which are made a part hereof.

## **ARTICLE 2. TIME OF COMPLETION**

The contract performance time is **XXX** working days from the transmittal date of this agreement. The contract completion date is **MONTH, DAY, YEAR**. This time includes ten (10) working days for the Contractor to receive, sign and return the contract form along with required bonding and insurance certificates. Failure of the Contractor to provide correct bonding and insurance within the ten (10) working days shall not be grounds for a time extension. Receipt of proper bonding and insurance is a condition precedent to the formation of the contract and if not timely received, may result in forfeiture of the Contractor's bid security. Work may not commence until the Owner issues a written Notice to Proceed and must commence within seven (7) working days thereafter.

## **ARTICLE 3. LIQUIDATED DAMAGES**

Whenever time is mentioned in this contract, time shall be and is of the essence of this contract. The Owner would suffer a loss should the Contractor fail to have the work embraced in this contract fully completed on or before the time above specified. THEREFORE, the parties hereto realize in order to adjust satisfactorily the damages on account of such failure that it might be impossible to compute accurately or estimate the amount of such loss or damages which the Owner would sustain by reason of failure to complete fully said work within the time required by this contract. The Contractor hereby covenants and agrees to pay the Owner, as and for **liquidated damages, the sum of \$X,XXX** per day for each and every day, Sunday and legal holidays excepted, during which the work remains incomplete and unfinished. Any sum which may be due the Owner for such damages shall be deducted and retained by the Owner from any balance which may be due the Contractor when said work shall have been finished and accepted. But such provisions shall not release the Bond of the Contractor from liability according to its terms. In case of failure to complete, the Owner will be under no obligation to show or prove any actual or specific loss or damage.

**ARTICLE 4. CONTRACT SUM**

The Owner shall pay the Contractor for the prompt, faithful and efficient performance of the conditions and undertakings of this contract, subject to additions, and deductions as provided herein, in current funds the sum of:

Base Bid: \$

**DELETE THE ALTERNATE INFORMATION IF NOT USED**

The Owner accepts the following Alternate Bids:

Alternate One: \$

**TOTAL CONTRACT AMOUNT: (\$CONTRACT AMOUNT)**

**UNIT PRICES:** The Owner accepts the following Unit Prices: see Attachment A

For changing specified quantities of work from those indicated by the contract drawings and specifications, upon written instructions of Owner, the following unit prices shall prevail. The unit prices include all labor, overhead and profit, materials, equipment, appliances, bailing, shoring, shoring removal, etc., to cover the finished work of the several kinds of work called for. Only a single unit price shall be given and it shall apply for either MORE or LESS work than that shown on the drawings and called for in the specifications or included in the Base Bid. In the event of more or less units than so indicated or included, change orders may be issued for the increased or decreased amount.

***INSERT UNIT PRICE DESCRIPTIONS AND QUANTITY INCLUDED IN THE BASE BID FROM SECTION 01026***

**OR**

**IF NO Unit Prices are used, type "NOT APPLICABLE"**

**ARTICLE 5. PREVAILING WAGE RATE**

It is understood and agreed by and between the parties that not less than the prevailing hourly rate of wages shall be paid for work of a similar character in the locality in which the work is performed, and not less than the prevailing hourly rate of wages for legal holiday and overtime work in the locality in which the work is performed, both as determined by the Department of Labor and Industrial Relations or as determined by the court on appeal, to all workmen employed by or on behalf of the Contractor or any subcontractor, exclusive of maintenance work. Only such workmen as are directly employed by the Contractor or his subcontractors, in actual construction work on the site shall be deemed to be employed.

When the hauling of materials or equipment includes some phase of the construction other than the mere transportation to the site of the construction, workmen engaged in this dual capacity shall be deemed to be employed directly on the project and entitled to the prevailing wage.

**ARTICLE 6. MINORITY/WOMEN/SERVICE DISABLED VETERAN BUSINESS ENTERPRISE PARTICIPATION**

The Contractor has been granted a waiver of the 10% MBE and 10% WBE and 3% SDVE participation goals. The Contractor agrees to secure the MBE/WBE/SDVE participation amounts for this project as follows: (OR)

The Contractor has met the MBE/WBE/SDVE participation goals and agrees to secure the MBE/WBE/SDVE participation amounts for this project as follows:

MBE/WBE/SDVE Firm: Subcontract Amt:\$  
MBE/WBE/SDVE Firm: Subcontract Amt:\$  
MBE/WBE/SDVE Firm: Subcontract Amt:\$

Total \$

MBE/WBE/SDVE assignments identified above shall not be changed without a Contract Change signed by the Owner.

The Director of the Division of Facilities Management, Design and Construction or his Designee shall be the final authority to resolve disputes and disagreements between the Contractor and the MBE/WBE/SDVE firms listed above when such disputes impact the subcontract amounts shown above.

**ARTICLE 7. CONTRACT DOCUMENTS**

Contract documents shall consist of the following component parts:

- 1. Division 0, with executed forms
- 2. Division 1
- 3. Executed Construction Contract Form
- 4. The Drawings
- 5. The Technical Specifications
- 6. Addenda
- 7. Contractor's Proposal as accepted by the Owner

By signature below, the parties hereby execute this contract document.

**APPROVED:**

\_\_\_\_\_  
Mark Hill, P.E., Director  
Division of Facilities Management,  
Design and Construction

\_\_\_\_\_  
Contractor's Authorized Signature

**DELETE IF PRIVATE OR PARTNERSHIP**

I, Corporate Secretary, certify that I am Secretary of the corporation named above and that (CONTRACTOR NAME), who signed said contract on behalf of the corporation, was then (TITLE) of said corporation and that said contract was duly signed for and in behalf of the corporation by authority of its governing body, and is within the scope of its corporate powers.

\_\_\_\_\_  
*Corporate Secretary*



STATE OF MISSOURI  
 OFFICE OF ADMINISTRATION  
 DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION  
**AFFIDAVIT FOR AFFIRMATIVE ACTION**

PROJECT NUMBER
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NAME
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First being duly sworn on oath states: that

he/she is the  sole proprietor  partner  officer or  manager or managing member of

NAME
------

a  sole proprietorship  partnership  
 limited liability company (LLC)

or  corporation, and as such, said proprietor, partner, or officer is duly authorized to make this

affidavit on behalf of said sole proprietorship, partnership, or corporation; that under the contract known as

PROJECT TITLE
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Less than 50 persons in the aggregate will be employed and therefore, the applicable Affirmative Action requirements as set forth in Article 1.4 of the General Conditions of the State of Missouri have been met.

PRINT NAME & SIGNATURE
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DATE
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**NOTARY INFORMATION**

NOTARY PUBLIC EMBOSSER SEAL	STATE OF	COUNTY (OR CITY OF ST. LOUIS)	USE RUBBER STAMP IN CLEAR AREA BELOW
	SUBSCRIBED AND SWORN BEFORE ME, THIS		
	DAY OF	YEAR	
	NOTARY PUBLIC SIGNATURE	MY COMMISSION EXPIRES	
NOTARY PUBLIC NAME (TYPED OR PRINTED)			

**SECTION 006113 - PERFORMANCE AND PAYMENT BOND FORM**

KNOW ALL MEN BY THESE PRESENTS, THAT we \_\_\_\_\_

as principal, and \_\_\_\_\_

\_\_\_\_\_ as Surety, are held and firmly bound unto the

STATE OF MISSOURI. in the sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_ )

for payment whereof the Principal and Surety bind themselves, their heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

WHEREAS, the Principal has, by means of a written agreement dated the \_\_\_\_\_

day of \_\_\_\_\_, 20\_\_\_\_\_, enter into a contract with the State of Missouri for

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

(Insert Project Title and Number)

NOW, THEREFORE, if the Principal shall faithfully perform and fulfill all the undertakings, covenants, terms, conditions and agreements of said contract during the original term of said contract and any extensions thereof that may be granted by the State of Missouri, with or without notice to the Surety and during the life of any guaranty required under the contract; and shall also faithfully perform and fulfill all undertakings, covenants, terms, conditions and agreements of any and all duly authorized modifications of said contract that may hereafter be made with or without notice to the Surety; and shall also promptly make payment for materials incorporated, consumed or used in connection with the work set forth in the contract referred to above, and all insurance premiums, both compensation and all other kinds of insurance, on said work, and for all labor performed on such work, whether by subcontractor or otherwise, at not less than the prevailing hourly rate of wages for work of a similar character (exclusive of maintenance work) in the locality in which the work is performed and not less than the prevailing hourly rate of wages for legal holiday and overtime work (exclusive of maintenance work) in the locality in which the work is performed both as determined by the Department of Labor and Industrial Relations or determined by the Court of Appeal, as provided for in said contract and in any and all duly authorized modifications of said contract that may be hereafter made, with or without notice to the Surety, then, this obligation shall be void and of no effect, but it is expressly understood that if the Principal should make default in or should fail to strictly, faithfully and efficiently do, perform and comply with any or more of the covenants, agreements, stipulations, conditions, requirements or undertakings, as specified in or by the terms of said contract, and with the time therein named, then this obligation shall be valid and binding upon each of the parties hereto and this bond shall remain in full force and effect; and the same may be sued on at the instance of any material man, laborer, mechanic, subcontractor, individual, or otherwise to whom such payment is due, in the name of the State of Missouri, to the use of any such person.

AND, IT IS FURTHER specifically provided that any modifications which may hereinafter be made in the terms of the contract or in the work to be done under it or the giving by the Owner of any extension of the time for the performance of the contract or any other forbearance on the part of either the Owner or the Principal to the other, shall not in any way release the Principal and the Surety, or either or any of them, their heirs, executors, administrators and successors, from their liability hereunder, notice to the Surety of any such extension, modifications or forbearance being hereby waived.

IN WITNESS WHEREOF, the above bounden parties have executed the within instrument this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_.

**AS APPLICABLE:**

**AN INDIVIDUAL**

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

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

**A PARTNERSHIP**

Name of Partner: \_\_\_\_\_

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

Name of Partner: \_\_\_\_\_

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

**CORPORATION**

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

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

**SURETY**

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

Attorney-in-Fact: \_\_\_\_\_

Address of Attorney-in-Fact: \_\_\_\_\_

Telephone Number of Attorney-in-Fact: \_\_\_\_\_

Signature Attorney-in-Fact: \_\_\_\_\_

**NOTE:** Surety shall attach Power of Attorney



STATE OF MISSOURI  
 OFFICE OF ADMINISTRATION  
 DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION  
**PRODUCT SUBSTITUTION REQUEST**

PROJECT NUMBER

PROJECT TITLE AND LOCATION

CHECK APPROPRIATE BOX

- SUBSTITUTION PRIOR TO BID OPENING**  
 (Minimum of (5) working days prior to receipt of Bids as per Article 4 – Instructions to Bidders)
- SUBSTITUTION FOLLOWING AWARD**  
 (Maximum of (20) working days from Notice to Proceed as per Article 3 – General Conditions)

FROM: BIDDER/CONTRACTOR (PRINT COMPANY NAME)

TO: ARCHITECT/ENGINEER (PRINT COMPANY NAME)

Bidder/Contractor hereby requests acceptance of the following product or systems as a substitution in accordance with provisions of Division One of the Bidding Documents:

SPECIFIED PRODUCT OR SYSTEM

SPECIFICATION SECTION NO.

SUPPORTING DATA

- Product data for proposed substitution is attached (include description of product, standards, performance, and test data)
- Sample                       Sample will be sent, if requested

**QUALITY COMPARISON**

	SPECIFIED PRODUCT	SUBSTITUTION REQUEST
NAME, BRAND		
CATALOG NO.		
MANUFACTURER		
VENDOR		

**PREVIOUS INSTALLATIONS**

PROJECT	ARCHITECT/ENGINEER	DATE INSTALLED
LOCATION		

**SIGNIFICANT VARIATIONS FROM SPECIFIED PRODUCT**

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**REASON FOR SUBSTITUTION**

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**DOES PROPOSED SUBSTITUTION AFFECT OTHER PARTS OF WORK?**

YES     NO

IF YES, EXPLAIN

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**SUBSTITUTION REQUIRES DIMENSIONAL REVISION OR REDESIGN OF STRUCTURE OR A/E WORK**

YES     NO

**BIDDER'S/CONTRACTOR'S STATEMENT OF CONFORMANCE OF PROPOSED SUBSTITUTION TO CONTRACT REQUIREMENT:**

We have investigated the proposed substitution. We believe that it is equal or superior in all respects to specified product, except as stated above; that it will provide the same Warranty as specified product; that we have included complete implications of the substitution; that we will pay redesign and other costs caused by the substitution which subsequently become apparent; and that we will pay costs to modify other parts of the Work as may be needed, to make all parts of the Work complete and functioning as a result of the substitution.

BIDDER/CONTRACTOR

DATE

**REVIEW AND ACTION**

Resubmit Substitution Request with the following additional information:

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Substitution is accepted.

Substitution is accepted with the following comments:

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Substitution is not accepted.

ARCHITECT/ENGINEER

DATE



KNOW ALL MEN BY THESE PRESENT THAT:                    hereinafter called "Subcontractor" who heretofore entered into an agreement with                    hereinafter called "Contractor", for the performance of work and/or furnishing of material for the construction of the project entitled

(PROJECT TITLE, PROJECT LOCATION, AND PROJECT NUMBER)

at

(ADDRESS OF PROJECT)

for the State of Missouri (Owner) which said subcontract is by this reference incorporated herein, in consideration of such final payment by Contractor.

DOES HEREBY:

1. ACKNOWLEDGE that they have been **PAID IN FULL** all sums due for work and materials contracted or done by their Subcontractors, Material Vendors, Equipment and Fixture Suppliers, Agents and Employees, or otherwise in the performance of the Work called for by the aforesaid Contract and all modifications or extras or additions thereto, for the construction of said project or otherwise.
2. RELEASE and fully, finally, and forever discharge the Owner from any and all suits, actions, claims, and demands for payment for work performed or materials supplied by Subcontractor in accordance with the requirements of the above referenced Contract.
1. REPRESENT that all of their Employees, Subcontractors, Material Vendors, Equipment and Fixture Suppliers, and everyone else has been **paid in full** all sums due them, or any of them, in connection with performance of said Work, or anything done or omitted by them, or any of them in connection with the construction of said improvements, or otherwise.

DATED this                    day of                    , 20                    .

NAME OF SUBCONTRACTOR

BY (TYPED OR PRINTED NAME)

SIGNATURE

TITLE



STATE OF MISSOURI  
 OFFICE OF ADMINISTRATION  
 DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION  
**MBE/WBE/SDVE PROGRESS REPORT**  
 SUBMIT WITH ALL INVOICES: (PLEASE CHECK APPROPRIATE BOX BELOW)  
CONSULTANT      CONSTRUCTION

INVOICE NO.	PROJECT NUMBER
CHECK IF FINAL <input type="checkbox"/> <b>FINAL</b>	DATE

PROJECT TITLE
PROJECT LOCATION
FIRM
TOTAL CONTRACT AMOUNT \$

THE PERCENTAGE AND DOLLAR AMOUNT OF THIS PROJECT THAT ARE TO BE MBE/WBE/SDVE AS INDICATED IN THE ORIGINAL CONTRACT:      % and \$ .

<b>CHECK</b> MBE WBE SDVE	ITEM OF WORK	TOTAL AMOUNT OF SUBCONTRACT	\$ AMOUNT & % COMPLETE (PAID-TO-DATE)	CONSULTANT/SUBCONSULTANT OR CONTRACTOR/SUBCONTRACTOR/SUPPLIER NAME, ADDRESS, CONTACT, AND PHONE NUMBER
MBE <input type="checkbox"/> WBE <input type="checkbox"/> SDVE <input type="checkbox"/>		\$	\$  %	- -
MBE <input type="checkbox"/> WBE <input type="checkbox"/> SDVE <input type="checkbox"/>		\$	\$  %	- -
MBE <input type="checkbox"/> WBE <input type="checkbox"/> SDVE <input type="checkbox"/>		\$	\$  %	- -
MBE <input type="checkbox"/> WBE <input type="checkbox"/> SDVE <input type="checkbox"/>		\$	\$  %	- -
MBE <input type="checkbox"/> WBE <input type="checkbox"/> SDVE <input type="checkbox"/>		\$	\$  %	- -

ORIGINAL: Attach to ALL Progress and Final Payments



STATE OF MISSOURI  
 OFFICE OF ADMINISTRATION  
 DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION  
**AFFIDAVIT – COMPLIANCE WITH PREVAILING WAGE LAW**

PROJECT NUMBER
----------------

Before me, the undersigned Notary Public, in and for the County of \_\_\_\_\_

State of \_\_\_\_\_ personally came and appeared \_\_\_\_\_

(NAME)

\_\_\_\_\_ of the \_\_\_\_\_

(POSITION) (NAME OF THE COMPANY)

(a corporation) (a partnership) (a proprietorship) and after being duly sworn did depose and say that all provisions and requirements set out in Chapter 290, Sections 290.210 through and including 290.340, Missouri Revised Statutes, pertaining to the payment of wages to workmen employed on public works project have been fully satisfied and there has been no exception to the full and completed compliance with said provisions and requirements and with Wage Determination No: \_\_\_\_\_ issued by the Department of Labor and Industrial Relations, State of Missouri on the \_\_\_\_\_ day of \_\_\_\_\_ 20 \_\_\_\_\_ in carrying out the contract and working in connection with \_\_\_\_\_

(NAME OF PROJECT)

Located at \_\_\_\_\_ in \_\_\_\_\_ County

(NAME OF THE INSTITUTION)

Missouri, and completed on the \_\_\_\_\_ day of \_\_\_\_\_ 20 \_\_\_\_\_

SIGNATURE

**NOTARY INFORMATION**

NOTARY PUBLIC EMBOSSEER OR BLACK INK RUBBER STAMP SEAL	STATE	COUNTY (OR CITY OF ST. LOUIS)
	SUBSCRIBED AND SWORN BEFORE ME, THIS	
	DAY OF	YEAR
	NOTARY PUBLIC SIGNATURE	MY COMMISSION EXPIRES
NOTARY PUBLIC NAME (TYPED OR PRINTED)		<b>USE RUBBER STAMP IN CLEAR AREA BELOW</b>

FILE: Closeout Documents

# GENERAL CONDITIONS

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### ARTICLE:

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## SECTION 007213 - GENERAL CONDITIONS

- A. These General Conditions apply to each section of these specifications. The Contractor is subject to the provisions contained herein.
- B. The General Conditions are intended to define the relationship of the Owner, the Designer and the Contractor thereby establishing certain rules and provisions governing the operation and performance of the work so that the work may be performed in a safe, orderly, expeditious and workmanlike manner.

## ARTICLE 1 – GENERAL PROVISIONS

### ARTICLE 1.1 - DEFINITIONS

- A. As used in these contract documents, the following terms shall have the meanings and refer to the parties designated in these definitions.
  - 1. **"COMMISSIONER"**: The Commissioner of the Office of Administration.
  - 2. **"CONSTRUCTION DOCUMENTS"**: The "Construction Documents" shall consist of the Project Manual, Drawings and Addenda.
  - 3. **"CONSTRUCTION REPRESENTATIVE:"** Whenever the term "Construction Representative" is used, it shall mean the Owner's Representative at the work site.
  - 4. **"CONTRACTOR"**: Party or parties who have entered into a contract with the Owner to furnish work under these specifications and drawings.
  - 5. **"DESIGNER"**: When the term "Designer" is used herein, it shall refer to the Architect, Engineer, or Consultant of Record specified and defined in Paragraph 2.0 of the Supplemental Conditions, or his duly authorized representative. The Designer may be either a consultant or state employee.
  - 6. **"DIRECTOR"**: Whenever the term "Director" is used, it shall mean the Director of the Division of Facilities Management, Design and Construction or his Designee, representing the Office of Administration, State of Missouri. The Director is the agent of the Owner.
  - 7. **"DIVISION"**: Shall mean the Division of Facilities Management, Design and Construction, State of Missouri.

- 8. **"INCIDENTAL JOB BURDENS"**: Shall mean those expenses relating to the cost of work, incurred either in the home office or on the job-site, which are necessary in the course of doing business but are incidental to the job. Such costs include office supplies and equipment, postage, courier services, telephone expenses including long distance, water and ice and other similar expenses.
- 9. **"JOINT VENTURE"**: An association of two (2) or more businesses to carry out a single business enterprise for profit for which purpose they combine their property, capital, efforts, skills and knowledge.
- 10. **"OWNER"**: Whenever the term "Owner" is used, it shall mean the State of Missouri.
- 11. **"PROJECT"**: Wherever the term "Project" is used, it shall mean the work required to be completed by the construction contract.
- 12. **"PROJECT MANUAL"**: The "Project Manual" shall consist of Introductory Information, Invitation for Bid, Instructions to Bidders, Bid Documents, Additional Information, Standard Forms, General Conditions, Supplemental General Conditions, General Requirements and Technical Specifications.
- 13. **"SUBCONTRACTOR"**: Party or parties who contract under, or for the performance of part or this entire Contract between the Owner and Contractor. The subcontract may or may not be direct with the Contractor.
- 14. **"WORK"**: Labor, material, supplies, plant and equipment required to perform and complete the service agreed to by the Contractor in a safe, expeditious, orderly and workmanlike manner so that the project shall be complete and finished in the best manner known to each respective trade.
- 15. **"WORKING DAYS"**: are all calendar days except Saturdays, Sundays and the following holidays: New Year's Day, Martin Luther King, Jr. Day, Lincoln Day, Washington's Birthday (observed), Truman Day, Memorial Day, Independence Day, Labor Day, Columbus Day, Veterans Day (observed), Thanksgiving Day, Christmas Day.

### ARTICLE 1.2 DRAWINGS AND SPECIFICATIONS

- A. In case of discrepancy between drawings and specifications, specifications shall govern. Should discrepancies in architectural drawings, structural drawings and mechanical drawings occur, architectural drawings shall govern and, in case of

conflict between structural and mechanical drawings, structural drawings shall govern.

- B. Specifications are separated into titled divisions for convenience of reference only and to facilitate letting of contracts and subcontracts. The Contractor is responsible for establishing the scope of work for subcontractors, which may cross titled divisions. Neither the Owner nor Designer will establish limits and jurisdiction of subcontracts.
- C. Figured dimensions take precedence over scaled measurements and details over smaller scale general drawings. In the event of conflict between any of the documents contained within the contract, the documents shall take precedence and be controlling in the following sequence: addenda, supplementary general conditions, general conditions, division 1 specifications, technical division specifications, drawings, bid form and instructions to bidders.
- D. Anything shown on drawings and not mentioned in these specifications or vice versa, as well as any incidental work which is obviously necessary to complete the project within the limits established by the drawings and specifications, although not shown on or described therein, shall be performed by the Contractor at no additional cost as a part of his contract.
- E. Upon encountering conditions differing materially from those indicated in the contract documents, the Contractor shall promptly notify the Designer and Construction Representative in writing before such conditions are disturbed. The Designer shall promptly investigate said conditions and report to the Owner, with a recommended course of action. If conditions do materially differ and cause an increase or decrease in contract cost or time required for completion of any portion of the work, a contract change will be initiated as outlined in Article 4 of these General Conditions.
- E. Only work included in the contract documents is authorized, and the Contractor shall do no work other than that described therein or in accordance with appropriately authorized and approved contract changes.

### **ARTICLE 1.3 - COMPLIANCE WITH LAWS, PERMITS, REGULATIONS AND INSPECTIONS**

- A. Since the Owner is the State of Missouri, municipal or political subdivisions, zoning ordinances, construction codes (other than licensing of trades), and other like ordinances are not applicable to construction on Owner's property, and Contractor will not be required to submit drawings and specifications to any municipal or political subdivision, authority, obtain construction permits or any other licenses (other

than licensing of trades) or permits from or submit to inspections by any municipality or political subdivision relating to the construction for this project. All permits or licenses required by municipality or political subdivision for operation on property not belonging to Owner shall be obtained by and paid for by Contractor. Each Contractor shall comply with all applicable laws, ordinances, rules and regulations that pertain to the work of this contract.

- B. Contractors, subcontractors and their employees engaged in the businesses of electrical, mechanical, plumbing, carpentry, sprinkler system work, and other construction related trades shall be licensed to perform such work by the municipal or political subdivision where the project is located, if such licensure is required by local code. Local codes shall dictate the level (master, journeyman, and apprentice) and the number, type and ratio of licensed tradesmen required for this project within the jurisdiction of such municipal or political subdivision.
- C. Equipment and controls manufacturers and their authorized service and installation technicians that do not maintain an office within the jurisdiction of the municipal or political subdivision but are a listed or specified contractor or subcontractor on this project are exempt from Paragraph 1.3 B above.
- D. The Contractor shall post a copy of the wage determination issued for the project and included as a part of the contract documents, in a prominent and easily accessible location at the site of construction for the duration of the project.
- E. Any contractor or subcontractor to such contractor at any tier signing a contract to work on this project shall provide a ten-hour Occupational Safety and Health Administration (OSHA) construction safety program for their on-site employees which includes a course in construction safety and health approved by OSHA or a similar program approved by the Department of Labor and Industrial Relations which is at least as stringent as an approved OSHA program. The contractor shall forfeit as a penalty to the public body on whose behalf the contract is made or awarded, two thousand five hundred dollars plus one hundred dollars for each employee employed by the contractor or subcontractor, for each calendar day, or portion thereof, such employee is employed without the required training.

### **ARTICLE 1.4 - NONDISCRIMINATION IN EMPLOYMENT**

- A. The Contractor and his subcontractors will not discriminate against individuals based on race, color, religion, national origin, sex, disability, or

age, but may use restrictions which relate to bona fide occupational qualifications. Specifically, the Contractor and his subcontractors shall not discriminate:

1. Against recipients of service on the basis of race, color, religion, national origin, sex, disability or age.
2. Against any employee or applicant, for employment on the basis of race, color, religion, national origin, sex or otherwise qualified disability status.
3. Against any applicant for employment or employee on the basis of age, where such applicant or employee is between ages 40 and 70 and where such Contractor employs at least 20 persons.
4. Against any applicant for employment or employee on the basis of that person's status as a disabled or Vietnam-era veteran.

The Contractor and his Subcontractors will take affirmative action to insure applicants for employment and employees are treated equally without regard to race, color, religion, national origin, sex, disability, or age. Such action shall include, but not be limited to, the following: employment, upgrading, demotion and transfer; recruitment or recruitment advertising; and selection for training, including apprenticeship. The Contractor and his Subcontractors will give written notice of their commitments under this clause to any labor union with which they have bargaining or other agreements.

- B. The Contractor and his Subcontractors shall develop, implement, maintain and submit in writing to the Owner 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 included in the contract specifications. For the purpose of this section, an "affirmative action program" means positive action 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 age 40 and 70), disabled and Vietnam-era veteran status, and disability. 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 all collective bargaining agreements; and
5. Performance of an internal audit of the reporting system to monitor execution and to provide for future planning.

In the enforcement of this non-discrimination clause, 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.

- C. In the event of the Contractor's or his subcontractor's noncompliance with any provisions of this Article of the Contract, the Owner may cancel this contract in whole or in part or require the Contractor to terminate his contract with the subcontractor.

#### **ARTICLE 1.5 - ANTI-KICKBACK**

- A. No employee of the division, shall have or acquire any pecuniary interest, whether direct or indirect, in this contract or in any part hereof. No officer, employee, designer, attorney, or administrator of or for the Owner who is authorized in such capacity and on behalf of the Owner to exercise any legislative, executive, supervisory or other similar functions in connection with the construction of the project, shall have or acquire any pecuniary interest, whether direct or indirect, in this contract, any material supply contract, subcontract, insurance contract, or any other contract pertaining to the project.

#### **ARTICLE 1.6 - PATENTS AND ROYALTIES**

- A. The Contractor shall hold and save the Owner and its officers, agents, servants and employees harmless from liabilities of any nature or kind, including cost and expenses, for, or on account of, any patented or unpatented invention, process, article or appliance manufactured or used in the performance of this contract, including its use by the Owner, unless otherwise specifically stipulated in the contract documents.
- B. If the Contractor uses any design, device or materials covered by letters, patent or copyright,

the Contractor 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 prices shall include all royalties or costs arising from the use of such design, device or materials, in any way involved in the work. The Contractor and/or his sureties shall indemnify and save harmless the Owner of the project from any and all claims for infringement by reason of the use of such patented or copyrighted design, device or materials 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 obliged to pay by reason of such infringement at any time during the prosecution of the work or after completion of the work.

#### **ARTICLE 1.7 - PREFERENCE FOR AMERICAN AND MISSOURI PRODUCTS AND SERVICES**

- A. By virtue of statutory authority a preference will be given to Missouri labor and to products of mines, forests and quarries of the state of Missouri when they are found in marketable quantities in the state, and all such materials shall be of the best quality and suitable character that can be obtained at reasonable market prices, all as provided for in Section 8.280, Missouri Revised Statutes and Cumulative Supplements.
- B. Furthermore, pursuant to Section 34.076 Missouri Revised Statutes and Cumulative Supplements, a preference shall be given to those persons doing business as Missouri firms, corporations, or individuals, or which maintain Missouri offices or places of business, when the quality of performance promised is equal or better and the price quoted is the same or less. In addition, in order for a non-domiciliary bidder to be successful, his bid must be that same percentage lower than a domiciliary Missouri bidder's bid, as would be required for a Missouri bidder to successfully bid in the non-domiciliary state.
- C. In accordance with the Missouri Domestic Products Procurement Act Section 34.350 RSMo and Cumulative Supplements any manufactured goods or commodities used or supplied in the performance of this contract or any subcontract thereto shall be manufactured, assembled or produced in the United States, unless the specified products are not manufactured, assembled or produced in the United States in sufficient quantities to meet the agency's requirements or cannot be manufactured, assembled or produced in the United States within the necessary time in sufficient quantities to meet the contract requirements, or if obtaining the specified products manufactured, assembled or produced in the

United States would increase the cost of this contract for purchase of the product by more than ten percent.

#### **ARTICLE 1.8 - COMMUNICATIONS**

- A. All notices, requests, instructions, approvals and claims must be in writing and shall be delivered to the Designer and copied to the Construction Representative for the project except as required by Article 1.12 Disputes and Disagreements, or as otherwise specified by the Owner in writing as stated in Section 012600. Any such notice shall be deemed to have been given as of the time of actual receipt.
- B. The Contractor shall attend on-site progress and coordination meetings, as scheduled by the Construction Representative, no less than once a month.
- C. The Contractor shall ensure that major subcontractors and suppliers shall attend monthly progress meetings as necessary to coordinate the work, and as specifically requested by the Construction Representative.

#### **ARTICLE 1.9 - SEPARATE CONTRACTS AND COOPERATION**

- A. The Owner reserves the right to let other contracts in connection with this work. The Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work and shall properly connect and coordinate his work with theirs.
- B. The Contractor shall consult the drawings for all other contractors in connection with this work. Any work conflicting with the above shall be brought to the attention of the Owner's Representative before the work is performed. If the Contractor fails to do this, and constructs any work which interferes with the work of another contractor, the Contractor shall remove any part so conflicting and rebuild same, as directed by the Owner's Representative at no additional cost to the Owner.
- C. Each contractor shall be required to coordinate his work with other contractors so as to afford others reasonable opportunity for execution of their work. No contractor shall delay any other contractor by neglecting to perform contract work at the proper time. If any contractor causes delay to another, they shall be liable directly to that contractor for such delay in addition to any liquidated damages which might be due the Owner.
- D. Should the Contractor or project associated subcontractors refuse to cooperate with the instructions and reasonable requests of other Contractors or other subcontractors in the overall

coordinating of the work, the Owner may take such appropriate action and issue directions, as required, to avoid unnecessary and unwarranted delays.

- E. Each Contractor shall be responsible for damage done to Owner's or other Contractor's property by him/her or workers in his employ through their fault or negligence.
- F. Should a Contractor sustain any damage through any act or omission of any other Contractor having a contract with the Owner, the Contractor so damaged shall have no claim or cause of action against the Owner for such damage, but shall have a claim or cause of action against the other Contractor to recover any and all damages sustained by reason of the acts or omissions of such Contractor. The phrase "acts or omissions" as used in this section shall be defined to include, but not be limited to, any unreasonable delay on the part of any such contractors.

#### **ARTICLE 1.10 - ASSIGNMENT OF CONTRACT**

- A. No assignment by Contractor of any amount or any part of this contract or of the funds to be received there under will be recognized unless such assignment has had the written approval of the Director and the surety has been given due notice of such assignment and has furnished written consent thereto. 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 this contract and to claims or 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 1.11 - INDEMNIFICATION**

- A. Contractor agrees to indemnify and save harmless Owner and its respective commissioners, officers, officials, agents, consultants and employees and Designer, their agents, servants and employees, from and against any and all liability for damage arising from injuries to persons or damage to property occasioned by any acts or omissions of Contractor, any subcontractors, agents, servants or employees, including any and all expense, legal or otherwise, which may be incurred by Owner or Designer, its agents, servants or employees, in defense of any claim, action or suit.
- B. The obligations of the Contractor under this paragraph shall not extend to the liability of the Designer, his agents or employees, arising out of (1) the preparation or approval of maps, drawings, opinions, reports, surveys, contract changes, design or specifications, or (2) giving of or the failure to

give directions or instructions by the Designer, his agents or employees as required by this contract documents provided such giving or failure to give is the primary cause of the injury or damage.

#### **ARTICLE 1.12 - DISPUTES AND DISAGREEMENTS**

- A. It is hereby expressly agreed and understood that in case any controversy or difference of opinion arises during construction, best efforts will be given to resolution at the field level. Should those efforts be unsuccessful, the Contractor has the right to appeal in writing, the decision of the Director's Designee to the Director at Room 730 Truman Building, P.O. Box 809, Jefferson City, Missouri 65102. The decision of the Director shall be final and binding on all parties.

#### **ARTICLE 2 -- OWNER/DESIGNER RESPONSIBILITIES**

- A. The Owner shall give all orders and directions contemplated under this contract relative to the execution of the work. During progress of work the Owner will be represented at the project site by the Construction Representative and/or Designer, whose responsibilities are to see that this contract is properly fulfilled.
- B. The Owner shall at all times have access to the work whenever it is in preparation or progress. The Contractors shall provide proper facilities for such access and for inspection and supervision.
- C. All materials and workmanship used in the work shall be subject to the inspection of the Designer and Construction Representative, and any work which is deemed defective shall be removed, rebuilt or made good immediately upon notice. The cost of such correction shall be borne by the Contractor. Contractor shall not be entitled to an extension of the contract completion date in order to remedy defective work. All rejected materials shall be immediately removed from the site of the work.
- D. If the Contractor fails to proceed at once with the correction of rejected defective materials or workmanship, the Owner may, by separate contract or otherwise, have the defects remedied or rejected. Materials removed from the site and charge the cost of the same against any monies which may be due the Contractor, without prejudice to any other rights or remedies of the Owner.
- E. Failure or neglect on the part of Owner to observe faulty work, or work done which is not in accordance with the drawings and specifications shall not relieve the Contractor from responsibility

for correcting such work without additional compensation.

- F. The Owner shall have the right to direct the Contractor to uncover any completed work.
  - 1. If the Contractor fails to adequately notify the Construction Representative and/or Designer of an inspection as required by the Contract Documents, the Contractor shall, upon written request, uncover the work. The Contractor shall bear all costs associated with uncovering and again covering the work exposed.
  - 2. If the Contractor is directed to uncover work, which was not otherwise required by the Contract Documents to be inspected, and the work is found to be defective in any respect, no compensation shall be allowed for this work. If, however, such work is found to meet the requirements of this contract, the actual cost of labor and material necessarily involved in the examination and replacement plus 10% shall be allowed the Contractor.
- G. The Designer shall give all orders and directions contemplated under this contract relative to the scope of the work and shall give the initial interpretation of the contract documents.
- H. The Owner may file a written notice to the Contractor to dismiss immediately any subcontractors, project managers, superintendents, foremen, workers, watchmen or other employees whom the Owner may deem incompetent, careless or a hindrance to proper or timely execution of the work. The Contractor shall comply with such notice as promptly as practicable without detriment to the work or its progress.
- I. If in the Owner's judgment it becomes necessary at any time to accelerate work, when ordered by the Owner in writing, the Contractor shall redirect resources to such work items and execute such portions of the work as may be required to complete the work within the current approved contract schedule.

### **ARTICLE 3 -- CONTRACTOR RESPONSIBILITIES**

#### **ARTICLE 3.1 -- ACCEPTABLE SUBSTITUTIONS**

- A. The Contractor may request use of any article, device, product, material, fixture, form or type of construction which in the judgment of the Owner and Designer is equal in all respects to that named. 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 and Designer that they are equal in design, strength, durability, usefulness and convenience for the purpose intended.

- B. Any changes required in the details and dimensions indicated on the drawings for the substitution of products other than those specified shall be properly made at the expense of the Contractor requesting the substitution or change.
- C. The Contractor shall submit a request for such substitutions in writing to the Owner and Designer within twenty (20) working days after the date of the "Notice to Proceed." Thereafter no consideration will be given to alternate forms of accomplishing the work. This Article does not preclude the Owner from exercising the provisions of Article 4 hereof.
- D. Any request for substitution by the Contractor shall be submitted in accordance with SECTION 002113 - INSTRUCTIONS TO BIDDERS.
- E. When a material has been approved, no change in brand or make will be permitted unless:
  - 1. Written verification is received from the manufacturer stating they cannot make delivery on the date previously agreed, or
  - 2. Material delivered fails to comply with contract requirements.

#### **ARTICLE 3.2 -- SUBMITTALS**

- A. The Contractor's submittals must be submitted with such promptness as to allow for review and approval so as not to cause delay in the work. The Contractor shall coordinate preparation and processing of submittals with performance of construction activities.

Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

Submit four (4) copies to the Designer and additional copies as required for the subcontractors and material suppliers. Also provide copies to meet the requirements for maintenance manuals.
- B. All subcontractors' shop drawings and schedules shall be submitted by the Contractor and shall bear evidence that Contractor has received, reviewed, and approved them. Any shop drawings and schedules submitted without this evidence will be returned to the Contractor for resubmission.
- C. The Contractor shall include with the shop drawing, a letter indicating any and all deviations from the drawings and/or specifications. Failure to notify the Designer of such deviations will be grounds for subsequent rejection of the related work or materials. If, in the opinion of the Designer, the deviations are not acceptable, the Contractor will be required to furnish the item as specified and indicated on the drawings.

- D. The Designer shall check shop drawings and schedules with reasonable promptness and approve them only if they conform to the design concept of the project and comply with the information given in the contract documents. The approval shall not relieve the Contractor from the responsibility to comply with the drawings and specifications, unless the Contractor has called the Designer's attention to the deviation, in writing, at the time of submission and the Designer has knowingly approved thereof. An approval of any such modification will be given only under the following conditions:
1. It is in the best interest of the Owner
  2. It does not increase the contract sum and/or completion time
  3. It does not deviate from the design intent
  4. It is without prejudice to any and all rights under the surety bond.
- E. No extension of time will be granted because of the Contractor's failure to submit shop drawings and schedules in ample time to allow for review, possible resubmission, and approval. Fabrication of work shall not commence until the Contractor has received approval. The Contractor shall furnish prints of approved shop drawings and schedules to all subcontractors whose work is in any way related to the work under this contract. Only prints bearing this approval will be allowed on the site of construction
- F. The Contractor shall maintain a complete file on-site of approved shop drawings available for use by the Construction Representative.

**ARTICLE 3.3 – AS-BUILT DRAWINGS**

- A. The Contractor shall update a complete set of the construction drawings, shop drawings and schedules of all work monthly by marking changes, and at the completion of their work (prior to submission of request for final payment) note all changes and turn the set over to the Construction Representative. The updates shall show all addenda, all field changes that were made to adapt to field conditions, changes resulting from contract changes or supplemental instructions, and all locations of structures, buried installations of piping, conduit, and utility services. All buried and concealed items both inside and outside shall be accurately located as to depth and referenced to permanent features such as interior or exterior wall faces and dimensions shall be given in a neat and legible manner in a contrasting colored pencil or ink. If approved by the Designer, an electronic file format may be provided.

**ARTICLE 3.4 – GUARANTY AND WARRANTIES**

A. General Guaranty

1. Neither the final certificate of payment nor any provision in the contract documents nor partial use or occupancy of the premises by the Owner shall constitute an acceptance of work not done in accordance with contract requirements.
2. The Contractor or surety shall remedy any defects in the work and pay for any damage to property resulting there from which shall appear within a period of one (1) year from the date of substantial completion unless a longer period is otherwise specified or a differing guaranty period has been established in the substantial completion certificate. The Owner will give notice of observed defects with reasonable promptness.
3. In case of default on the part of the Contractor in fulfilling this part of this contract, the Owner may correct the work or repair the damage and the cost and expense incurred in such event shall be paid by or recoverable from the Contractor or surety.
4. The work will be free from defects not inherent in the quality required or permitted, and that the Work will conform to the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. The Contractor's guaranty excludes remedy for damage or defect caused by abuse, modifications not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear under normal usage. If required by the Owner, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment

B. Extended Warranty

Manufacturer's certificates of warranty shall be obtained for all major equipment. Warranty shall be obtained for at least one year. Where a longer period is offered at no additional cost or called for in the specific equipment specifications, the longer period shall govern.

**ARTICLE 3.5 -- OPERATION AND MAINTENANCE MANUALS**

- A. Immediately after equipment submittals are approved and no later than ten (10) working days prior to the substantial completion inspection, the Contractor shall provide to the Designer three (3)

copies of operating instructions and service manuals, containing the following:

1. Start-up and Shut-down 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 be prepared to include model number, capacities, flow rate, name plate data, shop drawings and air and water balance reports.
  4. Service Instructions: Provide the following information for all pieces of equipment.
    - a. Recommended spare parts including catalog number and name of local supplier or factory representative.
    - b. Belt sizes, types, and lengths.
    - c. Wiring diagrams.
  5. Manufacturer's Certificate of Warranty as described in Article 3.4.
  6. Prior to the final payment, furnish to the Designer three (4) copies of parts catalogs for each piece of equipment furnished by him/her on the project with the components identified by number for replacement ordering.
- B. Submission of operating instructions shall be done in the following manner.
1. Manuals shall be in quadruplicate, and all materials shall be bound into volumes of standard 8½" x 11" hard binders. Large drawings too bulky to be folded into 8½" x 11" shall be separately bound or folded and in envelopes, cross referenced and indexed with the manuals.
  2. The manuals shall identify project name, project number, and include the name and address of the Contractor, subcontractors and manufacturers who were involved with the activity described in that particular manual.
  3. Internally subdivide the binder contents with permanent page dividers, logically organized with tab titles clearly printed under reinforced laminated plastic tabs.
  4. Contents: Prepare a Table of Contents for each volume, with each product or system description identified.

### **ARTICLE 3.6 – OTHER CONTRACTOR RESPONSIBILITIES**

- A. The Contractor shall keep on site, during progress of the work, a competent superintendent satisfactory to the Construction Representative. The superintendent shall represent the Contractor and all agreements made by the superintendent shall be binding. The superintendent shall carefully study and compare all drawings, specifications and other instructions and shall promptly notify the Construction Representative and Designer, in writing, any error, inconsistency or omission which may be discovered. The superintendent shall coordinate all work on the project. Any change of the superintendent shall be approved by the Construction Representative.
- B. Contractor shall, at all times, enforce strict discipline and good order among his employees, and shall not employ on the work any unfit person or anyone not skilled in the work assigned to him/her.
- C. The Contractor shall supply sufficient labor, material, plant and equipment and pay when due any laborer, subcontractor or supplier for supplies furnished and otherwise prosecute the work with diligence to prevent work stoppage and insure completion thereof within the time specified.
- D. The Contractor and each of his subcontractors shall submit to the Construction Representative, through the Designer such schedules of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data as the Owner may request concerning work performed or to be performed under this contract.
- E. The Contractor, subcontractors, and material suppliers shall upon written request, give the Owner access to all time cards, material invoices, payrolls, estimates, profit and loss statements, and all other direct or indirect costs related to this work.
- F. The Contractor shall be responsible for laying out all contract work such as layout of architectural, structural, mechanical and electrical work, which shall be coordinated with layouts of subcontractors for general construction work. The Contractor is also responsible for unloading, uncrating and handling of all materials and equipment to be erected or placed by him/her, whether furnished by Contractor or others. No extra charges or compensation will be allowed as a result of failure to verify dimensions before ordering materials or fabricating items.
- G. The Contractor must notify the Construction Representative at least one working day before

placing concrete or burying underground utilities, pipelines, etc.

- H. Contractors shall prearrange time with the Construction Representative for the interruption of any facility operation. Unless otherwise specified in these documents, all connections, alterations or relocations as well as all other portions of the work will be performed during normal working hours.
- I. The Contractor shall coordinate all work so there will not be prolonged interruptions of existing equipment operation. Any existing plumbing, heating, ventilating, air conditioning or electrical disconnections necessary for the project, which affect portions of this construction or building or any other building must be scheduled with the Construction Representative to minimize or avoid any disruption of facility operations. In no case, unless previously approved in writing by the Construction Representative, 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 responsible for the interruption from the responsibility to repair and restore the utility to normal service. Repairs and restoration shall be made before the workers responsible for the repair and restoration leave the job.
- J. Contractors shall limit operations and storage of materials to the area within the project, except as necessary to connect to existing utilities, and shall not encroach on neighboring property. The Contractor shall be responsible for repair of their damage to property on or off the project site occurring during construction of project. All such repairs shall be made to the satisfaction of the property owner.
- K. Unless otherwise permitted, all materials shall be new and both workmanship and materials shall be of the best quality.
- L. Unless otherwise provided and stipulated within these specifications, the Contractor shall furnish, construct, and/or install and pay for materials, devices, mechanisms, equipment, all necessary personnel, utilities including, but not limited to water, heat, light and electric power, transportation services, applicable taxes of every nature, and all other facilities necessary for the proper execution and completion of the work.
- M. Contractor shall carefully examine the plans and drawings and shall be responsible for the proper fitting of his material, equipment and apparatus into the building.
- N. The Contractor or subcontractors shall not overload, or permit others to overload, any part of

any structure during the performance of this contract.

- O. All temporary shoring, bracing, etc., required for the removal of existing work and/or for the installation of new work shall be included in this contract. The Contractor shall make good, at no cost to the Owner, any damage caused by improper support or failure of shoring in any respect. Each Contractor shall be responsible for shoring required to protect his work or adjacent property and improvements of Owner and shall be responsible for shoring or for giving written notice to adjacent property owners. Shoring shall be removed only after completion of permanent supports.
- P. The Contractor shall provide at the proper time such material as is required for support of the work. If openings are required, whether shown on drawings or not, the Contractor shall see that they are properly constructed.
- Q. During the performance of 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 will give proper and understandable warning to all persons of danger of entry onto land, structure or equipment.
- R. The Contractor shall be responsible for protection, including weather protection, and proper maintenance of all equipment and materials.
- S. The Contractor shall be responsible for care of the finished work and shall protect same from damage or defacement until substantial completion by the Owner. If the work is damaged by any cause, the Contractor shall immediately begin to make repairs in accordance with the drawings and specifications. Contractor shall be liable for all damage or loss unless attributable to the acts or omissions of the Owner or Designer. Any claim for reimbursement shall be submitted in accordance with Article 4. After substantial completion the Contractor will only be responsible for damage resulting from acts or omissions of the Contractor or subcontractors through final warranty.
- T. In the event the Contractor encounters an unforeseen hazardous material, the Contractor shall immediately stop work in the area affected and report the condition to the Owner and Designer in writing. The Contractor shall not be required, pursuant to Article 4, to perform, any work relating to hazardous materials.
- U. In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation

or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 4.

- V. Before commencing work, Contractors shall confer with the Construction Representative and facility representative and review any facility rules and regulations which may affect the conduct of the work.
- W. Project signs will only be erected on major projects and only as described in the specifications. If no sign is specified, none shall be erected.

### **ARTICLE 3.7 -- SUBCONTRACTS**

- A. Subcontractor assignments as identified in the bid form shall not be changed without written approval of the Owner. The Owner will not approve changes of a listed subcontractor unless the Contractor documents, to the satisfaction of the Owner that the subcontractor cannot or will not perform the work as specified.
- B. The Contractor is fully responsible to the Owner for the acts and omissions of all subcontractors and of persons either directly or indirectly employed by them.
- C. Every subcontractor shall be bound by the applicable terms and provisions of these contract documents, but no contractual relationship shall exist between any subcontractor and the Owner unless the right of the Contractor to proceed with the work is suspended or this contract is terminated as herein provided, and the Owner in writing elects to assume the subcontract.
- D. The Contractor shall upon receipt of "Notice to Proceed" and prior to submission of the first payment request, notify the Designer and Construction Representative in writing of the names of any subcontractors to be used in addition to those identified in the bid form and all major material suppliers proposed for all parts of the work.

### **ARTICLE 4 -- CHANGES IN THE WORK**

#### **4.1 CHANGES IN THE WORK**

- A. The Construction Representative, without giving notice to the surety and without invalidating this contract, may order extra work or make changes by altering, adding to or deducting from the work, this contract sum being adjusted accordingly. All such work shall be executed under the conditions of the original contract. A claim for extension of time caused by any change must be adjusted at the time of ordering such change. No future request for time will be considered.
- B. Each Contract Change shall include all costs required to perform the work including all labor,

material, equipment, overheads and profit, delay, disruptions, or other miscellaneous expenses. No subsequent requests for additional compensation including claims for delay, disruption, or reduced efficiency as a result of each change will be considered. Values from the Schedule of Values will not be binding as a basis for additions to or deductions from the contract price.

- C. The amount of any adjustment in this contract price for authorized changes shall be agreed upon before such changes become effective and shall be determined, through submission of a request for proposal, as follows:

1. By an acceptable fixed price proposal from the Contractor. Breakdowns shall include all takeoff sheets of each Contractor and subcontractor. Breakdown shall include a listing of each item of material with unit prices and number of hours of labor for each task. Labor costs per hour shall be included with labor burden identified, which shall be not less than the prevailing wage rate, etc. Overhead and profit shall be shown separately for each subcontractor and the Contractor.
2. By a cost-plus-fixed-fee (time and material) basis with maximum price, total cost not to exceed said maximum. Breakdown shall include a listing of each item of material with unit prices and number of hours of labor for each task. Labor costs per hour shall be included with labor burden identified, which shall be not less than the prevailing wage rate, etc. Overhead and profit shall be shown separately for each subcontractor and the Contractor.
3. By unit prices contained in Contractor's original bid form and incorporated in the construction contract.

- D. Overhead and Profit on Contract Changes shall be applied as follows:

1. The overhead and profit charge by the Contractor and all subcontractors shall be considered to include, but is not limited to: incidental job burdens, small truck (under 1 ton) expense, mileage, small hand tools, warranty costs, company benefits and general office overhead. Project supervision including field supervision and job site office expense shall be considered a part of overhead and profit unless a compensable time extension is granted.
2. The percentages for overhead and profit charged on Contract Changes shall be negotiated, and may vary according to the nature, extent, and complexity of the work

involved. However, the overhead and profit for the Contractor or subcontractor actually performing the work shall not exceed 14%. When one or more tiers of subcontractors are used, in no event shall any Contractor or subcontractor receive as overhead and profit more than 3% of the cost of the work performed by any of his subcontractors. In no case shall the total overhead and profit paid by the Owner on any Contract Changes exceed twenty percent (20%) of the cost of materials, labor and equipment (exclusive of Contractor or any Subcontractor overhead and profit) necessary to put the contract change work in place.

3. The Contractor will be allowed to add the cost of bonding and insurance to their cost of work. This bonding and insurance cost shall not exceed 2% and shall be allowed on the total cost of the added work, including overhead and profit.
  4. On proposals covering both increases and decreases in the amount of this contract, the application of overhead and profit shall be on the net change in the cost of the work.
  5. The percentage for overhead and profit to be credited to the Owner on Contract Changes that are solely 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 in no case shall be less than ten percent (10%). If the percentage for overhead and profit charged for work added by Contract Changes for this contract has been negotiated to less than 10%, the negotiated rate shall then apply to credits as well.
- E. No claim for an addition to this contract sum shall be valid unless authorized as aforesaid in writing by the Owner. In the event that none of the foregoing methods are agreed upon, the Owner may order the Contractor to perform work on a time and material basis. The cost of such work shall be determined by the Contractor's actual labor and material cost to perform the work plus overhead and profit as outlined herein. The Designer and Construction Representative shall approve the Contractor's daily time and material invoices for the work involved.
- F. If the Contractor claims that any instructions involve extra cost under this contract, the Contractor shall give the Owner's Representative written notice thereof within a reasonable time after the receipt of such instructions, and in any event before proceeding to execute the work. No

such claim shall be valid unless so made and authorized by the Owner, in writing.

- G. In an emergency affecting the safety of life or of the structure or of adjoining property, the Contractor, without special instruction or authorization from the Construction Representative, is hereby permitted to act at their discretion to prevent such threatened loss or injury. The Contractor shall submit a claim for compensation for such emergency work in writing to the Owner's Representative.

#### **ARTICLE 4.2 – CHANGES IN COMPLETION TIME**

- A. Extension of the number of work days stipulated in the Contract for completion of the work with compensation may be made when:
1. The contractor documents that proposed Changes in the work, as provided in Article 4.1, extends construction activities critical to contract completion date, OR
  2. The Owner suspends all work for convenience of the Owner as provided in Article 7.3, OR
  3. An Owner caused delay extends construction activities critical to contract completion (except as provided elsewhere in these General Conditions). The Contractor is to review the work activities yet to begin and evaluate the possibility of rescheduling the work to minimize the overall project delay.
- B. Extension of the number of work days stipulated in the Contract for completion of the work without compensation may be made when:
1. Weather-related delays occur, subject to provisions for the inclusion of a specified number of "bad weather" days when provided for in Section 012100-Allowances, OR
  2. Labor strikes or acts of God occur, OR
  3. The work of the Contractor is delayed on account of conditions which were beyond the control of the Contractor, subcontractors or suppliers, and were not the result of their fault or negligence.
- C. No time extension or compensation will be provided for delays caused by or within the control of the Contractor, subcontractors or suppliers and for concurrent delays caused by the Owner.
- D. The Contractor shall notify the Owner promptly of any occurrence or conditions which in the Contractor's opinion results in a need for an extension of time. The notice shall be in writing and shall include all necessary supporting materials with details of any resultant costs and be submitted in time to permit full investigation and

evaluation of the Contractor's claim. The Owner shall promptly acknowledge the Contractor's notice and, after recommendation from the Owner's Representative and/or Designer, shall provide a decision to the Contractor. Failure on the part of the Contractor to provide such notice and to detail the costs shall constitute a waiver by the Contractor of any claim. Requests for extensions of time shall be for working days only.

## **ARTICLE 5 - CONSTRUCTION AND COMPLETION**

### **ARTICLE 5.1 – CONSTRUCTION COMMENCEMENT**

- A. Upon receipt of the "Intent to Award" letter, the Contractor must submit the following properly executed instruments to the Owner:
  1. Contract;
  2. Performance/payment bond as described in Article 6.1;
  3. Certificates of Insurance, or the actual policies themselves, showing that the Contractor has obtained the insurance coverage required by Article 6.2.
  4. Written Affirmative Action Plans as required in Article 1.4.

Above referenced items must be received by the Owner within ten (10) working days after the effective date of the contract. If not received, the Owner may treat the failure to timely submit them as a refusal by the Contractor to accept a contract for this work and may retain as liquidated damages the Contractor's bid bond, cashier's check or certified check as provided in the Instructions to Bidders. Upon receipt the Owner will issue a "Notice to Proceed" with the work to the Contractor.

- B. Within the time frame noted in Section 013200 - Schedules, following receipt of the "Notice to Proceed", the Contractor shall submit to the Owner a progress schedule and schedule of values, showing activities through the end of the contract period. Should the Contractor not receive written notification from the Owner of the disapproval of the schedule of values within fifteen (15) working days, the Contractor may consider it approved for purpose of determining when the first monthly Application and Certification for Payment may be submitted.
- C. The Contractor may commence work upon receipt of the Division of Facilities Management, Design and Construction's "Notice to Proceed" letter. Contractor shall prosecute the work with faithfulness and energy, and shall complete the

entire work on or before the completion time stated in the contract documents or pay to the Owner the damages resulting from the failure to timely complete the work as set out within Article 5.4.

### **ARTICLE 5.2 -- PROJECT CONSTRUCTION**

- A. Each Contractor shall submit for the Owner's approval, in reproducible form, a progress schedule showing the rate of progress and the order of the work proposed to carry on various phases of the project. The schedule shall be in conformance with the requirements outlined in Section 013200 – Schedules.
- B. Contractor shall employ and supply a sufficient force of workers, material, and equipment and shall pay when due, any worker, subcontractor or supplier and otherwise prosecute the work with such diligence so as to maintain the rate of progress indicated on the progress schedule, prevent work stoppage, and insure completion of the project within the time specified.

### **ARTICLE 5.3 -- PROJECT COMPLETION**

- A. Substantial Completion. A Project is substantially complete when construction is essentially complete and work items remaining to be completed can be done without interfering with the Owner's ability to use the Project for its intended purpose.
  1. Once the Contractor has reached what they believe is Substantial Completion, the Contractor shall notify the Designer and the Construction Representative of the following:
    - a. That work is essentially complete with the exception of certain listed work items. The list shall be referred to as the "Contractor's Punch."
    - b. That all Operation and Maintenance Manuals have been assembled and submitted in accordance with Article 3.5A.
    - c. That the Work is ready for inspection by the Designer and Construction Representative. The Owner shall be entitled to a minimum of ten working days notice before the inspection shall be performed.
  2. If the work is acceptable, the Owner shall issue a Certificate of Substantial Completion, which shall set forth the responsibilities of the Owner and the Contractor for utilities, security, maintenance, damage to the work and risk of loss. The Certificate shall also identify those remaining items of work to be

performed by the Contractor. All such work items shall be complete within 30 working days of the date of the Certificate, unless the Certificate specifies a different time. If the Contractor shall be required to perform tests that must be delayed due to climatic conditions, it is understood that such tests and affected equipment will be identified on the Certificate and shall be accomplished by the Contractor at the earliest possible date.

Performance of the tests may not be required before Substantial Completion can be issued. The date of the issuance of the Certificate of Substantial Completion shall determine whether or not the work was completed within the contract time and whether or not Liquidated Damages are due.

3. If the work is not acceptable, and the Owner does not issue a Certificate of Substantial Completion, the Owner shall be entitled to charge the Contractor with the Designer's and Owner's costs of re-inspection, including time and travel.
- B. Partial Occupancy. Contractor agrees that the Owner shall be permitted to occupy and use any completed or partially completed portions of the Project, when such occupancy and use is in the Owner's best interest. Owner shall notify Contractor of its desire and intention to take Partial Occupancy as soon as possible but at least ten (10) working days before the Owner intends to occupy. If the Contractor believes that the portion of the work the Owner intends to occupy is not ready for occupancy, the Contractor shall notify the Owner immediately. The Designer shall inspect the work in accordance with the procedures above. If the Contractor claims increased cost of the project or delay in completion as a result of the occupancy, he shall notify the Owner immediately but in all cases before occupancy occurs.
- C. Final Completion. The Project is finally complete when the Certificate of Substantial Completion has been issued and all work items identified therein as incomplete have been completed, and when all administrative items required by the contract have been completed. Final Completion entitles the Contractor to payment of the outstanding balance of the contract amount including all change orders and retainage. Within five (5) working days of the date of the Certificate of Substantial Completion, the Contractor shall identify the cost to complete any outstanding items of work. The Designer shall review the Contractor's estimate and either approve it or provide an independent estimate for all such items. If the Contractor fails to complete the remaining items within the time specified in the Certificate, the Owner may terminate the

contract and go to the surety for project completion in accordance with Article 7.2 or release the contract balance to the Contractor less 150% of the approved estimate to complete the outstanding items. Upon completion of the outstanding items, when a final cost has been established, any monies remaining shall be paid to the Contractor. Failure to complete items of work does not relieve the Contractor from the obligation to complete the administrative requirements of the contract, such as the provisions of Article 5.3 FAILURE TO COMPLETE ALL ITEMS OF WORK UNDER THE CONTRACT SHALL BE CONSIDERED A DEFAULT AND BE GROUNDS FOR CONTRACT TERMINATION AND DEBARMENT.

- D. Liquidated Damages. Contractor agrees that the Owner may deduct from the contract price and retain as liquidated damages, and not as penalty or forfeiture, the sum stipulated in this contract for each work day after the Contract Completion Day on which work is not Substantially Complete. Assessment of Liquidated Damages shall not relieve the Contractor or the surety of any responsibility or obligation under the Contract. In addition, the Owner may, without prejudice to any other rights, claims, or remedies the Owner may have including the right to Liquidated Damages, charge the Contractor for all additional expenses incurred by the Owner and/or Designer as the result of the extended contract period through Final Completion. Additional Expenses shall include but not be limited to the costs of additional inspections.
- E. Early Completion. The Contractor has the right to finish the work before the contract completion date; however, the Owner assumes no liability for any hindrances to the Contractor unless Owner caused delays result in a time extension to the contract completion date. The Contractor shall not be entitled to any claims for lost efficiencies or for delay if a Certificate of Substantial Completion is given on or before the Contract Completion Date.

#### **ARTICLE 5.4 -- PAYMENT TO CONTRACTOR**

- A. Payments on account of this contract will be made monthly in proportion to the work which has been completed. Request for payment must be submitted on the Owner's forms. No other pay request will be processed. Supporting breakdowns must be in the same format as Owner's forms and must provide the same level of detail. The Designer will, within 5 working days from receipt of the contractor's request for payment either issue a Certificate for Payment to the Owner, for such amount as the Designer determines is properly due, or notify the Contractor in writing of reasons for withholding a Certificate. The Owner shall make

payment within 30 calendar days after the "Application and Certification for Payment" has been received and certified by the Designer. The following items are to be attached to the contractor's pay request:

1. Updated construction schedule
  2. Certified payrolls consisting of name, occupation and craft, number of hours worked and actual wages paid for each individual employee, of the Contractor and all subcontractors working on the project
- B. The Owner shall retain 5 percent of the amount of each such payment application, except as allowed by Article 5.4, until final completion and acceptance of all work covered by this contract.
- C. Each payment made to Contractor shall be on account of the total amount payable to Contractor and all material and work covered by paid partial payment shall thereupon become the sole property of Owner. This provision shall not be construed as relieving Contractor from sole responsibility for care and protection of materials and work upon which payments have been made or restoration of any damaged work or as a waiver of the right of Owner to require fulfillment of all terms of this contract.
- D. Materials delivered to the work site and not incorporated in the work will be allowed in the Application and Certification for Payment on the basis of one hundred (100%) percent of value, subject to the 5% retainage providing that they are suitably stored on the site or in an approved warehouse in accordance with the following requirements:
1. Material has previously been approved through submittal and acceptance of shop drawings conforming to requirements of Article 3.2 of General Conditions.
  2. Delivery is made in accordance with the time frame on the approved schedule.
  3. Materials, equipment, etc., are properly stored and protected from damage and deterioration and remain so - if not, previously approved amounts will be deleted from subsequent pay applications.
  4. The payment request is accompanied by a breakdown identifying the material equipment, etc. in sufficient detail to establish quantity and value.
- E. The Contractor shall be allowed to include in the Application and Certification for Payment, one hundred (100%) of the value, subject to retainage, of major equipment and material stored off the site if all of the following conditions are met:

1. The request for consideration of payment for materials stored off site is made at least 15 working days prior to submittal of the Application for Payment including such material. Only materials inspected will be considered for inclusion on Application for Payment requests.
  2. Materials stored in one location off site are valued in excess of \$25,000.
  3. That a Certificate of Insurance is provided indicating adequate protection from loss, theft conversion or damage for materials stored off site. This Certificate shall show the State of Missouri as an additional insured for this loss.
  4. The materials are stored in a facility approved and inspected, by the Construction Representative.
  5. Contractor shall be responsible for, Owner costs to inspect out of state facilities, and any delays in the completion of the work caused by damage to the material or for any other failure of the Contractor to have access to this material for the execution of the work.
- F. The Owner shall determine the amount, quality and acceptability of the work and materials which are to be paid for under this contract. In the event any questions shall arise between the parties, relative to this contract or specifications, determination or decision of the Owner or the Construction Representative and the Designer shall be a condition precedent to the right of the Contractor to receive any money or payment for work under this contract affected in any manner or to any extent by such question.
- G. Payments Withheld: The Owner may withhold or nullify in whole or part any certificate to such extent as may be necessary to protect the Owner from loss on account of:
1. Defective work not remedied. When a notice of noncompliance is issued on an item or items, corrective action shall be undertaken immediately. Until corrective action is completed, no monies will be paid and no additional time will be allowed for the item or items. The cost of corrective action(s) shall be borne by the Contractor.
  2. A reasonable doubt that this contract can be completed for the unpaid balance.
  3. Failure of the Contractor to update as-built drawings monthly for review by the Construction Representative.
  4. Failure of the Contractor to update the construction schedule.

When the Construction Representative is satisfied the Contractor has remedied above deficiencies, payment shall be released.

- H. Final Payment: Upon receipt of written notice from the Contractor to the Designer and Project Representative that the work is ready for final inspection and acceptance, the Designer and Project Representative, with the Contractor, shall promptly make such inspection. If the work is acceptable and the contract fully performed, the Construction Representative shall complete a final acceptance report and the Contractor will be directed to submit a final Application and Certification for Payment. If the Owner approves the same, the entire balance shall be due and payable, with the exception of deductions as provided for under Article 5.4.
1. Where the specifications provide for the performance by the Contractor of (certain tests for the purpose of balancing and checking the air conditioning and heating equipment and the Contractor shall have furnished and installed all such equipment in accordance with the specifications, but said test cannot then be made because of climatic conditions, such test shall may be considered as required under the provisions of the specifications, Section 013300 and this contract may be substantial Full payment will not be made until the tests have been made and the equipment and system is finally accepted. If the tests are not completed when scheduled, the Owner may deduct 150% of the value of the tests from the final payment.
  2. The final payment shall not become due until the Contractor delivers to the Construction Representative:
    - a) A complete file of releases, on the standard form included in the contract documents as "Final Receipt of Payment and Release Form", from subcontractors and material suppliers evidencing payment in full for services, equipment and materials, as the case may require, if the Owner approves, or a consent from the Surety to final payment accepting liability for any unpaid amounts.
    - b) An Affidavit of Compliance with Prevailing Wage Law, in the form as included in this contract specifications, properly executed by each subcontractor, and the Contractor
    - c) Certified copies of all payrolls
    - d) As-built drawings

3. If any claim remains unsatisfied after all payments are made, the Contractor shall refund to the Owner all monies that the latter may be compelled to pay in discharging such a claim including all costs and a reasonable attorney's fee.
4. Missouri statute requires prompt payment from the Owner to the Contractor within thirty calendar days and from the Contractor to his subcontractors within fifteen calendar days. Failure to make payments within the required time frame entitles the receiving party to charge interest at the rate of one and one half percent per month calculated from the expiration of the statutory time period until paid.
5. The value of all unused unit price allowances and/or 150% of the value of the outstanding work items, and/or liquidated damages may be deducted from the final pay request without executing a Contract Change. Any unit price items which exceed the number of units in the contract may be added by Contract Change.

## **ARTICLE 6 -- INSURANCE AND BONDS**

### **ARTICLE 6.1 -- BOND**

- A. Contractor shall furnish a performance/payment bond in an amount equal to 100% of the contract price to guarantee faithful performance of the contract and 100% of the contract price to guarantee the payment of all persons performing labor on the project and furnishing materials in connection therewith under this contract as set forth in the standard form of performance and payment bond included in the contract documents. The surety on such bond shall be issued by a surety company authorized by the Missouri Department of Insurance to do business in the state of Missouri.
- B. All Performance/Payment Bonds furnished in response to this provision shall be provided by a bonding company with a rating of B+ or higher as established by A.M. Best Company, Inc. in their most recent publication.

### **ARTICLE 6.2 – INSURANCE**

- A. The successful Contractor shall procure and maintain for the duration of the contract issued a policy or policies of insurance for the protection of both the Contractor and the Owner and their respective officers, officials, agents, consultants and employees. The Owner requires certification of insurance coverage from the Contractor prior to commencing work.
- B. Minimum Scope and Extent of Coverage

1. General Liability

Commercial General Liability, ISO coverage form number or equivalent CG 00 01 ("occurrence" basis), or I-SO coverage form number CG 00 02, or ISO equivalent.

If ISO equivalent or manuscript general liability coverage forms are used, minimum coverage will be as follows: Premises/Operations;Independent Contractors; Products/Completed Operations; personal Injury; Broad Form Property Damage including Completed Operations; Broad Form Contractual Liability Coverage to include Contractor's obligations under Article 1.11 Indemnification and any other Special Hazards required by the work of the contract.

2. Automobile Liability

Business Automobile Liability Insurance, ISO Coverage form number or equivalent CA 00 01 covering automobile liability, code 1 "ANY AUTO".

3. Workers' Compensation and Employer's Liability

Statutory Workers' Compensation Insurance for Missouri and standard Employer's Liability Insurance, or the authorization to self-insure for such liability from the Missouri Division of Workers' Compensation.

4. Builder's Risk or Installation Floater Insurance

Insurance upon the work and all materials, equipment, supplies, temporary structures and similar items which may be incident to the performance of the work and located at or adjacent to the site, against loss or damage from fire and such other casualties as are included in extended coverage in broad "All Risk" form, including coverage for Flood and Earthquake, in an amount not less than the replacement cost of the work or this contract price, whichever is greater, with loss payable to Contractor and Owner as their respective interests may appear.

Contractor shall maintain sufficient insurance to cover the full value of the work and materials as the work progresses, and shall furnish Owner copies of all endorsements. If Builder's Risk Reporting- Form of Endorsement is used, Contractor shall make all reports as required therein so as to keep in force an amount of insurance which will equal the replacement cost of the work, materials, equipment, supplies, temporary structures, and other property covered thereby; and if, as a result of Contractor's failure to make any such

report, the amount of insurance so recoverable shall be less than such replacement cost, Contractor's interest in the proceeds of such insurance, if any, shall be subordinated to Owner's interest to the end that Owner may receive full reimbursement for its loss.

C. Minimum Limits of Insurance

1. General Liability

Contractor

\$2,000,000 combined single limit per occurrence for bodily injury, personal injury, and property damage

\$2,000,000 annual aggregate

2. Automobile Liability

\$2,000,000 combined single limit per occurrence for bodily injury and property damage

3. Workers' Compensation and Employers Liability

Workers' Compensation limits as required by applicable State Statutes (generally unlimited) and minimum of \$1,000,000 limit per accident for Employer's Liability.

General Liability and Automobile Liability insurance may be arranged under individual policies for the full limits required or by a combination of underlying policies with the balance provided by a form-following Excess or Umbrella Liability policy.

D. Deductibles and Self-Insured Retentions

All deductibles, co-payment clauses, and self-insured retentions must be declared to and approved by the Owner. The Owner reserves the right to request the reduction or elimination of unacceptable deductibles or self-insured retentions, as they would apply to the Owner, and their respective officers, officials, agents, consultants and employees. Alternatively, the Owner may request Contractor to procure a bond guaranteeing payment of losses and related investigations, claims administration, and defense expenses.

E. Other Insurance Provisions and Requirements

The respective insurance policies and coverage, as specified below, must contain, or be endorsed to contain the following conditions or provisions:

1. General Liability

The Owner, and its respective commissioners, officers, officials, agents, consultants and employees shall be endorsed as additional insured's by ISO form CG 20 26 Additional

Insured - Designated Person or Organization. As additional insured's, they shall be covered as to work performed by or on behalf of the Contractor or as to liability which arises out of Contractor's activities or resulting from the performance of services or the delivery of goods called for by the Contract.

Contractor's insurance coverage shall be primary with respect to all additional insured's. Insurance of self-insurance programs maintained by the designated additional -insured's shall be excess of the Contractor's insurance and shall not contribute with it.

Additionally, the Contractor and Contractor's general liability insurer shall agree to waive all rights of subrogation against the Owner and any of their respective officers, officials, agents, consultants or employees for claims, losses, or expenses which arise out of Contractor's activities or result from the performance of services or the delivery of goods called for by the Contract.

Contractor's failure to comply with the terms and conditions of these insurance policies shall not affect or abridge coverage for the Owner, or for any of their officers, officials, agents, consultants or employees.

## 2. Automobile Insurance

The Owner, and their respective officers, officials, agents, consultants and employees shall be endorsed as additional insured's by ISO form CG 20 26 - Additional Insured Designated Person or Organization. As additional insured's, they shall be covered as to work performed by or on behalf of the Contractor or as to liability which arises out of Contractor's activities or resulting from the performance of services or the delivery of goods called for by the Contract.

Contractor's insurance coverage shall be primary with respect to all additional insured's. Insurance or self-insurance programs maintained by the designated additional insured's shall be in excess of the Contractor's insurance and shall not contribute with it.

Additionally, the Contractor and Contractor's automobile insurer shall agree to waive all rights of subrogation against the Owner and any of their respective officers, officials, agents, consultants or employees for claims, losses, or expenses which arise out of Contractor's activities or result from the

performance of services or the delivery of goods called for by the Contract.

Contractor's failure to comply with the terms and conditions of these insurance policies shall not affect or abridge coverage for the Owner or for any of its officers, officials, agents, consultants or employees.

## 3. Workers' Compensation/Employer's Liability

Contractor's workers' compensation insurance shall be endorsed with NCCI form WC 00 03 01 A - Alternative Employer Endorsement. The Alternative Employer Endorsement shall designate the Owner as "alternate employers."

## 4. All Coverages

Each insurance policy required by this section of the Contract shall contain a stipulation, endorsed if necessary, that the Owner will receive a minimum of a thirty (30) calendar day advance notice of any policy cancellation. Ten (10) calendar days advance notice is required for policy cancellation due to non-payment of premium.

## F. Insurer Qualifications and Acceptability

Insurance required hereunder shall be issued by an A.M. Best, "B+" rated, Class IX insurance company approved to conduct insurance business in the state of Missouri.

## G. Verification of Insurance Coverage

Prior to Owner issuing a Notice to Proceed, the Contractor shall furnish the Owner with Certificate(s) of Insurance and with any applicable original endorsements evidencing the required insurance coverage. The insurance certificates and endorsements are to be signed by a person authorized by that insurer to bind coverage on its behalf. All certificates and endorsements received by the Owner are subject to review and approval by the Owner. The Owner reserves the right to require certified copies of all required policies at any time. If the scope of this contract will exceed one (1) year - or, if any of Contractor's applicable insurance coverage expires prior to completion of the work or services required under this contract - the Contractor will provide a renewal or replacement certificate before continuing work or services hereunder. If the Contractor fails to provide documentation of required insurance coverage, the Owner may issue a stop work order and no additional contract completion time and/or compensation shall be granted as a result thereof.

## **ARTICLE 7 – SUSPENSION OR TERMINATION OF CONTRACT**

### **ARTICLE 7.1 - FOR SITE CONDITIONS**

- A. When conditions at the site of the proposed work are considered by the Owner to be unsatisfactory for prosecution of the work, the Contractor may be ordered in writing to suspend the work or any part thereof until reasonable conditions exist. When such suspension is not due to fault or negligence of the Contractor, time allowed for completion of such suspended work will be extended by a period of time equal to that lost due to delay occasioned by ordered suspension. This will be a no cost time extension.

### **ARTICLE 7.2 - FOR CAUSE**

- A. Termination or Suspension for Cause:
1. If the Contractor shall file for bankruptcy, or should make a general assignment for the benefit of the creditors, or if a receiver should be appointed on account of insolvency, or if the contractor should persistently or repeatedly refuse or fail to supply enough properly skilled workers or proper materials, or if the contractor should fail to make prompt payment to subcontractors or for material or labor, or persistently disregard laws, ordinances or the instructions of the Owner, or otherwise be guilty of a substantial violation of any provision of this contract, then the Owner may serve notice on the Contractor and the surety setting forth the violations and demanding compliance with this contract. Unless within ten (10) consecutive calendar days after serving such notice, such violations shall cease and satisfactory arrangements for correction be made, the Owner may suspend the Contractor's right to proceed with the work or terminate this contract.
  2. In the event the Owner suspends Contractor's right to proceed with the work or terminates the contract, the Owner may demand that the Contractor's surety take over and complete the work on this contract, after the surety submits a written proposal to the Owner and receives written approval and upon the surety's failure or refusal to do so within ten (10) consecutive calendar days after demand therefore, the Owner may take over the work and prosecute the same to completion by bid or negotiated contract, or the Owner may elect to take possession of and utilize in completing the work such materials, supplies, appliances and plant as may be on the site of the work, and all subcontractors, if the Owner elects, shall be bound to perform their contracts.

- B. The Contractor and its surety shall be and remain liable to the Owner for any excess cost or damages occasioned to the Owner as a result of the actions above set forth.
- C. The Contractor in the event of such suspension or termination shall not be entitled to receive any further payments under this contract until the work is wholly finished. Then if the unpaid balance under this contract shall exceed all expenses of the Owner as certified by the Director, such excess shall be paid to the Contractor; but, if such expenses shall exceed the unpaid balance as certified by the Director, the Contractor and their surety shall be liable for and shall pay the difference and any damages to the Owner.
- D. In exercising Owner's right to secure completion of the work under any of the provisions hereof, the Director shall have the right to exercise Owner's sole discretion as to the manner, methods and reasonableness of costs of completing the work.
- E. The rights of the Owner to suspend or terminate as herein provided shall be cumulative and not exclusive and shall be in addition to any other remedy provided by law.
- F. The Contractor in the event of such suspension or termination may be declared ineligible for Owner contracts for a minimal period of twelve (12) months. Further, no contract will be awarded to any Contractor who lists in their bid form any subcontractor whose prior performance has contributed, as determined by the Owner, to a breach of a contract. In order to be considered for state-awarded contracts after this period, the Contractor/subcontractor will be required to forward acceptance reports to the Owner regarding successful completion of non-state projects during the intervening twelve (12) months from the date of default. No contracts will be awarded to a subcontractor/Contractor until the ability to perform responsibly in the private sector has been proven to the Owner.

### **ARTICLE 7.3 -- FOR CONVENIENCE**

- A. The Owner may terminate or suspend the Contract or any portion of the Work without cause at any time, and at the Owner's convenience. Notification of a termination or suspension shall be in writing and shall be given to the Contractor and their surety. If the Contract is suspended, the notice will contain the anticipated duration of the suspension or the conditions under which work will be permitted to resume. If appropriate, the Contractor will be requested to demobilize and re-mobilize and will be reimbursed time and costs associated with the suspension.
- B. Upon receipt of notification, the Contractor shall:

1. Cease operations when directed.
  2. Take actions to protect the work and any stored materials.
  3. Place no further subcontracts or orders for material, supplies, services or facilities except as may be necessary to complete the portion of the Contract that has not been terminated. No claim for payment of materials or supplies ordered after the termination date shall be considered.
  4. Terminate all existing subcontracts, rentals, material, and equipment orders.
  5. Settle all outstanding liabilities arising from termination with subcontractors and suppliers.
  6. Transfer title and deliver to the Owner, work in progress, completed work, supplies and other material produced or acquire for the work terminated, and completed or partially completed plans, drawings information and other property that, if the Contract had been completed, would be required to be furnished to the Owner.
- C. For termination without cause and at the Owner's convenience, in addition to payment for work completed prior to date of termination, the Contractor may be entitled to payment of other documented costs directly associated with the early termination of the contract. Payment for anticipated profit and unapplied overhead will not be allowed.

## **SECTION 007300 - SUPPLEMENTARY CONDITIONS**

### **1.0 GENERAL:**

- A. These Supplementary General Conditions clarify, add, delete, or otherwise modify standard terms and conditions of DIVISION 0, BIDDING AND CONTRACTING REQUIREMENTS.

### **2.0 CONTACTS:**

Designer: Elaine Lewis  
L2e Solutions  
20 South Sarah St.  
St. Louis, MO 63108  
Telephone: 314-730-2779  
Email: elaine.lewis@l2eco.com

Construction Representative: Kevin Hultberg  
Division of Facilities Management, Design and Construction  
10325 Business 21 North, Hillsboro, MO 63050  
Telephone: 636-524-8528  
Email: kevin.hultberg@oa.mo.gov

Project Manager: Frank Cunningham  
Division of Facilities Management, Design and Construction  
301 West High Street, Room 730  
Jefferson City, Missouri 65102  
Telephone: 573-526-3309  
Email: frank.cunningham@oa.mo.gov

Contract Specialist: Paul Girouard  
Division of Facilities Management, Design and Construction  
301 West High Street, Room 730  
Jefferson City, Missouri 65102  
Telephone: 573-751-4797  
Email: paul.girouard@oa.mo.gov

### **3.0 NOTICE: ALL BID MATERIALS ARE DUE AT THE TIME OF BID SUBMITTAL. THERE IS NO SECOND SUBMITTAL FOR THIS PROJECT.**

### **4.0 FURNISHING CONSTRUCTION DOCUMENTS:**

- A. The Owner will furnish the Contractor with approximately 5 complete sets of drawings and specifications at no charge.
- B. The Owner will furnish the Contractor with approximately 5 sets of explanatory or change drawings at no charge.
- C. The Contractor may make copies of the documents as needed with no additional cost to the Owner.

### **5.0 ILLEGAL IMMIGRATION REFORM AND IMMIGRANT RESPONSIBILITY ACT**

The Contractor understands and agrees that by signing a contract for this project, they certify the following:

- A. The Contractor shall only utilize personnel authorized to work in the United States in accordance with applicable federal and state laws. This includes but is not limited to the Illegal Immigration Reform and Immigrant Responsibility Act (IIRIRA) and INA Section 274A.
- B. If the Contractor is found to be in violation of this requirement or the applicable laws of the state, federal and local laws and regulations, and if the State of Missouri has reasonable cause to believe that the Contractor has knowingly employed individuals who are not eligible to work in the United States, the state shall have the right to cancel the contract immediately without penalty or recourse and suspend or debar the contractor from doing business with the state.
- C. The Contractor agrees to fully cooperate with any audit or investigation from federal, state or local law enforcement agencies.

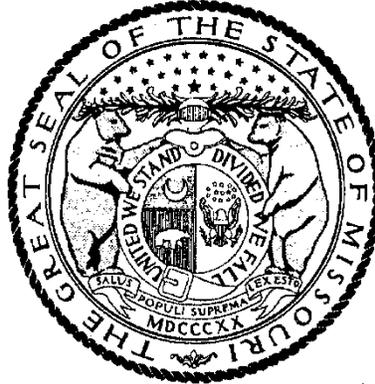
### **6.0 SAFETY REQUIREMENTS**

Contractor and subcontractors at any tier shall comply with RSMo 292.675 and Article 1.3, E, of Section 007213, General Conditions.

# Missouri

## Division of Labor Standards

### WAGE AND HOUR SECTION



MICHAEL L. PARSON, Governor

# Annual Wage Order No. 26

Section 095  
**ST. FRANCOIS 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 8, 2019**

Last Date Objections May Be Filed: **April 8, 2019**

Prepared by Missouri Department of Labor and Industrial Relations

OCCUPATIONAL TITLE	** Date of Increase	Basic Hourly Rates
Asbestos Worker		\$18.67*
Boilermaker		\$18.67*
Bricklayer		\$42.51
Carpenter		\$49.33
Lather		
Linoleum Layer		
Millwright		
Pile Driver		
Cement Mason		\$51.94
Plasterer		
Communications Technician		\$18.67*
Electrician (Inside Wireman)		\$65.05
Electrician Outside Lineman		\$18.67*
Lineman Operator		
Lineman - Tree Trimmer		
Groundman		
Groundman - Tree Trimmer		
Elevator Constructor		\$18.67*
Glazier		\$60.75
Ironworker		\$60.19
Laborer		\$39.15
General Laborer		
First Semi-Skilled		
Second Semi-Skilled		
Mason		\$50.30
Marble Mason		
Marble Finisher		
Terrazzo Worker		
Terrazzo Finisher		
Tile Setter		
Tile Finisher		
Operating Engineer		\$59.99
Group I		
Group II		
Group III		
Group III-A		
Group IV		
Group V		
Painter		\$40.26
Plumber		\$61.91
Pipe Fitter		
Roofer		\$51.02
Sheet Metal Worker		\$65.40
Sprinkler Fitter		\$18.67*
Truck Driver		\$18.67*
Truck Control Service Driver		
Group I		
Group II		
Group III		
Group IV		

\*The Division of Labor Standards received less than 1,000 reportable hours as required by RSMo 290.257.4(b). Public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center, in accordance with RSMo 290.257.2.

Heavy Construction Rates for  
ST. FRANCOIS County

Section 095

OCCUPATIONAL TITLE	** Date of Increase	Basic Hourly Rates
Carpenter		\$18.67*
Millwright		
Pile Driver		
Electrician (Outside Lineman)		\$18.67*
Lineman Operator		
Lineman - Tree Trimmer		
Groundman		
Groundman - Tree Trimmer		
Laborer		\$43.21
General Laborer		
Skilled Laborer		
Operating Engineer		\$58.47
Group I		
Group II		
Group III		
Group IV		
Truck Driver		\$18.67*
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 as required by RSMo 290.257.4(b). Public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center, in accordance with RSMo 290.257.2.

# 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 011000 – SUMMARY OF WORK

### 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 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Project consists of the complete tear-off of the existing shingle roofing system, removal of existing dormers, repair of existing wood soffits and fascia and installation of a new standing seam metal roofing system at seven (7) buildings located at Farmington Correctional Center (FCC). The buildings included in this project include the following: Medical Building #16, Food Service Building #17 A-side, Education Building #18, Library Building #19, Boot Camp Building #31, Chapel Building #32 B-Side, and Warehouse Building #33 B-Side.
  - 1. Project Location: **Farmington Correctional Center, 1012 West Columbia Street, Farmington, Missouri, 63640.**
  - 2. Owner: State of Missouri, Office of Administration, Division of Facilities Management, Design and Construction, Harry S Truman State Office Building, Post Office Box 809, 301 West High Street, Jefferson City, Missouri 65102.
- B. Contract Documents, dated **February 7, 2020** were prepared for the Project by **L2e Solutions, 1834 Kennett Place, St. Louis, MO 63104, IMEG Corp, 15 Sunnen, Suite 104, St. Louis, Missouri 63143 and John A Jurgiel & Associates.**
- C. The Work consists of the complete tear-off of the existing shingle roofing system, removal of existing dormers, repair of existing wood soffits and fascia and installation of a new standing seam metal roofing system at seven (7) buildings located at Farmington Correctional Center (FCC). The buildings included in this project include the following: Medical Building #16, Food Service Building #17 A-side, Education Building #18, Library Building #19, Boot Camp Building #31, Chapel Building #32 B-Side, and Warehouse Building #33 B-Side.
  - 1. The Work includes **removal of existing shingle roofing system down to existing plywood roof deck, removal of existing dormers as indicated in the documents, infill of existing dormer locations to match existing per structural documents, replacement/painting of existing damaged wood soffits and fascia as indicated in the documents, installation of new standing seam metal roofing system, flashings, gutters, downspouts, sealing of penetrants, and reinstallation of MEP roof equipment and installation of venting system as indicated in the documents.**
- D. The Work will be constructed under a single prime contract.

#### 1.3 DESIGNER'S ESTIMATE OF CONSTRUCTION COSTS

- A. The project designer has prepared this cost estimate. It is intended to provide an indication of the relative amounts of work by division and section only. The State of Missouri makes no guarantee regarding the accuracy of the values contained herein nor does the State of Missouri intend to imply that the values associated with any specification section are accurate or in any way reflect actual costs required to perform

the work represented by the specifications and drawings. The contractor should not rely on this estimate in any way while preparing a bid for this project or otherwise.

- B. Estimate of Cost: \$1,488,000.00 - \$2,046,000.00
  - 1. Alternate #1: \$7,700.00 - \$10,600.00
  - 2. Alternate #2: \$33,300.00 – \$45,800.00
  - 3. Alternate #3” \$29,200.00 - \$40,200.00

#### **1.4 WORK UNDER OTHER CONTRACTS**

- A. Cooperate fully with separate contractors on site so that work under those contracts may be carried out smoothly, without interfering with or delaying work under this Contract.

#### **1.5 WORK SEQUENCE**

- A. The Work will be conducted in phases as required to maintain watertight roofing construction.

#### **1.6 CONTRACTOR USE OF PREMISES**

- A. Use of the Site: Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.
  - 1. Owner Occupancy: Allow for Owner occupancy and use by the public.
  - 2. Driveways and Entrances: Keep driveways and entrances serving the premises clear and available to the Owner, the Owner’s employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
  - 3. Verify lift locations with the Facility and secure lifts overnight as required by Facility protocol.
- B. Use of the Existing Building: Maintain the existing building in a weathertight condition throughout the construction period. Repair damage cause by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period.

#### **1.7 OCCUPANCY REQUIREMENTS**

- A. Full Owner Occupancy: The Owner will occupy the site and existing building during the entire construction period. Cooperate with the Owner during construction operations to minimize conflicts and facilitate owner usage. Perform the Work so as not to interfere with the Owner’s operations.

**1.8 MISCELLANEOUS PROVISIONS**

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

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

**END OF SECTION 011000**

## **SECTION 012100 – ALLOWANCES**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. Types of allowances include the following:
  - 1. Weather allowances.
- B. Related Sections include the following:
  - 1. Division 1 Section "Contract Modification Procedures" for procedures for submitting and handling Contract Changes for allowances.

#### **1.3 WEATHER ALLOWANCE**

- A. Included within the completion period for this project are a specified number of “bad weather” days (see Schedule of Allowances).
- B. The Contractor’s progress schedule shall clearly indicate the bad weather day allowance as an “activity” or “activities”. In the event weather conditions preclude performance of critical work activities for 50% or more of the Contractor’s scheduled workday, that day shall be declared unavailable for work due to weather (a “bad weather” day) and charged against the above allowance. Critical work activities will be determined by review of the Contractor’s current progress schedule.
- C. The Contractor’s Representative and the Construction Representative shall agree monthly on the number of “bad weather” days to be charged against the allowance. This determination will be documented in writing and be signed by the Contractor and the Construction Representatives. If there is a failure to agree on all or part of the “bad weather” days for a particular month, that disagreement shall be noted on this written document and signed by each party’s representative. Failure of the Contractor’s representative to sign the “bad weather” day documentation after it is presented, with or without the notes of disagreement, shall constitute agreement with the “bad weather” day determination contained in that document.
- D. There will be no modification to the time of contract performance due solely to the failure to deplete the “bad weather” day allowance.
- E. Once this allowance is depleted, a no cost Contract Change time extension will be executed for “bad weather” days, as defined above, encountered during the remainder of the Project.

#### **1.4 SUBMITTALS**

- A. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

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

**PART 3 - EXECUTION**

**3.1 SCHEDULE OF ALLOWANCES**

- A. Weather Allowance: Included within the completion period for this Project 10 “bad weather” days.

**END OF SECTION 012100**

## **SECTION 012200 - UNIT PRICES**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. Section includes administrative and procedural requirements for unit prices.
- B. Related Requirements:
  - 1. Section 012600 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.

#### **1.3 DEFINITIONS**

- A. Unit price is a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

#### **1.4 PROCEDURES**

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- C. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

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

### **PART 3 - EXECUTION**

#### **3.1 SCHEDULE OF UNIT PRICES**

- A. Unit Price 1: Removal/replacement of existing damaged wood plank decking.

1. Description: Remove existing unsatisfactory and/or damaged wood plank decking and replace/secure as indicated in the structural drawings.
2. Unit of Measurement: Square foot of plank decking removed/replaced.
3. Base Bid Quantity: 2500 sf.

**END OF SECTION 012200**

## **SECTION 012300 - ALTERNATES**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes administrative and procedural requirements governing Alternates.

#### **1.3 DEFINITIONS**

- A. Definition: An alternate is an amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to the Base Bid amount if the Owner decides to accept a corresponding change in either the amount of construction to be completed, or in the products, materials, equipment, systems, or installation methods described in the Contract Documents..
  - 1. The cost for each alternate is the net addition to the Contract Sum to incorporate the Alternate into the Work. No other adjustments are made to the Contract Sum.
- B. No additional time will be allowed for alternate work unless the number of work days is so stated on the bid form.

#### **1.4 PROCEDURES**

- A. Coordination: Modify or adjust affected adjacent Work as necessary to completely and fully integrate the Alternate Work into the Project.
  - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not mentioned as part of the Alternate.
- B. Notification: The award of the Contract will indicate whether alternates have been accepted or rejected.
- C. Execute accepted alternates under the same conditions as other Work of this Contract.
- D. Schedule: A "Schedule of Alternates" is included at the end of this Section. Specification Sections referenced in the Schedule contain requirements for materials necessary to achieve the Work described under each alternate.

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

### **PART 3 - EXECUTION**

#### **3.1 SCHEDULE OF ALTERNATES**

- A. Alternate No. 1: At Building 18, scrape clean and repaint existing fascia, soffit and trim along top of exterior wall construction/roof area for entire building. Comply with lead paint removal

as indicated in the documents and hazardous materials report. Prime wood and apply (2) coats of paint per painting manufacturer.

- B. Alternate No. 2: At Building 31, scrape clean and repaint existing fascia, soffit and trim along top of exterior wall construction/roof area for entire building. Comply with lead paint removal as indicated in the documents and hazardous materials report. Prime wood and apply (2) coats of paint per painting manufacturer. At areas of soffit/fascia replacement include scraping clean and repainting existing exterior wall trim to remain as part of alternate scope of work.
- C. Alternate No. 3: At Building 33, scrape clean and repaint existing fascia, soffit and trim along top of exterior wall construction/roof area for entire building. Comply with lead paint removal as indicated in the documents and hazardous materials report. Prime wood and apply (2) coats of paint per painting manufacturer. At areas of soffit/fascia replacement include scraping clean and repainting existing exterior wall trim to remain as part of alternate scope of work.

**END OF SECTION 012300**

## **SECTION 012600 – CONTRACT MODIFICATION PROCEDURES**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section specifies administrative and procedural requirements for handling and processing Contract Modifications.
- B. Related Sections include the following:
  - 1. Division 0, Section 007213, Article 3.1 "Acceptable Substitutions" for administrative procedures for handling Requests for Substitutions made after Contract award.
  - 2. Division 0, Section 007213, Article 4.0 "Changes in the Work" for Contract Change requirements.

#### **1.3 REQUESTS FOR INFORMATION**

- A. In the event that the Contractor or Subcontractor, at any tier, determines that some portion of the Drawings, Specifications, or other Contract Documents requires clarification or interpretation, the Contractor shall submit a "Request for Information" (RFI) in writing to the Designer. A RFI may only be submitted by the Contractor and shall only be submitted on the RFI forms provided by the Owner. The Contractor shall clearly and concisely set forth the issue for which clarification or interpretation is sought and why a response is needed. In the RFI, the Contractor shall set forth an interpretation or understanding of the requirement along with reasons why such an understanding was reached.
- B. Responses to RFI shall be issued within ten (10) working days of receipt of the Request from the Contractor unless the Designer determines that a longer time is necessary to provide an adequate response. If a longer time is determined necessary by the Designer, the Designer will, within five (5) working days of receipt of the request, notify the Contractor of the anticipated response time. If the Contractor submits a RFI on a time sensitive activity on the current project schedule, the Contractor shall not be entitled to any time extension due to the time it takes the Designer to respond to the request provided that the Designer responds within the ten (10) working days set forth above.
- C. Responses from the Designer will not change any requirement of the Contract Documents. In the event the Contractor believes that a response to a RFI will cause a change to the requirements of the Contract Document, the Contractor shall give written notice to the Designer requesting a Contract Change for the work. Failure to give such written notice within ten (10) working days, shall waive the Contractor's right to seek additional time or cost under Article 4, "Changes in the Work" of the General Conditions.

## **1.4 MINOR CHANGES IN THE WORK**

- A. Designer will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Amount or the Contract Time, on "Designer's Supplemental Instructions" (DSI).

## **1.5 PROPOSAL REQUESTS**

- A. The Designer or Owner Representative will issue a detailed description of proposed Changes in the Work that may require adjustment to the Contract Amount or the Contract Time. The proposed Change Description will be issued using the "Request for Proposal" (RFP) form. If necessary, the description will include supplemental or revised Drawings and Specifications.
  - 1. Proposal Requests issued by the Designer or Owner Representative are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
  - 2. Within ten (10) working days after receipt of Proposal Request, submit a proposal for the cost adjustments to the Contract Amount and the Contract Time necessary to execute the Change. The Contractor shall submit his proposal on the appropriate Contract Change Detailed Breakdown form. Subcontractors may use the appropriate Contract Change Detailed Breakdown form or submit their proposal on their letterhead provided the same level of detail is included. All proposals shall include:
    - a. A detailed breakdown of costs per Article 4.1 of the General Conditions.
    - b. If requesting additional time per Article 4.2 of the General Conditions, include an updated Contractor's Construction Schedule that indicates the effect of the Change including, but not limited to, changes in activity duration, start and finish times, and activity relationship.

## **1.6 CONTRACT CHANGE PROCEDURES**

- A. On Owner's approval of a Proposal Request, the Designer or Owner Representative will issue a Contract Change for signatures of Owner and Contractor on the "Contract Change" form.

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

## **PART 3 - EXECUTION**

### **3.1 REFERENCED FORMS**

- A. The following forms can be found on our website at <https://oa.mo.gov/facilities/vendor-links/architectengineering-forms> or <https://oa.mo.gov/facilities/vendor-links/contractor-forms>:
  - 1. Request for Information
  - 2. Designer's Supplemental Instructions
  - 3. Request for Proposal
  - 4. Contract Change

5. Contract Change Detailed Breakdown – SAMPLES
6. Contract Change Detailed Breakdown – General Contractor (GC)
7. Contract Change Detailed Breakdown – Subcontractor (SUB)

**END OF SECTION 012600**

## **SECTION 013100 – COORDINATION**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes administrative provisions for coordinating construction operations on Projects including, but not limited to, the following:
  - 1. Coordination Drawings.
  - 2. Administrative and supervisory personnel.
  - 3. Project meetings.
- B. Each Contractor shall participate in coordination requirements. Certain areas of responsibility will be assigned to a specific Contractor.
- C. Related Sections include the following:
  - 1. Division 1, Section 013200 "Schedules" for preparing and submitting Contractor's Construction Schedule.
  - 2. Articles 1.8.B and 1.8.C of Section 007213 "General Conditions" for coordinating meetings onsite.
  - 3. Article 5.4.H of Section 007213 "General Conditions" for coordinating Closeout of the Contract.

#### **1.3 COORDINATION**

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections, which depend on each other for proper installation, connection, and operation.
- B. Coordination: Each Contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each Contractor shall coordinate its operations with operations included in different Sections that depend on each other for proper installation, connection, and operation.
  - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  - 2. Coordinate installation of different components with other Contractors to ensure maximum accessibility for required maintenance, service, and repair.
  - 3. Make adequate provisions to accommodate items scheduled for later installation.
  - 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required

maintenance, service, and repair of all components including mechanical and electrical.

- C. Prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
  - 1. Prepare similar memoranda for Owner and separate Contractors if coordination of their Work is required.
- D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other Contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
  - 1. Preparation of Contractor's Construction Schedule.
  - 2. Preparation of the Schedule of Values.
  - 3. Installation and removal of temporary facilities and controls.
  - 4. Delivery and processing of submittals.
  - 5. Progress meetings.
  - 6. Preinstallation conferences.
  - 7. Startup and adjustment of systems.
  - 8. Project Closeout activities.
- E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
  - 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

#### **1.4 SUBMITTALS**

- A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.
- B. Key Personnel Names: Within fifteen (15) work days of starting construction operations, submit a list of key personnel assignments including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

#### **1.5 PROJECT MEETINGS**

- A. The Owner's Construction Representative will schedule a Pre-Construction Meeting prior to beginning of construction. The date, time, and exact place of this meeting will be determined after Contract Award and notification of all interested parties. The Contractor shall arrange to have the Job Superintendent and all prime Subcontractors

present at the meeting. During the Pre-Construction Meeting, the construction procedures and information necessary for submitting payment requests will be discussed and materials distributed along with any other pertinent information.

1. Minutes: Designer will record and distribute meeting minutes.
- B. Progress Meetings: The Owner's Construction Representative will conduct Monthly Progress Meetings as stated in Articles 1.8.B and 1.8.C of Section 007213 "General Conditions".
1. Minutes: Designer will record and distribute to Contractor the meeting minutes.
- C. Preinstallation Conferences: Contractor shall conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
1. Attendees: Installer and representatives of Manufacturers and Fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Designer and Construction Representative of scheduled meeting dates.
  2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration including requirements for the following:
    - a. Contract Documents
    - b. Options
    - c. Related RFIs
    - d. Related Contract Changes
    - e. Purchases
    - f. Deliveries
    - g. Submittals
    - h. Review of mockups
    - i. Possible conflicts
    - j. Compatibility problems
    - k. Time schedules
    - l. Weather limitations
    - m. Manufacturer's written recommendations
    - n. Warranty requirements
    - o. Compatibility of materials
    - p. Acceptability of substrates
    - q. Temporary facilities and controls
    - r. Space and access limitations
    - s. Regulations of authorities having jurisdiction
    - t. Testing and inspecting requirements

- u. Installation procedures
  - v. Coordination with other Work
  - w. Required performance results
  - x. Protection of adjacent Work
  - y. Protection of construction and personnel
3. Contractor shall record significant conference discussions, agreements, and disagreements including required corrective measures and actions.
  4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
  5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
  6. Revise paragraph below if Project requires holding progress meetings at different intervals. Insert special intervals such as "every third Tuesday" to suit special circumstances.
  7. Project name
  8. Name and address of Contractor
  9. Name and address of Designer
  10. RFI number including RFIs that were dropped and not submitted
  11. RFI description
  12. Date the RFI was submitted
  13. Date Designer's response was received
  14. Identification of related DSI or Proposal Request, as appropriate

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

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

**END OF SECTION 013100**

## **SECTION 013200 – SCHEDULES**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes requirements for a Bar Chart Schedule for the project construction activities, schedule of submittals, and schedule for testing.

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

### **PART 3 - EXECUTION**

#### **3.1 SUBMITTAL PROCEDURES**

- A. The Contractor shall submit to the Designer, within ten (10) working days following the Notice to Proceed, a Progress Schedule including Schedule of Values showing the rate of progress the Contractor agrees to maintain and the order in which he proposed to carry out the various phases of Work. No payments shall be made to the Contractor until the Progress Schedule has been approved by the Owner.
- B. The Contractor shall submit an updated Schedule for presentation at each Monthly Progress Meeting. The Schedule shall be updated by the Contractor as necessary to reflect the current Schedule and its relationship to the original Schedule. The updated Schedule shall reflect any changes in the logic, sequence, durations, or completion date. Payments to the Contractor shall be suspended if the Progress Schedule is not adequately updated to reflect actual conditions.
- C. The Contractor shall submit Progress Schedules to Subcontractors to permit coordinating their Progress Schedules to the general construction Work. The Contractor shall coordinate preparation and processing of Schedules and reports with performance of other construction activities.

#### **3.2 CONSTRUCTION PROGRESS SCHEDULE – BAR CHART SCHEDULE**

- A. Bar-Chart Schedule: The Contractor shall prepare a comprehensive, fully developed, horizontal bar chart-type Contractor's Construction Schedule. The Contractor for general construction shall prepare the Construction Schedule for the entire Project. The Schedule shall show the percentage of work to be completed at any time, anticipated monthly payments by Owner, as well as significant dates (such as completion of excavation, concrete foundation work, underground lines, superstructure, rough-ins, enclosure, hanging of fixtures, etc.) which shall serve as check points to determine compliance with the approved Schedule. The Schedule shall also include an activity for the number of "bad" weather days specified in Section 012100 – Allowances.

1. The Contractor shall provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week.
    - a. If practical, use the same Schedule of Values breakdown for schedule time bars.
  2. The Contractor shall provide a base activity time bar showing duration for each construction activity. Each bar is to indicate start and completion dates for the activity. The Contractor is to place a contrasting bar below each original schedule activity time for indicating actual progress and planned remaining duration for the activity.
  3. The Contractor shall prepare the Schedule on a minimal number of separate sheets to readily show the data for the entire construction period.
  4. Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on schedule with other construction activities. Include minor elements involved in the overall sequence of the Work. Show each activity in proper sequence. Indicate graphically the sequences necessary for completion of related portions of the Work.
  5. Coordinate the Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittal Schedule, progress reports, payment requests, and other required schedules and reports.
  6. Indicate the Intent to Award and the Contract Substantial Completion dates on the schedule.
- B. Phasing: Provide notations on the schedule to show how the sequence of the Work is affected by the following:
1. Requirement for Phased completion
  2. Work by separate Contractors
  3. Work by the Owner
  4. Pre-purchased materials
  5. Coordination with existing construction
  6. Limitations of continued occupancies
  7. Un-interruptible services
  8. Partial Occupancy prior to Substantial Completion
  9. Site restrictions
  10. Provisions for future construction
  11. Seasonal variations
  12. Environmental control
- C. Work Stages: Use crosshatched bars to indicate important stages of construction for each major portion of the Work. Such stages include, but are not necessarily limited to, the following:
1. Subcontract awards
  2. Submittals

3. Purchases
4. Mockups
5. Fabrication
6. Sample testing
7. Deliveries
8. Installation
9. Testing
10. Adjusting
11. Curing
12. Startup and placement into final use and operation

### **3.3 SCHEDULE OF SUBMITTALS**

- A. Upon acceptance of the Construction Progress Schedule, prepare and submit a complete schedule of submittals. Coordinate the submittal schedule with Section 013300 SUBMITTALS, the approved Construction Progress Schedule, list of subcontracts, Schedule of Values and the list of products.
- B. Prepare the schedule in chronological order. Provide the following information
  1. Scheduled date for the first submittal
  2. Related Section number
  3. Submittal category
  4. Name of the Subcontractor
  5. Description of the part of the Work covered
  6. Scheduled date for resubmittal
  7. Scheduled date for the Designer's final release or approval
- C. Distribution: Following the Designer's response to the initial submittal schedule, print and distribute copies to the Designer, Owner, subcontractors, and other parties required to comply with submittal dates indicated.
  1. When revisions are made, distribute to the same parties. Delete parties from distribution when they have completed their assigned part of the Work and are no longer involved in construction activities.
- D. Schedule Updating: Revise the schedule after each meeting or other activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

### **3.4 SCHEDULE OF INSPECTIONS AND TESTS**

- A. Prepare a schedule of inspections, tests, and similar services required by the Contract Documents. Submit the schedule with (15) days of the date established for commencement of the Contract Work. The Contractor is to notify the testing agency at least (5) working days in advance of the required tests unless otherwise specified.

- B. Form: This schedule shall be in tabular form and shall include, but not be limited to, the following:
1. Specification Section number
  2. Description of the test
  3. Identification of applicable standards
  4. Identification of test methods
  5. Number of tests required
  6. Time schedule or time span for tests
  7. Entity responsible for performing tests
  8. Requirements for taking samples
  9. Unique characteristics of each service
- C. Distribution: Distribute the schedule to the Owner, Architect, and each party involved in performance of portions of the Work where inspections and tests are required.

**END OF SECTION 013200**

## SECTION 013240 - ASBESTOS ABATEMENT

### PART 1 - GENERAL

#### 1.1 PROJECT/WORK IDENTIFICATION

- A. 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 materials, and subsequent cleaning of the affected environment.
- B. The contractor shall supply all labor, materials, equipment, testing, services, permits, notifications, insurance, and incidentals which are necessary or required to perform the work in accordance with applicable local, state, and federal regulations as may be necessary for the abatement of asbestos materials as specified in this section or as indicated in associated drawings, sketches, or details of the work.
- C. The contractor shall be responsible for assessing the site conditions and the facilities offered, as well as to fully inform itself of the Scope of Work and requirements for proper completion of the work. Should the contractor's proposal be accepted, the contractor will be held responsible for every error in its proposal resulting from failure to do so.
- D. It is the sole responsibility of the abatement contractor to establish the proper Personal Protective Equipment (PPE) for its employees based on the contractor's previous experience with this type of abatement. It is the sole responsibility of the abatement contractor to conduct the required OSHA personnel air monitoring and supply those results to the Owner or Owner's Representative within 24-hours of the contractor receiving the analytical results.
- E. The Base Scope of abatement work consists of the removal of windows containing asbestos glazing from the dormers of Building 17 and the cleanup of asbestos window glazing debris from the metal corrugated roof at the rear of Building 17. **The projected abatement duration is 3 days.**
- F. There will be a **mandatory** pre-bid walk through of the project, see bid form for date and time.
- G. Responses to this bid package should be fully completed on the attached Bid Form included in this package and sent to Farmington Correctional Center. See bid form for due date and time on date. Bids must be delivered no later than the bid due date and time to Farmington Correctional Center. Any bid form not fully completed will not be accepted nor considered. The Owner or Owner's Representative reserve the right to reject any and/or all bids and to waive all formalities. While cost is certainly a factor in selection of the contractor, the Owner or Owner's Representative reserves the right to select the Contractor it considers the most qualified to successfully accomplish the project.

#### H. Scope of Work, Base Bid

Wet asbestos window glazing thoroughly and cover glazing with duct tape or similar prior to window removal. Remove windows containing asbestos glazing from the dormers of building 17 using dismantling techniques. A critical barrier must be installed inside the building to prevent any glazing that may come loose during removal operations from entering the building. A temporary weather tight barrier shall be placed in the opening once the window has been removed. The approximate quantity of materials to be abated are as follows:

- 4 dormer windows with asbestos glazing
- I. Inside a regulated area, HEPA vacuum and wet wipe asbestos window glazing debris from the metal corrugated roof in the rear of building 17. Debris is primarily in close proximity to the building.
    - 20 square feet of roof surface area, total
  - J. **All quantities are approximate and must be field verified by the abatement contractor. Contractor is responsible for accurately determining the amount of material for removal. Quantities provided are only included to assist contractor in determining the amount of material designated for removal. No change orders will be issued if actual quantities differ from those listed above.**

## 1.2 SUMMARY OF REQUIREMENTS – BASE SCOPE

### A. ASBESTOS WINDOW GLAZING

If warranted, make notifications in compliance with Section 3.1 of this specification.

1. Remove windows containing asbestos window glazing from the dormers of Building 17. All work will comply with all federal, state and local regulations and this specification. The proper sequence of removal is as follows:
  - a. Establish regulated area by erecting danger barrier tape and danger signs at the perimeter of the abatement area.
  - b. Place drop cloths on the ground at the perimeter of the building and on the roof adjacent to the removal operations.
  - c. Erect critical barriers on the inside of the building over the windows.
  - d. Wet glazing with amended water by misting the material thoroughly.
  - e. Cover window glazing with duct tape or similar, to prevent glazing from coming loose from the window.
  - f. Remove the windows with the glazing intact using dismantling techniques.
  - g. Wrap windows in two layers of 6-mil poly sheeting.
  - h. Dispose of the asbestos waste materials as Regulated Asbestos Containing Material (RACM).
2. Regardless of the removal methods employed, the contractor shall immediately stop work in the event of any of the following:
  - a. visible asbestos materials are found outside the work area;
  - b. fiber levels exceeding Permissible Exposure Limit (PEL) of 0.1 fibers per cubic centimeter (f/cc) near the work areas;
  - c. fiber levels exceeding the USEPA Clearance Guideline of 0.01 f/cc downwind from the work areas;
  - d. subject material not kept thoroughly wet during removal and disposal, or
  - e. any emergency;
  - f. furthermore, the contractor shall implement corrective work practices, make re-notification to all regulatory agencies of the changes in work practices and material conditions, and comply with all referenced regulations in this document and the applicable sections of this specification as noted.

- 1) If any of the conditions in subparagraph 2 above are observed by the Owner, Owner's Representative or by the Third-Party Air Monitor, then all these parties have the right to issue a directive to stop work. The Contractor shall be obligated to implement corrective work, make re-notifications, et cetera, as outlined in subparagraph 2.
- 2) The Contractor shall **not** be entitled to additional compensation in the event of the conditions of subparagraph 2.

## B. ASBESTOS WINDOW GLAZING CLEANUP

If warranted, make notifications in compliance with Section 3.1 of this specification.

1. Cleanup window glazing debris from metal corrugated roof at the rear of Building 17. All work will comply with all federal, state and local regulations and this specification. The proper sequence of removal is as follows:
  - a. Establish regulated area by erecting danger barrier tape and danger signs at the perimeter of the abatement area.
  - b. HEPA vacuum the debris from the roof. Debris is primarily in close proximity to the building.
  - c. Wet wipe debris area thoroughly with amended water.
  - d. Dispose of the asbestos waste materials as Regulated Asbestos Containing Material (RACM).
2. Regardless of the removal methods employed, the contractor shall immediately stop work in the event of any of the following:
  - a. visible asbestos materials are found outside the work area;
  - b. fiber levels exceeding Permissible Exposure Limit (PEL) of 0.1 fibers per cubic centimeter (f/cc) near the work area;
  - c. fiber levels exceeding the USEPA Clearance Guideline of 0.01 f/cc downwind from the work area;
  - d. any emergency;
  - e. furthermore, the contractor shall implement corrective work practices, make re-notification to all regulatory agencies of the changes in work practices and material conditions, and comply with all referenced regulations in this document and the applicable sections of this specification as noted.
    - 1) If any of the conditions in subparagraph 2 above are observed by the Owner, Owner's Representative or by the Third-Party Air Monitor, then all these parties have the right to issue a directive to stop work. The Contractor shall be obligated to implement corrective work, make re-notifications, et cetera, as outlined in subparagraph 2.
    - 2) The Contractor shall **not** be entitled to additional compensation in the event of the conditions of subparagraph 2.

## 1.3 PROJECT COORDINATION

- A. Contractor shall coordinate and schedule all phases of the work of the contract documents under his control with the Owner, Owner's Representative, any subcontractors, materials suppliers, and other parties involved as necessary to ensure the smooth and orderly transition of separate phases, timely placement of items and materials, cooperation between parties, and proper execution of the work.

- All coordination necessary will be made through the Owner or Owner’s Representative.
- Normal daylight working hours will be observed in performing the abatement work.
- The contractor, project superintendent, subcontractors, and other appropriate parties shall attend meetings as scheduled and as otherwise necessary to accomplish the work in a timely and efficient manner. Meetings shall include but are not limited to the following:
  1. Pre-Abatement Meeting: The Owner or Owner’s Representative will schedule the pre-abatement meeting after the Notice of Award has been issued. The Owner or Owner’s Representative will determine the date, time, and exact place of this meeting and all necessary parties will be notified. During the meeting, discussions will be held regarding abatement procedures, scheduling requirements, general conditions, special conditions, channels of communication, responsible persons, requirements for submittals, documentation requirements, payment applications, and other pertinent information necessary for completing the work. Specific requirements of the facility regarding security, safety, utilities, access to buildings, and related matters will also be discussed.
    - All fees required for notification requirements, re-notifications, and/or inspections by Missouri Department of Natural Resources or U.S. Environmental Protection Agency shall be paid by the contractor. Bulk sample analysis information required in conjunction with the notification to the Missouri Department of Natural Resources or USEPA having jurisdiction shall be provided by the Owner’s Representative unless provided within this specification.
  2. Progress Meetings: Not Applicable

#### 1.4 TERMINOLOGY/DEFINITIONS/ABBREVIATIONS

##### A. Definitions:

1. Abatement: The Encapsulation, Enclosure and/or Removal of Asbestos Containing Materials (ACM). For Category I Non-friable ACM which will remain non-friable throughout disposal, abatement procedures will be modified and simplified as found within these and other applicable regulations.
2. Adequately Wet: To sufficiently mix or penetrate with liquid to prevent the release of particulates.
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. Air Sampling Professional: An individual, certified by the State of Missouri, who supervises air sampling activities during asbestos abatement projects.
5. Air Sampling Technician: An individual, under the supervision of an Air Sampling Professional, who performs air sampling during asbestos abatement projects.
6. Asbestos: The asbestiform varieties of serpentinite (chrysotile, antigorite), riebeckite (crocidolite), cummingtonite-grunerite (amosite), anthophyllite, and actinolite-tremolite. For purposes of determining respiratory and worker protection both the asbestiform and non-asbestiform varieties of the above materials and any of these materials that have been chemically treated and/or altered shall be considered as asbestos.
7. Asbestos Abatement Project Designer: An individual, certified by the State of Missouri, who prepares plans and specifications for asbestos abatement projects.

8. Asbestos Abatement Supervisor: An individual certified by the State of Missouri, who directs, controls, and/or supervises workers during an asbestos abatement project.
9. Asbestos Abatement Worker: An individual, certified by the State of Missouri, who performs asbestos abatement.
10. Asbestos-Containing Material (ACM): Any material or product which contains more than 1 percent asbestos by weight as determined by using the Polarized Light Microscopy method.
11. Asbestos-Containing Building Material (ACBM): Surfacing ACM, thermal system insulation ACM, or miscellaneous ACM that is found in or on building components.
12. Asbestos Containing Building Material (ACBM) Repair: The restoration of ACBM to an undamaged condition or to an intact state so as to prevent fiber release
13. Asbestos-Containing Waste Material (ACWM): Any material to be removed from a work area for disposal that is an asbestos containing material (ACM) or is suspected of being contaminated with ACM.
14. Barrier: Any surface that seals off the work area to inhibit the movement of asbestos fibers.
15. Breathing Zone: A hemisphere forward of the shoulders with a radius of approximately 6 to 9 inches.
16. Category I Non-friable 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.
17. Category II Non-friable ACM: Any material, excluding category I non-friable ACM, containing more than one percent (1%) asbestos as determined using the methods specified in 40 CFR part 768, subpart F, Appendix A, section 1, Polarized Light Microscopy that, when dry, cannot be crumbled, pulverized or reduced to powder by hand pressure.
18. Certified Industrial Hygienist (C.I.H.): An industrial hygienist, certified in Comprehensive Practice by the American Board of Industrial Hygiene.
19. Competent Person: An individual, capable of identifying existing asbestos hazards in the workplace and who has authority to take prompt corrective measures to eliminate them. His duties include: establishing the negative-pressure enclosure, ensuring its integrity, and controlling entry to and exit from the enclosure; supervising any employee exposure monitoring; ensuring that all employees working within such an enclosure wear the appropriate personal protective equipment, are trained in the use of appropriate methods of exposure control, and in the use of hygiene facilities and decontamination procedures; and ensuring that engineering controls in use are in proper operating condition and are functioning properly. An individual who has been certified by the State of Missouri as an Asbestos Abatement Supervisor is considered a "Competent Person".
20. Containment: Area where asbestos abatement project is conducted.
21. Critical Barrier: Plastic sheeting or other material to be placed over Work Area openings (i.e., windows, HVAC supply and return vents, doors, electrical fixtures, etc.).
22. Decontamination Facility: The serial arrangement of rooms or spaces for the purpose of separating the work site from the building environment upon entering the Work Area and for the cleaning of persons, equipment and contained waste prior to returning to the clean environment.
23. Disposal Bag: A properly labeled 6-mil thick leak-tight clear plastic bag used for transporting asbestos waste from work site and to the disposal site.
24. Encapsulant (Sealant): A liquid material which can be applied to asbestos-containing material and which prevents the release of asbestos fibers from the ACM either by creating a membrane over the surface (bridging encapsulant) or by penetrating into the ACM and binding its components together (penetrating encapsulant) or is specifically designed to minimize fiber release during removal of ACM (removal encapsulant).

25. Encapsulation: Treatment of asbestos-containing materials with an encapsulant.
26. Enclosure: The construction of an airtight, impact resistant barrier to isolate a surface coated with ACM.
27. Friable: Any material which when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.
28. Glove Bag: A manufactured or fabricated device, typically constructed of six (6) mil transparent polyethylene or polyvinyl chloride plastic. This device consists of two (2) inward projecting long sleeves, an internal tool pouch and an attached, labeled receptacle for asbestos waste.
29. Initial Exposure Assessment: Is a required assessment to be performed by the Contractor's Competent Person (Asbestos Abatement Supervisor) concerning the exposure potential of a specific asbestos projects, or series of similar asbestos projects. If it is concluded that the employee exposures during the project are likely to be consistently below the Permissible Exposure Limit, the Contractor establishes a Negative Initial Exposure Assessment.
30. Outside Air: Air outside containment.
31. Permissible Exposure Limit (PEL): Eight-hour time weighted average of 0.1 f/cc.
32. Personal Monitoring: Sampling of the asbestos fiber concentrations within the Breathing Zone of 25% of the work force.
33. Regulated Asbestos-Containing Material (RACM): Friable asbestos material; Category I non-friable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading; or Category II non-friable 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.
34. Removal: To take out or eliminate ACM and/or Lead-containing materials from building components, materials, substrates.
35. Third Party Air Monitor: The Air Sampling Professional who conducts air monitoring in who is not under the direct control of the abatement contractor and who has been selected by the owner.
36. Visible Emission: Any discharge of an air contaminant into the atmosphere that is visually detectable without the aid of instruments.
37. Work Area: A specific room or physically isolated portion of a room, other than the space enclosed within a glove bag, in which friable asbestos-containing material is required to be handled in accordance with current federal and state regulations. The area is designated as a work area from the time that the room, or portion of it, 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.

B. Abbreviations:

1. AIA: American Institute of Architects
2. AIHA: American Industrial Hygiene Association
3. ASHARA: Asbestos School Hazard Abatement Reauthorization Act
4. CERCLA: Comprehensive Environmental Response, Compensation and Liability Act
5. DEQ: Division of Environmental Quality, MoDNR
6. DOT: U. S. Department of Transportation
7. EPA: U. S. Environmental Protection Agency
8. HUD: U. S. Housing and Urban Development
9. MDNR: Missouri Department of Natural Resources
10. NIOSH: National Institute for Occupational Safety and Health
11. NLLAP: National Lead Laboratory Accreditation Program
12. NVLAP: National Voluntary Laboratory Accreditation Program
13. OSHA: Occupational Safety and Health Administration, U. S. Department of Labor.
14. TSCA: Toxic Substances Control Act

## 1.5 CODES AND REGULATIONS

A. This section sets forth governmental regulations and industry standards which are included and incorporated herein by reference and made a part of this specification.

- Requirements include adherence to work practices and procedures set forth in applicable codes, regulations and standards.
- General Applicability of Codes, Regulations and Standards: Except to the extent that more explicit or more stringent requirements are written directly into the contract documents, 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. In the event of conflicting applicable codes, regulations, standards, statutes, laws, or rules, the more stringent shall apply to these specifications.
- Contractor Responsibility: The contractor shall assume full responsibility and liability for 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, record keeping or other regulation on the part of himself, his employees, or his subcontractors.
- Requirements which govern asbestos abatement work or hauling, and disposal of asbestos 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:
    - a. Title 20, Part 1910, Section 1001 and Part 1926, Section 58 of the Code of Federal Regulations.
    - b. Respiratory Protection, Title 29, Part 1910, Section 134 of the Code of Federal Regulations.
    - c. Construction Industry, Title 29, Part 1926, of the Code of Federal Regulations.
    - d. Access to Employee Exposure and Medical Records, Title, 29, Part 1910, Section 2 of the Code of Federal Regulations.
    - e. Hazard Communication, Title 29, Part 1910, Section 1200 of the Code of Federal Regulations.
    - f. 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:
    - a. National Emission Standards for Hazardous Air Pollutants (NESHAPS) Title 40, Part 61, Subpart M of the Code of Federal Regulations.
  3. U. S. Department of Transportation (DOT)
    - a. Title 49, Part 172, Section 101 of the Code of Federal Regulations.

4. State of Missouri Department of Natural Resources
  - a. Missouri 10 CSR, Sections 6.241 and 6.250.

## **PART 2 - NOT APPLICABLE**

## **PART 3 - EXECUTION**

### **3.1 NOTIFICATIONS**

- A. If material being removed amounts to more than 260 LF, 160 SF or 35 cubic feet of asbestos or if abatement is being done prior to a demolition, Notification shall be completed and sent by the contractor not less than ten (10) days before the intended starting date of the project. Use EPA form "Notification of Demolition and Renovation", and the MDNR form "Asbestos Project Notification", to each of the following:
  1. Department of Natural Resources  
Air Pollution Control Program (ASBESTOS)  
P. O. Box 176  
Jefferson City, MO 65102
  2. U. S. Environmental Protection Agency  
Region VII  
Air & Toxic Division, Air Branch  
Attn: Air Compliance  
726 Minnesota Avenue  
Kansas City, KS 66101
  3. Provide copies of these notifications to the Owner:  
Farmington Correctional Center  
Attn: John Sherrill  
1012 W. Columbia Street  
Farmington, MO 63640
  4. Provide copies of these notifications to OA Facilities Management, Design and Construction  
Attn: Construction Administrator Kevin Hultberg  
10325 Business 21 N  
Hillsboro, MO 63050
- B. A Post-Notification report shall be completed and sent by the Contractor to the agencies listed in 3.1A above within forty-five (45) days of the completion of the project. The MDNR form "Asbestos Post Notification" is to be used for that purpose.

### **3.2 SUBMITTALS**

The following submittals will be required of the contractor prior to commencement of work and are subject to approval by the Owner's Representative.

1. One copy of the Safety Data Sheets (SDS) for the products to be used by the contractor in the performance of his work. The contractor will also maintain copies of the SDS on site per OSHA requirements.
2. A copy of the notifications to regulatory agencies as required in Section 3.1 of this specification.
3. Current certificates of training and statements of qualifications for project supervisor and

asbestos abatement workers. Supervisor shall meet the qualifications established in Section 3.7 of these specifications.

4. Name, address, and contact person's name of testing laboratory or laboratories to be utilized by the contractor (this is not the Third-Party Air Monitor) in analyzing personal air samples required by OSHA.
5. **Submit a detailed project specific plan of the procedures proposed for use in complying with requirements of this specification. Include in the plan the layout, route of ingress and egress from the work area, methods used to assure safety to building occupants and visitors, method of removal of material and engineering controls to be utilized to prevent emissions from the work area. Any technology or work practice to be used that is not identified in current federal, state or local regulations, a request for waiver of any of the regulatory requirements must be submitted for approval on the "Asbestos Project Notification" to Missouri Department of Natural Resources and the Owner's Representative prior to the start of the project.**
6. Provide a disposal plan to detail the types of disposal containers to be used, the methods of transportation to the disposal site, the waste hauler, and disposal site.
7. Copies of notifications required as part of the emergency notification plan in Section 3.6 of this specification.

B. Upon completion of the work and prior to final payment, the following information must be submitted to the Owner or Owner's Representative.

1. Waste disposal receipts and waste shipment records on all waste removed from the project. The disposal and/or shipment record must include the following information:
  - a. Work site name and address
  - b. Project Number
  - c. Owner's name and telephone
  - d. Operator's (Contractor's) name, address and telephone
  - e. Waste Disposal Site name, address and telephone
  - f. Name and address of responsible agency
  - g. Type of materials and quantity in cubic yards
  - h. Name, address and phone number of transporter and date of transport
  - i. Name, address and phone number of Waste Disposal Site representative and date material was received.
2. OSHA personal air monitoring sample results including field data sheets and laboratory analytical results.
3. Any other specific requirements spelled out in the General Conditions.

### 3.3 TESTING LABORATORY

- A. Testing laboratories utilized by the contractor for **OSHA required** sample analysis during the project shall meet the following minimum requirements and be approved by the Owner's Representative.
1. For asbestos bulk sample analysis, the laboratory must be accredited by the National Voluntary Laboratory Accreditation Program for asbestos fiber analysis.
  2. For asbestos air samples analyzed by Phase Contrast Microscopy, the laboratory must be accredited by the American Industrial Hygiene Association or the analyst must be listed on the AIHA Asbestos Analysts Registry (AAR).

3. For asbestos air samples analyzed by Transmission Electron Microscopy, the laboratory must be accredited by the National Voluntary Laboratory Accreditation Program.
4. On-site analysis by Phase Contrast Microscopy, when applicable, shall be by an analyst listed on the AIHA AAR.
5. Neither the contractor, nor any of his principals, officers, or directors may have any financial or business interests in any laboratory utilized on this contract.

### **3.4 LOCAL AREA PROTECTION/SITE SECURITY**

- A. The abatement contractor shall be responsible for all areas of the building used by him and/or subcontractors in the performance of the work. He 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 by these specifications.
  1. The 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 as he requires of his employees.
  2. The contractor shall have control of site security during abatement operations in order to protect his work and equipment. He will have the Owner's assistance in notifying building occupants of impending activity and enforcement of restricted access by owner's employees.
  3. The contractor shall keep, as a minimum, two 10 lbs. type ABC fire extinguishers on site at all times. The contractor's employees shall be trained in the use and operation of the extinguishers.
  4. The contractor shall use as small an area as necessary for storage of supplies and equipment and shall keep such in a neat and orderly fashion. Trash must be removed daily and will not be allowed to accumulate.
  5. The contractor shall maintain the work area free from rubbish, debris, and dirt and keep a clean safe work area. The contractor shall take measures to keep surfaces free from contamination or shall clean and lock down surfaces after work is done, protect with plastic sheeting and/or plywood during work, or remove from the work area.

### **3.5 WORKER PROTECTION/TRAINING**

- A. The contractor shall be responsible for providing his employees with proper respiratory protection, respiratory training, a written respirator program, medical examinations, protective clothing and equipment and for maintaining medical records to comply with OSHA requirements.
  1. The contractor shall be responsible for all testing and costs incurred for complying with requirements OSHA regulations for Personal Monitoring.
  2. All workers are to be trained in the dangers inherent in handling asbestos and breathing asbestos dust and in proper work procedures and personal and protective measures.

### **3.6 EMERGENCY PROTECTION PLAN**

- A. The contractor shall be responsible for developing a written site-specific Emergency Protection Plan and shall maintain this plan on site. The plan shall include considerations for asbestos leakage from site, fire, explosion, toxic atmospheres, electrical hazards, slips, falls, and heat related injury. All employees shall be instructed and trained in the procedures.
- Emergency protection planning shall also include written notification of police, fire, and medical personnel of the planned abatement activities, work schedule, and the layout of the work area, particularly barriers that may affect response capabilities.

### 3.7 SUPERVISOR OF ABATEMENT

- A. The contractor shall designate an abatement supervisor, subject to the approval of 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. The Abatement Supervisor must be licensed as an Asbestos Abatement Supervisor and must have at least one-year full time experience in asbestos abatement work.
  2. **Shall be on site whenever work is going on.**
  3. Maintain a daily log on the project documenting events, visitations, problems, equipment failures, accidents and inspections. The daily logs must be produced at the request of the Owner, Owner's Representative or the Third-Party Air Monitor.
  4. Implement first aid, safety training, respiratory protection, and ensuring all workers are trained in emergency procedures.
  5. Conduct visual inspection of the work area prior to the visual inspection done by the Third-Party Air Monitor.
  6. Supervise activities of any subcontractors of the contractor to ensure compliance with contract documents.
  7. Duties shall include those for the "Competent Person" as defined in this specification.

### 3.8 AIR MONITORING REQUIREMENTS

- A. The Owner's Representative / Third-Party Air Monitor will collect samples near and away from the work or upwind and downwind to determine the effectiveness of work practices and control measures used by the contractor to contain asbestos fibers inside the work areas. The Third-Party Air Monitor will determine the number, frequency and location of these samples. **The Third-Party Air Monitor will not be responsible for the abatement contractor's required OSHA personnel monitoring.**
1. Following the completion of the abatement work, the abatement supervisor shall notify the Third-Party Air Monitor. The Third-Party Air Monitor shall perform a visual inspection. Final clearance air sampling is not required for outdoor removal work.
  2. **Any work area failing to meet the final visual inspection criteria, shall be re-cleaned at the contractor's expense until a satisfactory visual is obtained. The Owner will not reimburse the contractor for re-cleaning the work area.**

### 3.9 RE-ESTABLISHMENT OF THE WORK AREA AND SYSTEMS

- A. Re-establishment of the work area shall only occur after the contractor has complied with the requirements of Section 3.8. All barriers, signs, trash, and equipment shall then be removed from the site.

### **3.10 WASTE DISPOSAL**

- A. All asbestos shall be disposed of in compliance with current federal, state and local regulations.
  - 1. RACM that is disposed of in Missouri shall be disposed of in a sanitary landfill having a state permit to operate. ACM shall be disposed of in a demolition landfill or a sanitary landfill having a state permit to operate. The landfill shall handle all ACM so that it does not become friable. Landfills shall cover ACM with at least six (6) inches of soil at the end of each operating day.
  - 2. A chain of custody letter/waste shipment record and disposal receipts shall be provided to the Construction Administrator for all materials disposed of.
  - 3. The waste shipment record shall be originated and signed by the waste generator and shall be used to track and substantiate the disposition of ACM.

### **3.11 DRAWINGS**

- A. For the purpose of this specification, drawings, when provided are not intended to be used for anything other than a “reference” to the work area. Information is not specific to quantities or to the exact location of asbestos. The contractor will be required to field verify the conditions, locations, and quantities referenced.

**END OF SECTION 013240**

## **SECTION 013300 – SUBMITTALS**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes administrative and procedural requirements for submittals required for performance of the Work including the following:
  - 1. Shop Drawings
  - 2. Product Data
  - 3. Samples
  - 4. Quality Assurance Submittals
  - 5. Construction Photographs
  - 6. Operating and Maintenance Manuals
  - 7. Warranties
- B. Administrative Submittals: Refer to General and Supplementary Conditions other applicable Division 1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to, the following:
  - 1. Construction Progress Schedule including Schedule of Values
  - 2. Performance and Payment Bonds
  - 3. Insurance Certificates
  - 4. Applications for Payment
  - 5. Certified Payroll Reports
  - 6. Partial and Final Receipt of Payment and Release Forms
  - 7. Affidavit – Compliance with Prevailing Wage Law
  - 8. Record Drawings
  - 9. Notifications, Permits, etc.
- C. The Contractor is obliged and responsible to check all shop drawings and schedules to assure compliance with contract plans and specifications. The Contractor is responsible for the content of the shop drawings and coordination with other contract work. Shop drawings and schedules shall indicate, in detail, all parts of an Item or Work including erection and setting instructions and integration with the Work of other trades.
- D. The Contractor shall at all times make a copy, of all approved submittals, available on site to the Construction Representative.

### **1.3 SUBMITTAL PROCEDURES**

- A. The Contractor shall comply with the General and Supplementary Conditions and other applicable sections of the Contract Documents. The Contractor shall submit, with such promptness as to cause no delay in his work or in that of any other contractors, all required submittals indicated in Part 3.1 of this section and elsewhere in the Contract Documents. Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
  - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  - 2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
    - a. The Designer reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received.
  
- B. Each drawing and/or series of drawings submitted must be accompanied by a letter of transmittal giving a list of the titles and numbers of the drawings. Each series shall be numbered consecutively for ready reference and each drawing shall be marked with the following information:
  - 1. Date of Submission
  - 2. Name of Project
  - 3. Location
  - 4. Section Number of Specification
  - 5. State Project Number
  - 6. Name of Submitting Contractor
  - 7. Name of Subcontractor
  - 8. Indicate if Item is submitted as specified or as a substitution

### **1.4 SHOP DRAWINGS**

- A. Comply with the General Conditions, Article 3.2.
  
- B. The Contractor shall submit newly prepared information drawn accurately to scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not a Shop Drawing.
  
- C. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates, and similar drawings including the following information:
  - 1. Dimensions
  - 2. Identification of products and materials included by sheet and detail number
  - 3. Compliance with specified standards

4. Notation of coordination requirements
5. Notation of dimensions established by field measurement
6. Sheet Size: Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least 8½"x11" but no larger than 36"x48".

## **1.5 PRODUCT DATA**

- A. The Contractor shall comply with the General Conditions, Article 3.2.
- B. The Contractor shall collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information, such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, and performance curves.
  1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products that are not required, mark copies to indicate the applicable information including the following information:
    - a. Manufacturer's printed recommendations
    - b. Compliance with Trade Association standards
    - c. Compliance with recognized Testing Agency standards
    - d. Application of Testing Agency labels and seals
    - e. Notation of dimensions verified by field measurement
    - f. Notation of coordination requirements
  2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

## **1.6 SAMPLES**

- A. The Contractor shall comply with the General Conditions, Article 3.2.
- B. The Contractor shall submit full-size, fully fabricated samples, cured and finished as specified, and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.
  1. The Contractor shall mount or display samples in the manner to facilitate review of qualities indicated. Prepare samples to match the Designer's sample including the following:
    - a. Specification Section number and reference
    - b. Generic description of the Sample
    - c. Sample source
    - d. Product name or name of the Manufacturer
    - e. Compliance with recognized standards
    - f. Availability and delivery time
  2. The Contractor shall submit samples for review of size, kind, color, pattern, and texture. Submit samples for a final check of these characteristics with other

elements and a comparison of these characteristics between the final submittal and the actual component as delivered and installed.

- a. Where variation in color, pattern, texture, or other characteristic is inherent in the material or product represented, submit at least three (3) multiple units that show approximate limits of the variations.
  - b. Refer to other Specification Sections for requirements for samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.
  - c. Refer to other Sections for samples to be returned to the Contractor for incorporation in the Work. Such samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of sample submittals.
  - d. Samples not incorporated into the Work, or otherwise designated as the Owner's property, are the property of the Contractor and shall be removed from the site prior to Substantial Completion.
3. Field samples are full-size examples erected onsite to illustrate finishes, coatings, or finish materials and to establish the Project standard.
- a. The Contractor shall comply with submittal requirements to the fullest extent possible. The Contractor shall process transmittal forms to provide a record of activity.

## **1.7 QUALITY ASSURANCE DOCUMENTS**

- A. The Contractor shall comply with the General Conditions, Article 3.2
- B. The Contractor shall submit quality control submittals including design data, certifications, manufacturer's instructions, manufacturer's field reports, and other quality-control submittals as required under other Sections of the Specifications.
- C. Certifications: Where other Sections of the Specifications require certification that a product, material, or installation complies with specified requirements, submit a notarized certification from the Manufacturer certifying compliance with specified requirements.
  1. Signature: Certification shall be signed by an officer of the Manufacturer or other individual authorized to contractually bind the Company.
- D. Inspection and Test Reports: The Contractor shall submit the required inspection and test reports from independent testing agencies as specified in this Section and in other Sections of the Contract Documents.
- E. Construction Photographs: The Contractor shall submit record construction photographs as specified in this Section and in other Sections of the Contract Documents.
  1. The Contractor shall submit two (2) sets of prints, black and white, glossy; 8"x10" size; mounted on 8½"x11" soft card stock with left edge binding margin for 3-hole punch.
  2. The Contractor shall identify each photograph with project name, location, number, date, time, and orientation.
  3. The Contractor shall submit progress photographs monthly unless specified otherwise. Photographs shall be taken one (1) week prior to submitting.

4. The Contractor shall take four (4) site photographs from differing directions and a minimum of five (5) interior photographs indicating the relative progress of the Work.

**1.8 OPERATING AND MAINTENANCE MANUALS AND WARRANTIES**

- A. The Contractor shall submit all required manufacturer’s operating instructions, maintenance/service manuals, and warranties in accordance with the General Conditions, Article 3.5, and Supplementary Conditions along with this and other Sections of the Contract Documents.

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

**PART 3 - EXECUTION**

**3.1 REQUIRED SUBMITTALS**

- A. Contractor shall submit the following information for materials and equipment to be provided under this contract.

SECTION	DESCRIPTION	TYPE OF SUBMITTAL																	
		Shon Drawings	Product Data	Sample	Certifications	Manufacturer' s Instruc-	Test report/Safety Sheets	Inspection Report	Wiring Diagrams	Record Photographs	Maintenance Data	Operating Instruction	Warranty	Schedule of Values	Coordination Drawings	Key Personnel	Schedule	Tabulation of Submittals	Closeout Submittals
013100	Coordination													X	X				
013200	Schedules															X	X		
013513.16	Site Security and Health Requirements						X								X	X			
017300	Execution													X					
017700	Closeout Procedures		X																X
017823	Operation and Maintenance Data																		X
017839	Project Record Documents																		X
024119	Selective Demolition																		X
061000	Rough Carpentry		X		X														
061500	Wood Decking		X																
074113.16	Standing-Seam Metal Roof Panels	X	X	X	X	X					X	X							
075423	Thermoplastic Polyolefin (TPO) Roofing	X	X	X	X	X	X				X	X							

076200	Sheet Metal Flashing and Trim	X	X	X	X		X						X						
077200	Roof Accessories	X	X	X									X						
077253	Snow Guards	X	X	X							X		X						
079200	Joint Sealants		X	X	X		X												
099113	Exterior Painting		X	X							X		X						
230593	Testing, Adjusting, and Balancing	X					X												
230900	Controls	X	X		X	X		X		X	X	X	X						
233423	Power Ventilators	X	X		X	X		X		X	X	X	X						
233700	Air Inlets and Outlets	X	X		X	X													
260533	Conduit and Boxes		X		X														

**END OF SECTION 013300**

## SECTION 013513.16 – SITE SECURITY AND HEALTH REQUIREMENTS (DOC)

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUBMITTALS

- A. List of required submittals:
  - 1. Materials Safety Data Sheets for all hazardous materials to be brought onsite.
  - 2. Schedule of proposed shutdowns, if applicable.
  - 3. Revise list to include all required submittals.
  - 4. A list of the names of all employees who will submit fingerprints for a background check, and the signed privacy documents identified below for each employee.
  - 5. Tuberculin skin test results for all employees required to be tested as set forth below.

### PART 2 - PRODUCTS (Not Applicable)

### PART 3 - EXECUTION

#### 3.1 ACCESS TO THE SITE

- A. The Contractor shall arrange with Facility Representatives to establish procedures for the controlled entry of workers and materials into the work areas at the Facility.
- B. The Contractor shall establish regular working hours with Facility Representatives. The Contractor must report changes in working hours or overtime to Facility Representatives and obtain approval twenty-four (24) hours ahead of time. The Contractor shall report emergency overtime to Facility Representatives as soon as it is evident that overtime is needed. The Contractor must obtain approval from Facility Representatives for all work performed after dark.
- C. The Contractor shall provide the name and phone number of the Contractor's employee or agent who is in charge onsite; this individual must be able to be contacted in case of emergency. The Contractor must be able to furnish names and address of all employees upon request.
- D. The Contractor shall provide Facility Representatives notice twenty-four (24) hours prior to any possible vehicle entry and/or required escort. The Contractor shall maintain a time log of any delays in gaining entrance to the Facility due to lack of an escort, which is to be submitted monthly with the Contractor's pay request materials. The purpose of this log is to establish a basis for a contract change, if required. The log shall contain the date and time of delay, date and time of request of entry, workers delayed (name and occupation), and name of the Facility Representative to whom the request was made, if possible. Any delay in entry must be validated by sallyport and pass office personnel at the Facility. Only delays greater than thirty (30) minutes will be considered for a contract change. A 30-minute delay upon arrival with a vehicle to enter the sallyport should be expected.

### 3.2 RULES OF THE FACILITY

A. The Contractor and its workers shall observe the following rules:

1. There shall be no fraternization with inmates.
2. No intoxicating beverages or illegal drugs shall be brought onto Facility grounds.
3. No firearms, other weapons, or explosives shall be carried onto Facility grounds.
4. No prescription drugs above one day's dosage shall be carried on Facility grounds.
5. Any vehicle or individual is subject to search at any time while on Facility grounds.
6. The vehicles of the Contractor and its workers shall be locked whenever unattended.
7. All tools and equipment shall be tightly secured during non-working hours in the Contractor's storage trailer or assigned area.
8. The Facility will not be responsible for the Contractor's tools, equipment, or materials. **The Contractor shall keep and maintain a current tool inventory.** The tool inventory shall be made available to Facility Representatives and the Owner upon request.
9. The Contractor shall report any missing tools to Facility Representatives immediately.
10. Smoking shall be permitted only in accordance with the regulations of the Facility.
11. Possession or use of smokeless tobacco or smokeless non-tobacco alternatives is strictly prohibited.

B. All workers shall be required to sign an acknowledgement of receipt of these rules.

### 3.3 SECURITY CLEARANCES AND RESTRICTIONS

#### A. DOC SECURITY CLEARANCE REQUIREMENTS

1. Prior to the commencement of any onsite work, the Contractor shall submit a list containing the name, date of birth, and Missouri driver's license number or social security number of all construction personnel to the Missouri Department of Corrections for the purpose of obtaining security clearances. The required information shall be submitted at the pre-construction meeting, or as otherwise directed by Department of Corrections' personnel. Any construction personnel with pending warrants or felony convictions within the last five (5) years or other offenses deemed to create a security risk by Department of Corrections shall not be allowed onsite. The Department of Corrections reserves the right to refuse admission to any individual they feel may be detrimental to the security of the Facility.

### 3.4 FIRE PROTECTION, SAFETY, AND HEALTH CONTROLS

A. The Contractor shall take all necessary precautions to guard against and eliminate possible fire hazards.

1. Onsite burning is prohibited.
2. The Contractor shall store all flammable or hazardous materials in proper containers located outside the buildings or offsite, if possible.

3. The Contractor shall provide and maintain, in good order, during construction fire extinguishers as required by the National Fire Protection Association. In areas of flammable liquids, asphalt, or electrical hazards, 15-pound carbon dioxide or 20-pound dry chemical extinguishers shall be provided.
- B. The Contractor shall not obstruct streets or walks without permission from the Owner's Construction Representative and Facility Representatives.
- C. The Contractor's personnel shall not exceed the speed limit of 15 mph while at the Facility unless otherwise posted.
- D. The Contractor shall take all necessary, reasonable measures to reduce air and water pollution by any material or equipment used during construction. The Contractor shall keep volatile wastes in covered containers, and shall not dispose of volatile wastes or oils in storm or sanitary drains.
- E. The Contractor shall keep the project site neat, orderly, and in a safe condition at all times. The Contractor shall immediately remove all hazardous waste, and shall not allow rubbish to accumulate. The Contractor shall provide onsite containers for collection of rubbish and shall dispose of it at frequent intervals during the progress of the Work.
- F. Fire exits, alarm systems, and sprinkler systems shall remain fully operational at all times, unless written approval is received from the Owner's Construction Representative and the appropriate Facility Representative at least twenty-four (24) hours in advance. The Contractor shall submit a written time schedule for any proposed shutdowns.
- G. For all hazardous materials brought onsite, Material Safety Data Sheets shall be on site and readily available upon request at least a day before delivery.
- H. The Contractor's workers shall not be under the influence of any intoxicating substances while on the Facility premises.

### **3.5 TUBERCULOSIS TESTING REQUIREMENTS**

- A. All workers who will be in the confines of the Facility for more than ten (10) consecutive working days must provide proof of a negative tuberculin skin test. The test results must be no more than six (6) months old at the commencement of construction. The Contractor or the worker, not the Owner, shall pay the cost of the test.
- B. The Contractor shall submit to Facility Representatives current tuberculin skin test results for all workers who are required to have such a test in accordance with paragraph A above. If the contract period extends for more than twelve (12) months, the Contractor must provide new test results for all workers prior to the anniversary of the contract commencement date.
- C. Any worker required to have a tuberculin skin test under paragraph A above who fails or refuses to do so will be denied admission to the facility until such time as proof of the test results are provided.
- D. If any worker has a tuberculin skin test with positive results, the worker shall be denied access to the facility until the worker produces a certification from a physician licensed to practice in the State of Missouri that the worker does not have infectious tuberculosis.
- E. The Contractor shall not be entitled to any additional time or compensation if any of its workers are denied access to the facility because of failure to produce negative tuberculin skin test results.

- F. Failure or refusal of the Contractor to maintain and produce the required tuberculin skin test records shall be a material breach of this contract, which shall subject the Contractor to a declaration of default.

### 3.6 PREA FOR CONTRACTORS AND EMPLOYEES

- A. The contractor and all of the contractor's employees and agents providing services in any Department of Corrections institution must be at least 18 years of age. A Missouri Uniform Law Enforcement System (MULES) check or other background investigation may be required on the contractor, the contractor's employees and agents before they are allowed entry into the institution. The contractor, its employees and agents understand and agree that the Department may complete criminal background records checks annually for the contractor and the contractor's employees and agents that have the potential to have contact with inmates.
- B. The institution shall have the right to deny access into the institution for the contractor and any of the contractor's employees and agents for any reason, at the discretion of the institution.
- C. The contractor, its employees and agents under active federal or state felony or misdemeanor supervision must receive written division director approval prior to providing services pursuant to a Department contract. Similarly, contractors/employees/agents with prior felony convictions and not under active supervision must receive written division director approval in advance.
- D. The contractor, its employees and agents shall at all times observe and comply with all applicable state statutes, Department rules, regulations, guidelines, internal management policies and procedures, and general orders of the Department that are applicable, regarding operations and activities in and about all Department property. Furthermore, the contractor, its employees and agents, shall not obstruct the Department or any of its designated officials from performing their duties in response to court orders or in the maintenance of a secure and safe correctional environment. The contractor shall comply with the Department's policies and procedures relating to employee conduct.
  - 1. The Department has a zero tolerance policy for any form of sexual misconduct to include staff/contractor/volunteer on offender, or offender on offender, sexual harassment, sexual assault, sexual abuse and consensual sex.
    - a) Any contractor or contractor's employee or agent who witnesses any form of sexual misconduct must immediately report it to the warden of the institution. If a contractor or contractor's employee or agent fails to report or knowingly condones sexual harassment or sexual contact with or between offenders, the Department may cancel the contract, or at the Department's sole discretion, require the contractor to remove the employee/agent from providing services under the contract.
    - b) Any contractor or contractor's employee or agent who engages in sexual abuse shall be prohibited from entering the institution and shall be reported to law enforcement agencies and licensing bodies, as appropriate.
- E. The contractor, its employees and agents shall not interact with the offenders except as is necessary to perform the requirements of the contract. The contractor, its employees and agents shall not give anything to nor accept anything from the offenders except in the normal performance of the contract.
- F. If any contractor or contractor's employee or agent is denied access into the institution for any reason or is denied approval to provide service to the Department for any reason stated herein, it shall not relieve the contractor of any requirements of the contract. If the contractor is unable to

perform the requirements of the contract for any reason, the contractor shall be considered in breach.

### **3.7 DISRUPTION OF UTILITIES**

- A. The Contractor shall give a minimum of seventy-two (72) hours written notice to the Construction Representative and the Facility Representative before disconnecting electric, gas, water, fire protection, or sewer service to any building.
- B. The Contractor shall give a minimum of seventy-two (72) hours written notice to the Construction Representative and Facility Representative before closing any access drives, and shall make temporary access available, if possible. The Contractor shall not obstruct streets, walks, or parking.

### **3.8 CELL PHONES AND ELECTRONIC DEVICES**

- A. Cell phones, pagers, smart watches (that can send/receive messages), fitness wrist bands (that can send/receive messages) or other electronic devices are not permitted.
  - 1. Contractors, repairpersons, or information technology services department staff may be permitted to bring in a cell phone and portable wireless router (Wi-Fi, MiFi, etc.) if approved by the Chief Administrative Officer (CAO) when the phone is necessary to complete job duties relating to repairs on a case by case basis.
  - 2. Tablets (IPad, etc.) are not allowed with the exception of for re-entry purposes and approved via the division of adult institutions (DAI) director and the re-entry manager.
  - 3. Lap top computers may be permitted by the CAO on a case by case basis.

**END OF SECTION 013513.16**

## **SECTION 015000 – CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes requirements for construction facilities and temporary controls including temporary utilities, support facilities, security, and protection.
- B. Temporary utilities include, but are not limited to, the following:
  - 1. Water service and distribution
  - 2. Temporary electric power and light
  - 3. Temporary heat
  - 4. Ventilation
  - 5. Sanitary facilities, including drinking water
- C. Support facilities include, but are not limited to, the following:
  - 1. Storage sheds
  - 2. Temporary enclosures
  - 3. Hoists and temporary elevator use
  - 4. Temporary project identification signs and bulletin boards
  - 5. Waste disposal services
  - 6. Rodent and pest control
  - 7. Construction aids and miscellaneous services and facilities
- D. Security and protection facilities include, but are not limited to, to following:
  - 1. Barricades, warning signs, and lights
  - 2. Sidewalk bridge or enclosure fence for the site
  - 3. Environmental protection

#### **1.3 QUALITY ASSURANCE**

- A. Regulations: Comply with industry standards and applicable laws and regulations including, but not limited to, the following:
  - 1. Building code requirements
  - 2. Health and safety regulations
  - 3. Utility company regulations
  - 4. Police, fire department, and rescue squad rules

5. Environmental protection regulations
- B. Standards: Comply with NFPA 241 “Standard for Safeguarding Construction, Alterations, and Demolition Operations”. ANSI A10 Series standards for “Safety Requirements for Construction and Demolition”, and NECA Electrical Design Library “Temporary Electrical Facilities”.
    1. Electrical Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 “National Electric Code”.

## **1.4 PROJECT CONDITIONS**

- A. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the Work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist onsite.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. General: Provide new materials. If acceptable to the Designer, the Contractor may use undamaged, previously used materials in serviceable condition. Provide materials suitable for use intended.

### **2.2 EQUIPMENT**

- A. General: Provide new equipment. If acceptable to the Designer, the Contractor may use undamaged, previously used equipment in serviceable condition. Provide equipment suitable for use intended.
- B. Water Hoses: Provide ¾” heavy-duty, abrasion-resistant, flexible rubber hoses 100’ long, with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge.
- C. Electrical Outlets: Provide properly configured, NEMA-polarized outlets to prevent insertion of 110 to 120V plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment.
- D. Electrical Power Cords: Provide grounded extension cords. Use hard-service cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage rating.
- E. Fire Extinguishers: Provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers, or a combination of extinguishers of NFPA-recommended classes for the exposures.
  1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

### **3.2 TEMPORARY UTILITY INSTALLATION**

- A. Temporary Water Service: The Owner will provide water for construction purposes from the existing building system. All required temporary extensions shall be provided and removed by the Contractor. Connection points and methods of connection shall be designated and approved by the Construction Representative.
- B. Temporary Electric Power Service: The Owner will provide electric power for construction lighting and power tools. Contractors using such services shall pay all costs of temporary services, circuits, outlet, extensions, etc.
- C. Temporary Heating and Cooling: The normal heating and/or cooling system of the building shall be maintained in operation during the construction. Should the Contractor find it necessary to interrupt the normal HVAC service to spaces, which have not been vacated for construction, such interruptions shall be pre-scheduled with the Construction Representative.
- D. Temporary Toilets: The Owner will provide toilets and associated facilities within the building. All construction personnel will be allowed access only to those specific facilities designated by the Construction Representative.
- E. Wash Facilities: The Owner will provide wash facilities within the building. All construction personnel will be allowed access only to those specific facilities designated by the Construction Representative.
- F. Drinking-Water Facilities: The Owner will provide drinking water facilities within the building. All construction personnel will be allowed access only to those specific facilities designated by the Construction Representative.

### **3.3 SUPPORT FACILITIES INSTALLATION**

- A. General: Locate temporary construction and support facilities per the Facility as indicated in the Pre-Construction Meeting.
- B. Storage Facilities: Areas for storage of building materials on site will be discussed at the Pre-Bid Meeting and Pre-Construction Meeting. For materials stored on existing roofs, loads shall not exceed the loading limits of the existing roof construction. Roofing materials must be craned onto the roof from dedicated area as arranged by the Contractor with the Facility Representative; costs of all such arrangements shall be paid by the Contractor. The Contractor shall provide his own security as he finds necessary. Specific locations for storage and craning operations will be discussed at the Pre-Bid Meeting and the Pre-Construction Meeting.
- C. Construction Parking: Contractors must be prepared to discuss their storage and parking needs at the Pre-Bid Meeting. Parking at the site will be provided in the areas designated

at the Pre-Construction Meeting. Under no circumstances will any vehicle be parked in a fire lane. Parking on lawns shall be prohibited.

- D. Temporary and Hoists: Provide facilities for hoisting materials and employees. Truck cranes and similar devices used for hoisting materials are considered “tools and equipment” and not temporary facilities.
- E. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than seven (7) days during normal weather or three (3) days when the temperature is expected to rise above 80°F (27°C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material lawfully.

### **3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION**

- A. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate, provide lighting including flashing red or amber lights.
- B. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted or that other undesirable effects might result. Avoid use of tools and equipment that project harmful noise. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from person or firms near the site.
- C. Fencing: At all dumpster and staging areas on site, comply with Facility standard security requirements. Provide a 10’-0” fence anchored with concrete block barricades per security requirements.

### **3.5 OPERATION, TERMINATION AND REMOVAL**

- A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
- C. Termination and Removal: Unless the Designer requests that it be maintained longer, remove each temporary facility when the need has ended or no later than Substantial Completion. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
  - 1. Materials and facilities that constitute temporary facilities are the Contractor’s property. The Owner reserves the right to take possession of project identification signs.
  - 2. At Substantial Completion, clean and renovate permanent facilities used during the construction period, restore to existing condition.

**END OF SECTION 015000**

## **SECTION 017300 - EXECUTION**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

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

1. Construction layout.
2. Installation of the Work.
3. Cutting and patching.
4. Progress cleaning.
5. Starting and adjusting.
6. Protection of installed construction.
7. Correction of the Work.

- B. Related Requirements:

1. Section 011000 "Summary of Work" for limits on use of Project site.
2. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
3. Section 024119 "Selective Demolition" for demolition and removal of selected portions of the building.

#### **1.3 DEFINITIONS**

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

#### **1.4 QUALITY ASSURANCE**

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
  1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and

patch structural elements in a manner that could change their load-carrying capacity or increase deflection

2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
  3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
  4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- B. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
  1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
- B. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
  1. Description of the Work.
  2. List of detrimental conditions, including substrates.

3. List of unacceptable installation tolerances.
  4. Recommended corrections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect.

### 3.3 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb and make horizontal work level.
  2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
  3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
  4. Maintain minimum headroom clearance of **96 inches** in occupied spaces and **90 inches** in unoccupied spaces.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with

other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

### 3.4 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
  - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to **prevent** interruption to occupied areas.
- F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
  - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
  - 3. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
  - 4. Proceed with patching after construction operations requiring cutting are complete.
- G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
  - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.

2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
  - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
  - b. Restore damaged pipe covering to its original condition.
- H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

### **3.5 PROGRESS CLEANING**

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
  1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
  2. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
    - a. Use containers intended for holding waste materials of type to be stored.
  3. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
  1. Remove liquid spills promptly.
  2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- H. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

- I. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

### **3.6 STARTING AND ADJUSTING**

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

### **3.7 PROTECTION OF INSTALLED CONSTRUCTION**

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

**END OF SECTION 017300**

## **SECTION 017310 - CUTTING AND PATCHING**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes procedural requirements for cutting and patching.
- B. Related Sections include the following:
  - 1. Division 1 Section "Selective Demolition" for demolition of selected portions of the building for alterations.
  - 2. Divisions 2 through 16 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
    - a. Requirements in this Section apply to mechanical and electrical installations. Refer to Divisions 15 and 16 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

#### **1.3 DEFINITIONS**

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

#### **1.4 QUALITY ASSURANCE**

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
- C. Miscellaneous Elements: Do not cut and patch the following elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
  - 1. Water, moisture, or vapor barriers.
  - 2. Membranes and flashings.
  - 3. Equipment supports.
  - 4. Piping, ductwork, vessels, and equipment.

6. Noise- and vibration-control elements and systems.

- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

## **1.5 WARRANTY**

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

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. General: Comply with requirements specified in other Sections of these Specifications.
- B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
  2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

### **3.2 PREPARATION**

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

### **3.3 PERFORMANCE**

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
  - 1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
  - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  - 2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
  - 3. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
  - 4. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
  - 1. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
    - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

**END OF SECTION 017310**

## **SECTION 017400 – CLEANING**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes administrative and procedural requirements for cleaning during the Project.
- B. Environmental Requirements: Conduct cleaning and waste-disposal operations in compliance with local laws and ordinances. Comply fully with federal and local environmental and anti-pollution regulations.
  - 1. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
  - 2. Burning or burying of debris, rubbish, or other waste material on the premises is not permitted.

### **PART 2 - PRODUCTS**

#### **2.1 MATERIALS**

- A. Cleaning Agents: Use cleaning materials and agents recommended by the manufacturer or fabricator for the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

### **PART 3 - EXECUTION**

#### **3.1 PROGRESS CLEANING**

- A. General
  - 1. Retain all stored items in an orderly arrangement allowing maximum access, not impeding drainage or traffic, and providing the required protection of materials.
  - 2. Do not allow the accumulation of scrap, debris, waste material, and other items not required for construction of this Work.
  - 3. Daily, completely remove all scrap, debris, and waste material from the jobsite.
  - 4. Provide adequate storage for all items awaiting removal from the jobsite, observing all requirements for fire protection and protection of the ecology.
- B. Site
  - 1. Daily, inspect the site and pick up all scrap, debris, and waste material. Remove all such items to the place designated for their storage.
  - 2. Maintain the site in a neat and orderly condition at all times.

### 3.2 FINAL CLEANING

- A. General: Provide final cleaning operations when indicated. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit of Work to the condition expected from a commercial building cleaning and maintenance program. Comply with manufacturer's instructions.
- B. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for the entire Project or a portion of the Project.
  - 1. Remove tools, construction equipment, machinery, and surplus material from the site.
  - 2. Clean exposed hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition.
  - 3. Remove labels that are not permanent labels.
  - 4. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
    - a. Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
  - 5. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
  - 6. Clean plumbing fixtures to a sanitary condition free of stains, including stains resulting from water exposure.
  - 7. Leave the Project clean and ready for occupancy.
- C. Removal of Protection: Remove temporary protection and facilities installed during construction to protect previously completed installations during the remainder of the construction period.
- D. Compliances: Comply with governing regulations and safety standards for cleaning operations. Remove waste materials from the site and dispose of lawfully.
  - 1. Where extra materials of value remain after Final Acceptance by the Owner, they become the Owner's property.

**END OF SECTION 017400**

## **SECTION 017700 - CLOSEOUT PROCEDURES**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
  - 1. Substantial Completion procedures.
  - 2. Final completion procedures.
  - 3. Warranties.
  - 4. Final cleaning.
  - 5. Repair of the Work.
- B. Related Requirements:
  - 1. Section 017300 "Execution" for progress cleaning of Project site.
  - 2. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
  - 3. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

#### **1.3 ACTION SUBMITTALS**

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

#### **1.4 CLOSEOUT SUBMITTALS**

- A. Certificate of Insurance: For continuing coverage.
- B. Field Report.

## 1.5 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
  3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Owner's representative. Label with manufacturer's name and model number where applicable.
  5. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
  2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
  3. Complete startup and testing of systems and equipment.
  4. Perform preventive maintenance on equipment used prior to Substantial Completion.
  5. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
  6. Complete final cleaning requirements, including touchup painting.
  7. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
  2. Results of completed inspection will form the basis of requirements for final completion.

## **1.6 FINAL COMPLETION PROCEDURES**

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
  - 1. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
  - 2. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
  - 1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

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

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
  - 1. Organize list of spaces in sequential order.
  - 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
  - 3. Include the following information at the top of each page:
    - a. Project name.
    - b. Date.
    - c. Name of Architect.
    - d. Name of Contractor.
    - e. Page number.
  - 4. Submit list of incomplete items in the following format:
    - a. MS Excel electronic file. Architect will return annotated file.

## **1.8 SUBMITTAL OF PROJECT WARRANTIES**

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive **8-1/2-by-11-inch** paper.
  2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
  3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
  4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
- C. Provide additional copies of each warranty to include in operation and maintenance manuals.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

## **PART 3 - EXECUTION**

### **3.1 FINAL CLEANING**

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project. Comply with requirements in Section 017410 "Cleaning"
- C. Construction Waste Disposal: Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls."

### **3.2 REPAIR OF THE WORK**

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
1. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
    - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
  2. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.

**END OF SECTION 017700**

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

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
  - 1. Product maintenance manuals.
  - 2. Systems and equipment maintenance manuals.
- B. Related Requirements:
  - 1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

#### **1.3 DEFINITIONS**

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

#### **1.4 CLOSEOUT SUBMITTALS**

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
  - 1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
  - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
  - 1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.
    - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
    - b. Enable inserted reviewer comments on draft submittals.

2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.
  1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

## **PART 2 - PRODUCTS**

### **2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY**

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:
  1. List of documents.
  2. List of systems.
  3. List of equipment.
  4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

### **2.2 REQUIREMENTS FOR MAINTENANCE MANUALS**

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
  1. Title page.
  2. Table of contents.

3. Manual contents.
- B. Title Page: Include the following information:
1. Subject matter included in manual.
  2. Name and address of Project.
  3. Name and address of Owner.
  4. Date of submittal.
  5. Name and contact information for Contractor.
  6. Name and contact information for Architect.
  7. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
  8. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
  2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered, post-type binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
    - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.

- b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch (215-by-280-mm) white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
  - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
  - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

### **2.3 OPERATION MANUALS**

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
  1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
  2. Performance and design criteria if Contractor has delegated design responsibility.
  3. Operating standards.
  4. Operating procedures.
  5. Operating logs.
  6. Wiring diagrams.
  7. Control diagrams.
  8. Piped system diagrams.
  9. Precautions against improper use.
  10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
  1. Product name and model number. Use designations for products indicated on Contract Documents.
  2. Manufacturer's name.
  3. Equipment identification with serial number of each component.
  4. Equipment function.
  5. Operating characteristics.
  6. Limiting conditions.
  7. Performance curves.
  8. Engineering data and tests.
  9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
  2. Equipment or system break-in procedures.
  3. Routine and normal operating instructions.
  4. Regulation and control procedures.
  5. Instructions on stopping.
  6. Normal shutdown instructions.
  7. Seasonal and weekend operating instructions.
  8. Required sequences for electric or electronic systems.
  9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

## **2.4 PRODUCT MAINTENANCE MANUALS**

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

## 2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

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

## **PART 3 - EXECUTION**

### **3.1 MANUAL PREPARATION**

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
  - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
  - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
  - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
  - 1. Do not use original project record documents as part of operation and maintenance manuals.
  - 2. Comply with requirements of newly prepared record Drawings in Section 017839 "Project Record Documents."
- F. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

**END OF SECTION 017823**

## **SECTION 017839 - PROJECT RECORD DOCUMENTS**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

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

#### **1.3 CLOSEOUT SUBMITTALS**

- A. Record Drawings: Comply with the following:
  - 1. Number of Copies: Submit copies of record Drawings as follows:
    - a. Submittal:
      - 1) Submit one paper-copy set(s) of marked-up record prints.
      - 2) Submit PDF electronic files of scanned record prints and one of file prints.
- B. Record Specifications: Submit one paper copy and annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit one paper copy and annotated PDF electronic files and directories of each submittal.
  - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

## PART 2 - PRODUCTS

### 2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
    - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    - b. Accurately record information in an acceptable drawing technique.
    - c. Record data as soon as possible after obtaining it.
    - d. Record and check the markup before enclosing concealed installations.
    - e. Cross-reference record prints to corresponding archive photographic documentation.
  2. Content: Types of items requiring marking include, but are not limited to, the following:
    - a. Dimensional changes to Drawings.
    - b. Revisions to details shown on Drawings.
    - c. Revisions to routing of piping and conduits.
    - d. Revisions to electrical circuitry.
    - e. Actual equipment locations.
    - f. Duct size and routing.
    - g. Locations of concealed internal utilities.
    - h. Changes made by Change Order or Change Directive.
    - i. Changes made following Architect's written orders.
    - j. Details not on the original Contract Drawings.
    - k. Field records for variable and concealed conditions.
    - l. Record information on the Work that is shown only schematically.
  3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
  4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
  5. Mark important additional information that was either shown schematically or omitted from original Drawings.
  6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
1. Format: Annotated PDF electronic file.
  2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
  3. Refer instances of uncertainty to Architect for resolution.

- C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
  - 1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
  - 2. Format: Annotated PDF electronic file.
  - 3. Identification: As follows:
    - a. Project name.
    - b. Date.
    - c. Designation "PROJECT RECORD DRAWINGS."
    - d. Name of Architect.
    - e. Name of Contractor.

## **2.2 RECORD SPECIFICATIONS**

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

## **2.3 RECORD PRODUCT DATA**

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

## **PART 3 - EXECUTION**

### **3.1 RECORDING AND MAINTENANCE**

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

**END OF SECTION 017839**

## **SECTION 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. Section 011000 "Summary of Work" for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.
  - 2. Section 017300 "Execution" for cutting and patching procedures.
  - 3. Section 017310 "Cutting and Patching"

#### **1.3 DEFINITIONS**

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

#### **1.4 MATERIALS OWNERSHIP**

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.

#### **1.5 INFORMATIONAL SUBMITTALS**

- A. 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.

- B. Schedule of Selective Demolition Activities: Indicate the following:
1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
  2. Interruption of utility services. Indicate how long utility services will be interrupted.
  3. Coordination for shutoff, capping, and continuation of utility services.
  4. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

## **1.6 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: Scope of work includes the removal of Hazardous Materials, see documents for description.
1. If suspected hazardous materials are encountered that are not indicated in the documents, do not disturb; immediately notify Architect and Owner.
- 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.

## **1.7 WARRANTY**

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

## **PART 2 - PRODUCTS**

### **2.1 PERFORMANCE REQUIREMENTS**

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

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

### **3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS**

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

### **3.3 PREPARATION**

- A. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
  - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.

### **3.4 SELECTIVE DEMOLITION, GENERAL**

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
  - 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
  - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
  - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
  - 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
  - 5. Maintain adequate ventilation when using cutting torches.
  - 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.

7. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on existing conditions.
8. Dispose of demolished items and materials promptly.

B. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Protect items from damage during transport and storage.
3. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

C. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

### **3.5 DISPOSAL OF DEMOLISHED MATERIALS**

A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them.

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.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

### **3.6 CLEANING**

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

**END OF SECTION 024119**

## **SECTION 061000 - ROUGH CARPENTRY**

### **PART 1 - GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Dimensional lumber, minor timber framing, engineered wood products, APA rated sheathing, wood blocking, and wood furring.
- B. Appropriate anchoring and/or fastening devices for wood members, as well as acceptable wood treatment.
- C. Preservative treatment of wood.
- D. Structural notes indicated on the drawings regarding rough carpentry shall be considered a part of this specification.

#### **1.2 RELATED WORK**

- A. Pertinent Sections of Division 01.
- B. Section 062000 - Finished Carpentry.
- C. Section 099000 - Paints and Coatings: Field Finishing.

#### **1.3 REFERENCES**

- A. Codes and Standards: Comply with the provisions of the following codes, specifications, and standards except where more stringent requirements are shown or specified. Where any provision of other pertinent codes and standards conflict with this specification, the more stringent provision shall govern.
  - 1. APA PRP-108 - Performance Standards and Qualification Policy for Structural-Use Panels.
  - 2. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
  - 3. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 psi Tensile Strength.
  - 4. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
  - 5. ASTM A653 - Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.
  - 6. ASTM D245 - Standard Practice for Establishing Structural Grades and Related Allowable Properties for Visually Graded Lumber.
  - 7. AWC - Manual for Engineered Wood Construction.
  - 8. AWPA M4 - Standard for the Care of Preservative-Treated Wood Products.
  - 9. AWPA P5 - Standard for Waterborne Preservatives.
  - 10. AWPA T1 - Use Category System: Processing and Treatment Standard.
  - 11. AWPA U1 - Use Category System: User Specification for Treated Wood.
  - 12. NDS - National Design Specification for Wood Construction with Commentary.
  - 13. NDS Supplement - National Design Specification Values for Wood Construction.
  - 14. NIST PS 1 - Structural Plywood.
  - 15. NIST PS 2 - Performance Standard for Wood-Based Structural-Use Panels.
  - 16. NIST PS 20 - American Softwood Lumber Standard.

## 1.4 TESTING AND INSPECTION

### A. Special Inspection and Testing:

1. In accordance with Chapter 17 of the International Building Code, the Owner shall employ a Special Inspection Agency to perform the duties and responsibilities specified in Section 1704.0.
2. The Owner Contractor shall employ an Inspection Agency to perform the duties and responsibilities specified below.
3. Refer to architectural, civil, mechanical, and electrical specifications for testing and inspection requirements of non-structural components.
4. Work performed on the premises of a fabricator approved by the building official need not be tested and inspected per the table below. The fabricator shall submit a certificate of compliance that the work has been performed in accordance with the approved plans and specification to the building official and the Architect and Engineer of Record.
5. Duties of the Special Inspection Agency:
  - a. Perform all testing and inspection required per approved testing and inspection program.
  - b. Furnish inspection reports to the building official, the Owner, the Architect, the Engineer of Record, and the General Contractor. The reports shall be completed and furnished within 48 hours of inspected work.
  - c. Submit a final signed report stating whether the work requiring special inspection was, to the best of the Special Inspection Agency's knowledge in conformance with the approved plans and specifications.
6. Structural Component Testing and Inspection Schedule for Section 061000 is as follows:

	Continuous	Periodic	Referenced Standard	IBC Reference
Wood				
Connections		X	ASTM D1761	
b. Nailing, bolting, anchoring and other fastening of components within the windforce-resisting system, including wood shear walls, wood diaphragms, drag struts, braces, and hold-downs		X		1705.11.1
b. Nailing, bolting, anchoring and other fastening of components within the seismic force-resisting system, including wood shear walls, wood diaphragms, drag struts, braces, shear panels and hold-downs		X		1705.12.2

## **1.5 QUALITY ASSURANCE**

- A. Engineered Wood Products: Obtain each type of engineered wood product through one source from a single manufacturer.
- B. Preservative lumber shall be identified by the Quality Mark of an approved inspection agency.

## **1.6 SUBMITTALS**

- A. Submit product data for each distinct product specified.
  - 1. Submit product data and current ICC Evaluation Reports for framing anchors.
- B. Material certificates for dimensional lumber specified to comply with minimum allowable unit stresses indicated on the documents. Indicate species and grade selected for each use, and design values approved by American Lumber Standards Committee.
- C. Wood treatment data as follows, including chemical treatment manufacturer's warranty and instructions for handling, storing, installing, and finishing treated materials:
  - 1. For each type of preservative-treated wood product, include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standard.
  - 2. For waterborne-treated products, include statement that moisture content of treated materials was reduced to levels indicated before shipment to the project site.

## **1.7 DELIVERY, STORAGE AND HANDLING**

- A. All lumber shall be delivered, piled and handled so as to protect it from warping due to excessive moisture or damage. Lumber shall be stored off the ground and under a waterproof cover properly fastened down to resist wind forces.
- B. All installed exposed wood roof nailers, cants, curbs, and similar items shall be protected from moisture until covered with subsequent roofing materials or flashings.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Lumber Standards:
  - 1. Dimensional Lumber: Comply with PS 20 and with applicable grading rules of inspection agencies certified by ALSC's Board of Review.
    - a. Each piece of lumber to be factory marked with grade, producing mill and the agency providing inspection services. Where exposed lumber is indicated to have a natural finish or receive stain, grade stamp to be located on the end or back of each piece.
    - b. Moisture content not to exceed 19% for kiln-dry or air-dry lumber.

2. Wood Structural Panels:
  - a. Comply with PS 1 or PS 2.
- B. Grade and Species:
  1. Provide dimensional lumber of any species, graded visually or mechanically, and capable of supporting required loads without exceeding allowable design values according to the “National Design Specification for Wood Construction” and its “Supplement.”
- C. Lumber grading rules shall be obtained from one of the following agencies:
  1. NELMA - Northeastern Lumber Manufacturers Association.
  2. NLGA - National Lumber Grades Authority.
  3. NSLB - Northern Softwood Lumber Bureau.
  4. RIS - Redwood Inspection Services.
  5. SPIB - Southern Pine Inspection Bureau.
  6. WCLIB - West Coast Lumber Inspection Bureau.
  7. WWPA - Western Wood Products Association.
- D. When nominal sizes are indicated, provide actual sizes required by PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.

## **2.2 DIMENSIONAL LUMBER**

- A. Beams, headers, joists, and rafters: Refer to plans for material specifications.
- B. Non-load bearing ceiling joists: Standard, stud, or No. 3 of mixed Southern Pine, Hem-Fir, Hem-Fir (North), or Spruce-Pine-Fir.
- C. Exposed framing indicated to be a natural finish or receive stain: Provide material free from imperfections with uniformity of appearance. Refer to plans for material specifications.

## **2.3 WOOD-PRESERVATIVE-TREATED MATERIALS**

- A. Preservative Treatment by Pressure Process: AWWA T1 and AWWA U1.
  1. Preservative Chemicals:
    - a. Alkaline Copper Quat (ACQ-C and ACQ-D)
    - b. Inorganic Boron (SBX)
    - c. Copper Azole (CBA-A and CA-B)
  2. Wood treatment plant shall be experienced in performing work of this section, have specialization in treatment of wood similar to that required for this project, and be licensed by the manufacturer.
- B. Kiln dry material after treatment to a maximum moisture content of 19 percent for lumber and 18 percent for plywood. Do not use material that is warped or does not comply with requirements for untreated material.

- C. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- D. All treated items shall bear an end tag or permanent ink stamp indicating the following:
  - 1. Identification of treating manufacturer.
  - 2. Type of preservative used.
  - 3. Minimum preservative retention (pcf).
  - 4. End use for which the product is treated.
  - 5. Identity of the accredited inspection agency.
  - 6. Standard to which the product is treated.
- E. Application: Contractor to treat wood in accordance with AWWPA Standard U1. Provide treated wood materials as indicated on the drawings and at the locations recommended by the following Use Categories:
  - 1. UC3A represents products used on the exterior of a building, coated in paint or stain, used in a vertical application where water will runoff rapidly. Products are:
    - a. Siding, fascia boards and trim
    - b. Exposed balcony or porch posts
    - c. Gazebo materials
  - 2. UC3B represents products used on the exterior of a building used is a horizontal application where water runoff is not rapid or isn't finished. Products are:
    - a. Decking or balcony boards, including all subframing
    - b. Unpainted siding, fascia boards and trim
    - c. Railings
    - d. Gazebo materials
    - e. Lattice
    - f. Shakes and shingles

## **2.4 ROOF SHEATHING**

- A. Plywood Roof Sheathing:
  - 1. Exposure Durability: As indicated on plans.
  - 2. Span Rating: As indicated on plans.
  - 3. Thickness: As indicated on plans.

## **2.5 MISCELLANEOUS LUMBER**

- A. Grounds, Nailers, Rooftop Equipment Bases and Curbs, Blocking, Cants, Bucks and Shims: Standard, stud, or No. 3 of mixed Southern Pine, Douglas-Fir, Hem-Fir, Hem-Fir (North), or Spruce-Pine-Fir.
- B. Wood preservative treatment for wood plates, curbs, cleats, nailing strips, cants, blocking, nailers and similar items for roof deck construction shall be ACQ or other non-arsenate based preservative.

1. Oil based preservatives, such as creosote or pentachlorophenol types are not acceptable.
2. Paint surfaces, which are cut after treatment with a concentrated solution of the treatment.

## **2.6 MISCELLANEOUS FASTENING REQUIREMENTS**

- A. Furnish and install all fasteners and anchoring devices for entire project, which shall include items as nails, screws, bolts, anchors, and similar items. Common nails shall be used for all fastening in rough carpentry. Exterior exposed nails and screws shall be hot-dipped galvanized. Bolts shall have standard threads and be complete with washers and nuts.
  1. Lumber attached to metal decking shall be anchored direct with two rows of 1/4 inch diameter bolts or sheet metal lag screws spaced not greater than 24 inches on center for each row.
  2. Wood assemblies such as wood curbs, top nailers and other built-up members shall be anchored with common nails or wood screws having at least 1-1/2 inch anchoring penetration spaced in two staggered rows at 24 inches on center for each row.
  3. Miscellaneous nailing shall be at Contractor's discretion for a secure and tight installation.
  4. Pre-drill holes for all nails larger than 20d. Field drill bolt holes for proper matching and bearing.
  5. Lead holes for lag screws shall be installed as per NDS. Lag screws shall be screwed and not driven into place.
  6. Bolts shall be installed in holes bored with a bit 1/16 inch larger than the diameter of the bolt. Bolts and nuts seating on wood shall have cut steel washers under heads and nuts. Nuts shall be pulled tight and again checked and tightened just prior to enclosing bolted members. Counterbore for bolted heads or nuts only where so indicated on the drawings, and then only to sufficient depth to house the bolt or head or nut and washer. Cut off excessive bolt projection where necessary. Nick threads to prevent loosening.

## **2.7 FASTENERS**

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
- B. Where rough carpentry is exposed to weather, in ground contact, used in treated wood, or in areas of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- C. Nails, Brads, and Staples: ASTM F 1667.
- D. Wood Screws: ASME B18.6.1.

- E. Screws for Fastening to Cold-Formed Metal Framing: ASTM C954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
- F. Lag Bolts: ASME B18.2.1.
- G. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION, GENERAL**

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Do not use materials with defects that impair quality of rough carpentry or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- C. Apply field treatment complying with AWWA M4 to cut surfaces of preservative-treated lumber and plywood.
- D. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  - 1. CABO NER-272 for power-driven fasteners.
  - 2. Published requirements of metal framing anchor manufacturer.
- E. Use common wire 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; predrill as required.
- F. All installed wood roof nailers, cants, curbs, and similar items shall be protected from moisture until covered with subsequent materials or flashing.

### **3.2 WOOD FRAMING INSTALLATION, GENERAL**

- A. Framing Standard: Comply with AF&PA's "Manual for Wood Frame Construction," unless otherwise indicated.
- B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions. The design provisions for solid sawn Douglas Fir lumber in the Code are applicable to laminated veneer lumber.
- C. Do not splice structural members between supports, unless specifically detailed.
- D. Maximum concentrated load on any joist to not exceed 100 pounds. Add joists when concentrated load exceeds this value.

- E. Provide a minimum of three inches of bearing for dimensional lumber. Refer to the supplier requirements for bearing of laminated veneer lumber, unless noted otherwise.
- F. Laminated veneer lumber beams shall be laterally supported at all points of bearing. Side mounted joist hangers, nailing to shoulder studs, and nailing of sheathing to beam will satisfy this requirement.
- G. Nails installed parallel to the glue lines on the narrow face shall not be spaced closer than four inches for 10d common nails and three inches for 8d common nails.
- H. Nails installed perpendicular to the glue lines on the wide face shall be installed in accordance with the Building Code. Assemble laminated veneer lumber beams with a minimum of three 16d nails per foot, fully penetrating each piece, unless noted otherwise.

### **3.3 RAFTER FRAMING INSTALLATION**

- A. Rafters: Notch to fit exterior wall plates and toe nail or use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.

**END OF SECTION 061000**

## **SECTION 061500 - WOOD DECKING**

### **PART 1 - GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Engineering, fabrication and erection of wood decking.
- B. Structural notes indicated on the drawings regarding wood decking shall be considered a part of this specification.

#### **1.2 RELATED WORK**

- A. Pertinent Sections of Division 01.
- B. Section 061000 - Rough Carpentry.

#### **1.3 REFERENCES**

- A. Codes and Standards: Comply with the provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified. Where any provision of other pertinent codes and standards conflict with this specification, the more stringent provision shall govern.
  - 1. ASTM D5664 - Standard Test Method for Evaluating the Effects of Fire-Retardant Treatments and Elevated Temperatures on Strength Properties of Fire-Retardant Treated Lumber.
  - 2. AWC - Manual for Engineered Wood Construction.
  - 3. AWWA M4 - Standard for the Care of Preservative-Treated Wood Products.
  - 4. AWWA P5 - Standard for Waterborne Preservatives.
  - 5. AWWA P17 - Fire-Retardant Formulations.
  - 6. AWWA T1 - Use Category System: Processing and Treatment Standard.
  - 7. AWWA U1 - Use Category System: User Specification for Treated Wood.

#### **1.4 TESTING AND INSPECTION**

- 1. Special Inspection and Testing: In accordance with Chapter 17 of the International Building Code, the Owner shall employ a Special Inspection Agency to perform the duties and responsibilities specified in Section 1704.0.
- 2. Refer to architectural, civil, mechanical, and electrical specifications for testing and inspection requirements of non-structural components.
- 3. Work performed on the premises of a fabricator approved by the building official need not be tested and inspected per the table below. The fabricator shall submit a certificate of compliance that the work has been performed in accordance with the approved plans and specification to the building official and the Architect and Engineer of Record.
- 4. Duties of the Special Inspection Agency:
  - a. Perform all testing and inspection required per approved testing and inspection program.

- b. Furnish inspection reports to the building official, the Owner, the Architect, the Engineer of Record, and the General Contractor. The reports shall be completed and furnished within 48 hours of inspected work.
- c. Submit a final signed report stating whether the work requiring special inspection was, to the best of the Special Inspection Agency’s knowledge in conformance with the approved plans and specifications.

5. Structural Component Testing and Inspection Schedule for Section 061500 is as follows:

Wood	Continuous	Periodic	Referenced Standard	IBC Reference
Structural wood with wind resistance				
a. Field gluing of elements of the windforce-resisting system	X			1705.11.1
b. Nailing, bolting, anchoring and other fastening of components within the windforce-resisting system, including wood shear walls, wood diaphragms, drag struts, braces, and hold-downs		X		1705.11.1
a. Field gluing of elements of the seismic force-resisting system	X			1705.12.2
b. Nailing, bolting, anchoring and other fastening of components within the seismic force-resisting system, including wood shear walls, wood diaphragms, drag struts, braces, shear panels and hold-downs		X		1705.12.2

**1.5 QUALITY ASSURANCE**

- A. Fire-Retardant-Treated Wood: Obtain each type of fire-retardant-treated wood product through one source from a single producer.

**1.6 SUBMITTALS**

- A. Product Data:
  - 1. Data for wood-preservative treatment from chemical treatment manufacturer and certification by treatment plant that treated materials comply with requirements. Indicate type of preservative used, net amount of preservative retained and chemical treatment manufacturer’s written instructions for handling, storing, installing and finished treated material.
    - a. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before further fabrication or shipment to site.

## **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Schedule delivery of wood decking to avoid extended on-site storage and to avoid delay.
- B. Store materials under cover and protected from weather and contact with damp or wet surfaces. Provide for air circulation within, around and under temporary coverings. Stack wood decking with surfaces that are to be exposed in the final work from exposure to sunlight.

## **PART 2 - PRODUCTS**

### **2.1 LUMBER, GENERAL**

- A. General: Comply with PS 20 and with applicable grading rules of inspection agencies certified by ALSC's Board of Review.
- B. Moisture Content: Provide wood decking with 19 percent maximum moisture content at time of dressing.

### **2.2 FASTENERS AND ACCESSORY MATERIALS**

- A. Fastener Material: Hot-dip galvanized steel.
- B. Penetrating Sealer: Clear sanding sealer complying with Division 9 painting Sections and compatible with topcoats specified for use over it.

### **2.3 FABRICATION**

- A. Shop Fabrication: Where preservative-treated decking is indicated, complete cutting, trimming, surfacing and sanding before treating.
- B. Fabricate decking in lengths for layup as indicated on the drawings.
- C. Predrill decking for lateral spiking to adjacent units to comply with referenced decking standard.
- D. Seal Coat: After fabricating and surfacing decking, apply a saturation coat of penetrating sealer.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine walls and support framing in areas to receive wood decking for compliance with installation tolerances and other conditions affecting performance of wood decking.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 INSTALLATION**

- A. Where preservative-treated decking must be cut during erection, apply a field-treatment preservative to comply with AWPA M4.

- B. Apply joint sealant to seal roof decking at exterior walls at the following locations:
  - 1. Between decking and supports located at exterior walls.
  - 2. Between decking and exterior walls that butt against underside of decking.
  - 3. Between tongues and grooves of decking over exterior walls and supports at exterior walls.

### **3.3 ADJUSTING**

- A. Repair damaged surfaces and finishes after completing erection. Replace damaged decking if repairs are not approved by Architect.

### **3.4 PROTECTION**

- A. Provide temporary waterproof covering to protect exposed decking before applying roofing.

**END OF SECTION 061500**

## **SECTION 074113.16 - STANDING-SEAM METAL ROOF PANELS**

### **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 standing-seam metal roof panels.
- B. Related Sections:
  - 1. Section 077253 "Snow Guards" for prefabricated devices designed to hold snow on the roof surface, allowing it to melt and drain off slowly.

#### **1.3 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference: Conduct conference at **Project site**.
  - 1. Meet with Owner, Architect, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of roof accessories and roof-mounted equipment.
  - 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  - 3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
  - 4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
  - 5. Review flashings, special details, drainage, penetrations, equipment curbs, and condition of other construction that affect metal panels.
  - 6. Review temporary protection requirements for metal panel systems during and after installation.
  - 7. Review procedures for repair of metal panels damaged after installation.
  - 8. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

#### **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 for each type of panel and accessory.
- B. Shop Drawings:

1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
  2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.
- C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.
1. Include similar Samples of trim and accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
1. Metal Panels: 12 inches long by actual panel width. Include clips, fasteners, closures, and other metal panel accessories.

### **1.5 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, tests performed by a qualified testing agency.
- C. Field quality-control reports.
- D. Sample Warranties: For special warranties.

### **1.6 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For metal panels to include in maintenance manuals.

### **1.7 QUALITY ASSURANCE**

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer with 5 years minimum experience.

### **1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal panels during installation.

## 1.9 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

## 1.10 COORDINATION

- A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.
- B. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

## 1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures including rupturing, cracking, or puncturing.
    - b. Deterioration of metals and other materials beyond normal weathering.
  - 2. Warranty Period: **2** years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  - 2. Finish Warranty Period: **25** years from date of Substantial Completion.
- C. Special Weathertightness Warranty: Manufacturer's standard form, joint no repair limit in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
  - 1. Warranty Period: **25** years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 PERFORMANCE REQUIREMENTS**

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than **25** percent.
- B. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:
  - 1. Deflection Limits: For wind loads, no greater than **1/240** of the span.
- C. Air Infiltration: Air leakage of not more than 0.0028 cfm/sq. ft. when tested according to ASTM E 1680 **or ASTM E 283** at the following test-pressure difference:
  - 1. Test-Pressure Difference: **20 lbf/sq. ft.**
- D. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 1646 **or ASTM E 331** at the following test-pressure difference:
  - 1. Test-Pressure Difference: **20 lbf/sq. ft.**
- E. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E 2140.
- F. Delegated Design Submittals: Submit engineering calculations indicating wind uplift pressure calculations according to local building code for project location with respect to appropriate Importance Factor, Exposure category and Safety Factor. Calculations shall be sealed by a professional engineer licensed to practice structural engineering in the state in which project is located.
- G. ASTM E1592 - Manufacturers test data, signed and sealed by a registered professional engineer, substantiating that roof system will meet the allowable wind pressures using an appropriate Factor of Safety in accordance with AISI S-100.
- H. Wind Uplift Resistance- Provide metal roof panel assemblies that comply with UL-580 for wind uplift resistance class indicated.
- I. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

### **2.2 STANDING-SEAM METAL ROOF PANELS**

- A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
  - 1. Acceptable Manufacturers
    - 1. McElroy Metal Bossier City, LA

2. Garland Company, (The)
3. CENTRIA Architectural Systems

## 2. Product Options

- a. Factory-formed panel, width of 16 inches. Panels shall be symmetrical in design and shall be mechanically seamed with a field operated electric seaming machine approved by the manufacturer.
- b. Minimum seam height 2 3/8 inches over open framing, 1 3/8" over plywood decking. Integral seam, double lock and snap together type panels are not acceptable
- c. Seam cap matching panel finish with two rows of integral factory hot applied sealant. Sealant should not come in contact with clip, and clip should not require sealant to maintain a weathertight condition.
- d. Galvalume coated sheet steel, Type AZ-50, Grade 50 as described in ASTM A792; 24 gauge.
- e. Finish: Two coat coil applied, baked-on full-strength (70% resin, PVF2) fluorocarbon coating consisting of a nominal 0.25 mil dry film thickness primer, and a nominal dry film thickness of 0.7 - 0.8 mil color coat for a total 0.9 to 1.1 mil total system dry film thickness. Finish to be selected from manufacturer's standard color selection. The back side of the material should be 0.25 mil primer and 0.25 mil polyester wash coat.
- f. Color: Color to be selected from Manufacturer's standard color selection. Facility/Architect to choose color during submittals.
- g. Roof panel system must allow individual roof panel removal and replacement from any point on the roof without damage to adjacent roof panel(s).
- h. Panels must be furnished and installed in continuous lengths from ridge to eave with no overlaps. Panels too long to ship will be manufactured on site using manufacturer's employees and equipment.
- i. Panel surface characteristics to be Minor Ribs

## 3. Performance Design

- a. Thermal Movement: Metal Roofing system, including flashing, shall accommodate unlimited thermal movement without buckling or excess stress on the structure.
- b. Roof panel and trim attachments will be designed to satisfy the requirements of the roof design (shown in shop drawings).
- c. Maximum wind uplift capacity of roof system shall be determined using ASTM E 1592 test results, with an appropriate Factor of Safety in accordance with AISI S-100.
- d. Panel system shall be designed in accordance with the local building code and ASCE7 for project location with respect to appropriate Exposure category, Importance Factor and Factor of Safety in accordance with AISI S-100.
- e. Tested and listed by Underwriters Laboratories to comply with UL 580 for wind uplift Class 90 rating.

#### 4. Accessories

- a. Panel Clip Screw - screw required in wind uplift rating requirements and design specification for application, with corrosion-resistant coating, in length necessary to penetrate substrate minimum 3/4 inch., as supplied by roof panel manufacturer.
- b. Roof Panel Clip:
  1. Intermittent Clip: 16 gauge galvanized steel, one-piece, designed to allow roof panel thermal movement and not contact roof panel cap, as supplied by roof panel manufacturer, meeting wind uplift requirements and design criteria of this section.
  2. Multi-Span Clip: as provided by roof panel manufacturer for full assembly warranted systems.
- c. Trim and flashing will be of the same gauge and finish as roof system.
  1. Ridge closures, consisting of metal channel surrounding factory precut closed cell foam, will not be secured through the field of the panel.
  2. Trim will be installed specifically as displayed in the manufacturer provided shop drawings. Proposed changes must be approved in writing by the metal roof system manufacturer.
- d. Concealed supports, angles, plates, accessories and brackets: gauge and finish as recommended, and furnished by manufacturer.
- e. Accessory Screw: Size and screw type as provided by panel manufacturer for each use, with prefinished hex washer head in color to match panels where exposed to view.
- f. Rivets: full stainless steel, including mandrel, in size to match application.
- g. Field Sealant:
  1. Exposed Sealant: Color coordinated urethane or polymer sealant as supplied by panel manufacturer.
  2. Non-exposed Sealant: Non-curing, non-skinning, butyl tape or tube sealant as supplied by manufacturer.
- h. Sealant Tape: non-drying, 100 percent solids, high grade butyl tape, as supplied by panel manufacturer, in sizes to match application.
- i. Pipe Penetration Flashings: 20 year warranted flexible boot type, with stainless steel compression ring. Use silicone type at hot pipes.
- j. Metal Roof Curbs: 0.063 minimum thickness welded aluminum, or 18 gauge minimum welded stainless steel, factory-insulated, with integral cricket, and designed to fit roof panel module, sized to meet application.

## 2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.
1. Thermal Stability: Stable after testing at 240 deg F (116 deg C); ASTM D 1970.
  2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F (29 deg C); ASTM D 1970.
  3. Products: Subject to compliance with requirements, **available products that may be incorporated into the Work include, but are not limited to, the following**:
    - a. Carlisle Residential, a division of Carlisle Construction Materials; WIP 300HT.
    - b. Grace Construction Products, a unit of W. R. Grace & Co.; **Grace Ice and Water Shield HT**.
    - c. Henry Company; Blueskin PE200 HT.
    - d. Metal-Fab Manufacturing, LLC; MetShield.
    - e. Owens Corning; WeatherLock Metal High Temperature Underlayment.
- B. Felt Underlayment: ASTM D 226/D 22M, Type II (No. 30), asphalt-saturated organic felts.

## 2.4 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C 645; cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fascia, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fascia, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Gutters: Formed from same material as roof panels, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- long sections, of size and metal thickness according to NRCA. Furnish gutter supports spaced a maximum of 36 inches o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match **roof fascia and rake trim**.
- E. Downspouts: Formed from same material as roof panels. Fabricate in 10-foot- long sections, complete with formed elbows and offsets, of size and metal thickness according to NRCA. Finish downspouts to match gutters.

## 2.5 FABRICATION

- A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in NRCA that apply to design, dimensions, metal, and other characteristics of item indicated.
  - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
  - 2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
  - 3. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with NRCA standards.
  - 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
  - 5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
    - a. Size: As recommended by NRCA or metal panel manufacturer for application, but not less than thickness of metal being secured.

## 2.6 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
  - 1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

### 3.3 UNDERLAYMENT INSTALLATION

- A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated **below**, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.
  - 1. Apply over the roof area indicated below:
    - a. Roof perimeter for a distance up from eaves of **36 inches** beyond interior wall line.
    - b. Valleys, from lowest point to highest point, for a distance on each side of **18 inches**. Overlap ends of sheets not less than 6 inches.
    - c. Rake edges for a distance of **18 inches**.
    - d. Hips and ridges for a distance on each side of **12 inches**.
    - e. Roof-to-wall intersections for a distance from wall of **18 inches**.
    - f. Around dormers, chimneys, skylights, and other penetrating elements for a distance from element of **18 inches**.
- B. Felt Underlayment: Apply at locations indicated **below**, in shingle fashion to shed water, and with lapped joints of not less than **2 inches**.
  - 1. Apply on roof not covered by self-adhering sheet underlayment. Lap over edges of self-adhering sheet underlayment not less than **3 inches**, in shingle fashion to shed water.
- C. Flashings: Install flashings to cover underlayment to comply with requirements specified in Section 076200 "Sheet Metal Flashing and Trim."

### 3.4 METAL PANEL INSTALLATION

- A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
1. Shim or otherwise plumb substrates receiving metal panels.
  2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
  3. Install screw fasteners in predrilled holes.
  4. Locate and space fastenings in uniform vertical and horizontal alignment.
  5. Install flashing and trim as metal panel work proceeds.
  6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
  7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
  8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
- C. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.
- D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- E. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.
1. Install clips to supports with self-tapping fasteners.
  2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
  3. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
  4. Watertight Installation:
    - a. Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommend in writing by manufacturer as needed to make panels watertight.
    - b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
    - c. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.
- F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal roof panel manufacturers; or, if not indicated, types recommended by metal roof panel manufacturer.
- G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and NRCA. Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof and weather-resistant performance.
  2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- H. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 36 inches o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.
- I. Downspouts: Join sections with telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.
1. Provide elbows at base of downspouts to direct water away from building.
  2. Connect downspouts to underground drainage system indicated.
- J. Roof Curbs: Install flashing around bases where they meet metal roof panels.
- K. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

### **3.5 ERECTION TOLERANCES**

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

### **3.6 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect metal roof panel installation, including accessories. Report results in writing.
- B. Remove and replace applications of metal roof panels where tests and inspections indicate that they do not comply with specified requirements.

- C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- D. Prepare test and inspection reports.

### **3.7 CLEANING AND PROTECTION**

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

**END OF SECTION 074113.16**

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## SECTION 075423 - THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Adhered TPO membrane roofing system.
  - 2. Roof insulation.
- B. Related Sections:
  - 1. Section 076200 "Sheet Metal Flashing and Trim" for metal roof penetration flashings, flashings, and counterflashings.
  - 2. Section 079200 "Joint Sealants" for joint sealants, joint fillers, and joint preparation.

#### 1.3 DEFINITIONS

- A. TPO: Thermoplastic polyolefin.
- B. Roofing Terminology: See ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.
- C. Roofing System Design: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7.
  - 1. Corner Uplift Pressure: 45 **lbf/sq. ft.**
  - 2. Perimeter Uplift Pressure: 35 **lbf/sq. ft.**
  - 3. Field-of-Roof Uplift Pressure: 25 **lbf/sq. ft.**

- D. FM Approvals Listing: Provide membrane roofing, base flashings, and component materials that comply with requirements in FM Approvals 4450 and FM Approvals 4470 as part of a membrane roofing system, and that are listed in FM Approvals' "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals markings.
- E. Solar Reflectance Index: Not less than **70** when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.
- F. Energy Performance: Provide roofing system that is listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for **low**-slope roof products.
- G. Energy Performance: Provide roofing system with initial solar reflectance not less than **0.70** and emissivity not less than **0.75** when tested according to CRRC-1.

## 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For roofing system include manufacturer's approved, but project specific details of roofing and flashings, including roof slopes and insulation layouts, penetration details, curbs and accessories, plans, elevations, sections, details, and attachments to other work.
  - 1. Base flashings and membrane terminations.
  - 2. Tapered insulation lay-out, including slopes.
  - 3. Penetration details, curbs and accessories.
  - 4. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
- C. A "systems" letter from the manufacturer agreeing "That all roofing components exclusive of the deck, contained in the system proposed are approved and compatible with the warranty requirements of the roof system as specified, and that the warranty specified will be issued at the completion of project if system is installed as designed.
- D. Samples for Verification: For the following products:
  - 1. Sheet roofing, of color specified, including T-shaped side and end lap seam.
  - 2. Roof insulation.
  - 3. Metal termination bars.
  - 4. Six insulation fasteners of each type, length, and finish.

## 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer and manufacturer.
- B. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
  - 1. Submit evidence of compliance with performance requirements.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of membrane roofing system.
- D. Research/Evaluation Reports: For components of membrane roofing system, from **the ICC-ES**.

- E. Warranties: Sample of proposed manufacturer's roof warranty and special warranties.

## 1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing system to include in maintenance manuals.

## 1.8 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by membrane roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.
- B. Source Limitations: Obtain components including **roof insulation**, metal edgings, parapet cap flashings, and **fasteners** for membrane roofing system **from same manufacturer as membrane roofing or approved by membrane roofing manufacturer**.
- C. Exterior Fire-Test Exposure: ASTM E 108, **Class A**; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.

## 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
  - 1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

## 1.10 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

## 1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard or customized form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period.
1. Special warranty includes membrane roofing, base flashings, metal edgings, parapet cap flashings, **roof insulation, fasteners, cover boards, roofing accessories**, and other components of membrane roofing system.
  2. Warranty Period: **20** years from date of Substantial Completion.
  3. The roofing manufacturer shall provide written confirmation, submitted with shop drawings, that "All roofing components exclusive of the deck, contained in the system proposed are approved, and compatible with the warranty requirements of the roof system, as specified, and that the warranty specified will be issued at completion of project if system is installed as designed.
  4. Warranty shall be executed by both the system manufacturer and the roofing contractor.
- B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering all components of membrane roofing system including roofing insulation, fasteners, membrane roofing, base flashing, penetrations, curbs, accessories, and cover boards, for the following warranty period:
1. Warranty Period: **Two** years from date of Substantial Completion.
  2. The liability of the Surety under the installer warranty provisions of this contract is limited to correcting defective workmanship and materials for a period of two years from the Substantial Completion date of the project. Any warranty beyond this two years is an agreement between the Owner and the Contractor and falls outside the performance bond obligation.
- C. Roofing Contractor shall notify Construction Administrator when Manufacturer's final Warranty inspection is to occur. Furnish a copy of the warranty inspection report to the Construction Administrator.

## PART 2 - PRODUCTS

### 2.1 TPO MEMBRANE ROOFING

- A. Fabric-Reinforced Thermoplastic Polyolefin Sheet: ASTM D 6878, internally fabric or scrim reinforced, uniform, flexible TPO sheet.
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. [Carlisle SynTec Incorporated.](#)
    - b. [Firestone Building Products Company.](#)
    - c. Genflex
  2. Thickness: **60 mils**, nominal.
  3. Exposed Face Color: **White**.

## 2.2 AUXILIARY MEMBRANE ROOFING MATERIALS

- A. General: Auxiliary membrane roofing materials recommended by roofing system manufacturer for intended use, and compatible with membrane roofing.
1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
  2. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
    - a. Plastic Foam Adhesives: 50 g/L.
    - b. Gypsum Board and Panel Adhesives: 50 g/L.
    - c. Multipurpose Construction Adhesives: 70 g/L.
    - d. Fiberglass Adhesives: 80 g/L.
    - e. Single-Ply Roof Membrane Adhesives: 250 g/L.
    - f. Other Adhesives: 250 g/L.
    - g. Single-Ply Roof Membrane Sealants: 450 g/L.
    - h. Nonmembrane Roof Sealants: 300 g/L.
    - i. Sealant Primers for Nonporous Substrates: 250 g/L.
    - j. Sealant Primers for Porous Substrates: 775 g/L.
  3. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Sheet Flashing: Manufacturer's standard unreinforced thermoplastic polyolefin sheet flashing, **55 mils** thick, minimum, of same color as sheet membrane.
- C. Bonding Adhesive: Manufacturer's standard.
- D. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately **1 by 1/8 inch** thick; with anchors.
- E. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
- F. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

## 2.3 ROOF INSULATION

- A. General: Preformed roof insulation boards manufactured by TPO membrane roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated.
- B. Polyisocyanurate Board Insulation: ASTM C 1289, **Type II, Class I, Grade 2**, felt or glass-fiber mat facer on both major surfaces, R-6 per inch.

- C. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of **1/4 inch per 12 inches (1:48)** unless otherwise indicated.
- D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes as required.

## **2.4 INSULATION ACCESSORIES**

- A. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with membrane roofing.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover board to substrate, and acceptable to roofing system manufacturer.
- C. Full-Spread Applied Insulation Adhesive: Insulation manufacturer's recommended spray-applied, low-rise, two-component urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
  - 1. Verify that roof openings and penetrations are in place and curbs are set and braced and that roof drain bodies are securely clamped in place.
  - 2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
  - 3. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 PREPARATION**

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
- D. The Contractor shall not remove any more roofs during the day than they can completely replace with new roofing materials including night seal-off and flashing of perimeter and accessories.

### 3.3 INSULATION INSTALLATION

- A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with membrane roofing system and insulation manufacturer's written instructions for installing roof insulation.
- C. Install tapered insulation under area of roofing to conform to slopes indicated.
- D. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is **2.7 inches** or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of **6 inches** in each direction.
  - 1. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
- E. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding **1/4 inch** with insulation.
  - 1. Cut and fit insulation within **1/4 inch** of nailers, projections, and penetrations.
- F. Mechanically Fastened and Adhered Insulation: Install each layer of insulation and secure first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
  - 1. Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
  - 2. Set each subsequent layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

### 3.4 ADHERED MEMBRANE ROOFING INSTALLATION

- A. Adhere membrane roofing over area to receive roofing and install according to membrane roofing system manufacturer's written instructions.
- B. Start installation of membrane roofing in presence of membrane roofing system manufacturer's technical personnel.
- C. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- D. Bonding Adhesive: Apply to substrate and underside of membrane roofing at rate required by manufacturer and allow to partially dry before installing membrane roofing. Do not apply to splice area of membrane roofing.
- E. Apply membrane roofing with side laps shingled with slope of roof deck where possible.
- F. Seams: Clean seam areas, overlap membrane roofing, and hot-air weld side and end laps of membrane roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.

1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.
  2. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
  3. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.
- G. Spread sealant bed over deck drain flange at roof drains and securely seal membrane roofing in place with clamping ring.

### 3.5 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.
- E. Terminate and seal top of sheet flashings **and mechanically anchor to substrate through termination bars**.

### 3.6 FIELD QUALITY CONTROL

- A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
- A. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements. Defective or non-confirming conditions defined as follows, unless more stringent criteria required by roofing system manufacturer:
  1. Blister, Bubble, Capillaries or Voids: A spongy raised portion of roofing membrane resulting from improper surface preparation, pressure of entrapped air, entrapped water vapor, inadequate adhesive, adhesive bonding failure, improper attachment method, or resulting from climatic installation conditions. Such conditions shall not exceed Four (4) inches in individual diameter, multiple occurrences be spaced less than Forty Eight (48) inches on center, or multiple occurrences exceeding Sixteen (16) square inches within One Hundred Forty Four (144) square feet of surface area.
  2. Fishmouth: Opening or void in lapped edge or seam.
  3. Punctures or Holes: Condition compromising system watertight effectiveness.
  4. Seam or Joint Separation: Unbonded edge condition where probing tool penetrates lapped area under firm pressure.
  5. Slope, Drainage, or Ponding (Standing Water): Criteria for judging proper slope for drainage is no ponding water on roof surface Forty-Eight (48) hours after precipitation event during conditions conducive to drying.
  6. Wrinkles or Distortions: Surface condition that impede the proper flow of water drainage.
  7. Insulation and/or Cover Board Joints: Butt joints exceeding 1/4" wide or uneven surfaces exceeding 1/4" vertical measured in transition plane.

- B. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

### 3.7 PROTECTING AND CLEANING

- A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements; repair substrates; and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

### 3.8 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS <NAME> of <ADDRESS>, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
  - 1. Owner: <Insert name of Owner>.
  - 2. Address: <Insert address>.
  - 3. Building Name/Type: <Insert information>.
  - 4. Address: <Insert address>.
  - 5. Area of Work: <Insert information>.
  - 6. Acceptance Date: <Insert date>.
  - 7. Warranty Period: <Insert time>.
  - 8. Expiration Date: <Insert date>.
- B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,
- C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.
- D. This Warranty is made subject to the following terms and conditions:
  - 1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
    - a. Lightning;
    - b. Peak gust wind speed exceeding 72 mph;
    - c. Fire;
    - d. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;

- e. Faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
  - f. Vapor condensation on bottom of roofing; and
  - g. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
  3. Roofing Installer is responsible for damage to work covered by this Warranty.
  4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
  5. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
  6. This Warranty is recognized to be the installation warranty of Roofing Installer one said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents and to coordinate the Manufacturer's warranty, regardless of whether Contract was contract directly with Owner or a subcontract with the Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this **<DAY>** day of **<MONTH>**, **<YEAR>**.

1. Authorized Signature: **<Insert signature>**.
2. Name: **<Insert name>**.
3. Title: **<Insert title>**.

**END OF SECTION 075423**

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

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. Section Includes:

1. Manufactured reglets with counterflashing.
2. Formed roof-drainage sheet metal fabrications.
3. Formed low-slope roof sheet metal fabrications.
4. Formed steep-slope roof sheet metal fabrications.
5. Formed equipment support flashing.

- B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood nailers, curbs, and blocking.
2. Section 075423 "Thermoplastic Polyolefin (TPO) Roofing" for installation of sheet metal flashing and trim integral with roofing.
3. Section 074113.16 "Standing-Seam Metal Roof Panels" for installation of sheet metal flashing and trim integral with roofing.
4. Section 077200 "Roof Accessories" for set-on-type curbs, equipment supports, vents, and other manufactured roof accessory units.

#### **1.3 COORDINATION**

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

#### **1.4 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference: Conduct conference at **Project site**.

1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
3. Review sheet metal flashing observation and repair procedures after flashing installation.

## 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
- B. Shop Drawings: For sheet metal flashing and trim.
  - 1. Include plans, elevations, sections, and attachment details.
  - 2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
  - 3. Include identification of material, thickness, weight, and finish for each item and location in Project.
  - 4. Include details for forming, including profiles, shapes, seams, and dimensions.
  - 5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
  - 6. Include details of termination points and assemblies.
  - 7. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
  - 8. Include details of special conditions.
  - 9. Include details of connections to adjoining work.
  - 10. Detail formed flashing and trim at scale of not less than **3 inches per 12 inches**.
- C. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.
- D. Samples for Verification: For each type of exposed finish.
  - 1. Sheet Metal Flashing: **12 inches** long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
  - 2. Trim, Metal Closures, Joint Intersections, and Miscellaneous Fabrications: **12 inches** long and in required profile. Include fasteners and other exposed accessories.
  - 3. Unit-Type Accessories and Miscellaneous Materials: Full-size Sample.

## 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- C. Sample Warranty: For special warranty.

## 1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

## 1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

## 1.9 DELIVERY, STORAGE, AND HANDLING

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

## 1.10 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  - 2. Finish Warranty Period: **20** years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with **NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual"** requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

## 2.2 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Aluminum Sheet: **ASTM B 209 (ASTM B 209M)**, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with **smooth, flat** surface.
1. Exposed Coil-Coated Finish:
    - a. Two-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
    2. Color: **As selected by Architect from manufacturer's full range.**
    3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of **0.5 mil**.
- C. Metallic-Coated Steel Sheet: Provide **zinc-coated (galvanized) steel sheet according to ASTM A 653/A 653M, G90 (Z275) coating designation or aluminum-zinc alloy-coated steel sheet according to ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation, Grade 40 (Grade 275)]**; prepainted by coil-coating process to comply with ASTM A 755/A 755M.
1. Surface: **Smooth, flat and with manufacturer's standard clear acrylic coating on both sides.**
  2. Exposed Coil-Coated Finish:
    - a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
    3. Color: **As selected by Architect from manufacturer's full range.**
    4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of **0.5 mil**.

## 2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet: Minimum **30 mils** thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer according to written recommendations of underlayment manufacturer.
1. **Products:** Subject to compliance with requirements, **available products that may be incorporated into the Work include, but are not limited to, the following:**
    - a. [Carlisle Residential, a division of Carlisle Construction Materials](#); WIP 300HT.

- b. [Grace Construction Products, a unit of W. R. Grace & Co.-Conn.](#); **Grace Ice and Water Shield HT**.
  - c. [Owens Corning](#); WeatherLock Specialty Tile & Metal Underlayment.
2. Thermal Stability: ASTM D 1970; stable after testing at **240 deg F (116 deg C)** or higher.
  3. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus **20 deg F (29 deg C)** or lower.

## 2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal **or manufactured item** unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal **or manufactured item**.
  1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
    - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
    - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
    - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
  2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
  3. Fasteners for **Zinc-Coated (Galvanized)** or **Aluminum-Zinc Alloy-Coated** Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.
- C. Solder:
  1. For Zinc-Coated (Galvanized) Steel: ASTM B 32, **Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead with maximum lead content of 0.2 percent**.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape **1/2 inch** wide and **1/8 inch** thick.
- E. Elastomeric Sealant: ASTM C 920, elastomeric **polyurethane** polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- G. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.

## 2.5 MANUFACTURED SHEET METAL FLASHING AND TRIM

- A. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated **with factory-mitered and -welded corners and junctions and with interlocking counterflashing on exterior face, of same metal as reglet.**
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. [Cheney Flashing Company](#).
    - b. [Fry Reglet Corporation](#).
    - c. [Heckmann Building Products, Inc.](#)
    - d. [Hickman, W. P. Company](#).
    - e. [Hohmann & Barnard, Inc.](#)
    - f. [Keystone Flashing Company, Inc.](#)
    - g. [National Sheet Metal Systems, Inc.](#)
    - h. [Sandell Manufacturing](#).
  2. Material: **Galvanized steel, 0.022 inch thick.**
  3. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
  4. Finish: With manufacturer's standard color coating.

## 2.6 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
  2. Obtain field measurements for accurate fit before shop fabrication.
  3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
  4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of **1/4 inch in 20 feet** on slope and location lines indicated on Drawings and within **1/8-inch** offset of adjoining faces and of alignment of matching profiles.
- C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
- D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

- F. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. **Rivet joints where necessary for strength.**
- G. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. **Rivet joints where necessary for strength.**
- H. Do not use graphite pencils to mark metal surfaces.

## 2.7 ROOF-DRAINAGE SHEET METAL FABRICATIONS

- A. Hanging Gutters: Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum **96-inch-** long sections. Furnish flat-stock gutter brackets and gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard but with thickness not less than **twice the gutter thickness**. Fabricate expansion joints, expansion-joint covers, and gutter accessories from same metal as gutters.
  - 1. Gutter Profile: as indicated in drawings
  - 2. Expansion Joints: **Built in.**
  - 3. Accessories: **Wire-ball downspout strainer** and **Valley baffles.**
  - 4. Gutters: Fabricate from the following materials:
    - a. Galvanized Steel: **0.040 inch** thick.
- B. Downspouts: Fabricate **rectangular** downspouts to dimensions indicated, complete with mitered elbows. Furnish with metal hangers from **same material as downspouts and anchors.**
  - 1. Fabricated Hanger Style: match existing
  - 2. Fabricate from the following materials:
    - a. Galvanized Steel: **0.022 inch** thick.

## 2.8 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof Edge Flashing **and Fascia Cap**: Fabricate in minimum **96-inch-** long, but not exceeding **12-foot-** long sections. Furnish with **6-inch-** wide, joint cover plates.
  - 1. Joint Style: **Overlapped, 4 inches wide.**
  - 2. Fabricate from the Following Materials:
    - a. Galvanized Steel: **0.028 inch** thick.
- B. Base Flashing: Fabricate from the following materials:
  - 1. Galvanized Steel: **0.028 inch** thick.
- C. Counterflashing: Fabricate from the following materials:
  - 1. Galvanized Steel: **0.022 inch** thick.
- D. Flashing Receivers: Fabricate from the following materials:

1. Galvanized Steel: **0.022 inch** thick.
- E. Roof-Penetration Flashing: Fabricate from the following materials:
1. Galvanized Steel: **0.028 inch** thick.

## **2.9 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS**

- A. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following materials:
1. Galvanized Steel: **0.022 inch** thick.
- B. Valley Flashing: Fabricate from the following materials:
1. Galvanized Steel: **0.028 inch** thick.
  2. Aluminum-Zinc Alloy-Coated Steel: **0.028 inch** thick.
- C. Drip Edges: Fabricate from the following materials:
1. Galvanized Steel: **0.022 inch** thick.
  2. Aluminum-Zinc Alloy-Coated Steel: **0.022 inch** thick.
- D. Eave, Rake, Ridge, and Hip Flashing: Fabricate from the following materials:
1. Galvanized Steel: **0.022 inch** thick.
  2. Aluminum-Zinc Alloy-Coated Steel: **0.022 inch** thick.
- E. Counterflashing: Fabricate from the following materials:
1. Galvanized Steel: **0.022 inch** thick.
  2. Aluminum-Zinc Alloy-Coated Steel: **0.022 inch** thick.
- F. Flashing Receivers: Fabricate from the following materials:
1. Galvanized Steel: **0.022 inch** thick.
  2. Aluminum-Zinc Alloy-Coated Steel: **0.022 inch** thick.

## **2.10 MISCELLANEOUS SHEET METAL FABRICATIONS**

- A. Equipment Support Flashing: Fabricate from the following materials:
1. Galvanized Steel: **0.028 inch** thick.
  2. Aluminum-Zinc Alloy-Coated Steel: **0.028 inch** thick.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
  - 1. Verify compliance with requirements for installation tolerances of substrates.
  - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
  - 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 UNDERLAYMENT INSTALLATION

- A. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than **6 inches** staggered **24 inches** between courses. Overlap side edges not less than **3-1/2 inches**. Roll laps and edges with roller. Cover underlayment within 14 days.

### 3.3 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
  - 1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
  - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
  - 3. Space cleats not more than **12 inches** apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
  - 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
  - 5. Torch cutting of sheet metal flashing and trim is not permitted.
  - 6. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of **uncoated-aluminum and stainless-steel** sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
  2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of **10 feet** with no joints within **24 inches** of corner or intersection.
- D. Fasteners: Use fastener sizes that penetrate **substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance**.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.
1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than **1 inch** into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between **40 and 70 deg F (4 and 21 deg C)**, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below **40 deg F (4 deg C)**.
  2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

### 3.4 ROOF-DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.
- B. Hanging Gutters: Join sections with **riveted or joints sealed with sealant**. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchor them in position. Provide end closures and seal watertight with sealant. Slope to downspouts.
1. Fasten gutter spacers to front and back of gutter.
  2. Anchor and loosely lock back edge of gutter to continuous **cleat and eave or apron flashing**.
  3. Anchor back of gutter that extends onto roof deck with cleats spaced not more than **24 inches** apart.
  4. Install gutter with expansion joints at locations indicated, but not exceeding, **50 feet** apart. Install expansion-joint caps.
- C. Downspouts: Join sections with **1-1/2-inch** telescoping joints.
1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately **60 inches** o.c.
  2. Provide elbows at base of downspout to direct water away from building.
  3. Connect downspouts to underground drainage system.

### 3.5 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, **sheet metal manufacturer's written installation instructions**, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at **staggered 3-inch** centers.
- C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of **4 inches** over base flashing. Install stainless-steel draw band and tighten.
- D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing **4 inches** over base flashing. Lap counterflashing joints minimum of **4 inches**.
- E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with **elastomeric** sealant and clamp flashing to pipes that penetrate roof.

### 3.6 WALL FLASHING INSTALLATION

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

### 3.7 MISCELLANEOUS FLASHING INSTALLATION

- A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

### 3.8 ERECTION TOLERANCES

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

### 3.9 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.

- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.
- E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

**END OF SECTION 076200**

## **SECTION 077200 - ROOF ACCESSORIES**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. Section Includes:

1. Roof curbs.
2. Equipment supports.
3. Preformed flashing sleeves.
4. Building Signage.

- B. Related Sections:

1. Section 076200 "Sheet Metal Flashing and Trim" for shop- and field-formed metal flashing, roof-drainage systems, roof expansion-joint covers, and miscellaneous sheet metal trim and accessories.

- C. PERFORMANCE REQUIREMENTS

- D. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

#### **1.3 ACTION SUBMITTALS**

- A. Product Data: For each type of roof accessory indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For roof accessories. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.
- C. Samples: For each exposed product and for each color and texture specified, prepared on Samples of size to adequately show color.

#### **1.4 INFORMATIONAL SUBMITTALS**

- A. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:
  1. Size and location of roof accessories specified in this Section.

2. Method of attaching roof accessories to roof or building structure.
3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.
4. Required clearances.

B. Warranty: Sample of special warranty.

## 1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.

## 1.6 COORDINATION

A. Coordinate layout and installation of roof accessories with **roofing membrane and base flashing and** interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

## 1.7 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
  - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
  - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
  - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: **20** years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 METAL MATERIALS

A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, **G90 (Z275)** coating designation.

1. Exposed Coil-Coated Finish: Prepainted by the coil-coating process to comply with ASTM A 755/A 755M. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  - a. Two-Coat Fluoropolymer Finish: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.

2. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of **0.5 mil**.

## 2.2 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, **containing no arsenic or chromium**, and complying with AWPA C2; not less than **1-1/2 inches** thick.
- C. Underlayment:
  1. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
  2. Polyethylene Sheet: **6-mil-** thick polyethylene sheet complying with ASTM D 4397.
  3. Slip Sheet: Building paper, **3-lb/100 sq. ft.** minimum, rosin sized.
- D. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:
  1. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.
  2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
- E. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.
- F. Elastomeric Sealant: ASTM C 920, elastomeric **polyurethane or silicone** polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.

## 2.3 ROOF CURBS

- A. Roof Curbs: Internally reinforced roof-curb units capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings; with welded or mechanically fastened and sealed corner joints, and integrally formed deck-mounting flange at perimeter bottom.
  1. Manufacturers: Subject to compliance with requirements, **available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:**
    - a. [AES Industries, Inc.](#)
    - b. [Curbs Plus, Inc.](#)
    - c. [Custom Solution Roof and Metal Products.](#)
    - d. [Greenheck Fan Corporation.](#)
    - e. [LM Curbs.](#)
    - f. [Metallic Products Corp.](#)

- g. [Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.](#)
  - h. [Pate Company \(The\).](#)
  - i. [Roof Products, Inc.](#)
  - j. [Safe Air of Illinois.](#)
  - k. [Thybar Corporation.](#)
  - l. [Vent Products Co., Inc.](#)
- B. Size: Coordinate dimensions with existing equipment.
- C. Loads: Coordinate with existing equipment loads.
- D. Material: **Zinc-coated (galvanized)** steel sheet, **0.079 inch** thick.
- 1. Finish: **Two-coat fluoropolymer.**
  - 2. Color: **As selected by Architect from manufacturer's full range.**
- E. Construction:
- 1. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
  - 2. Fabricate curbs to minimum height of **12 inches** unless otherwise indicated.
  - 3. Top Surface: Level around perimeter with roof slope accommodated by sloping the deck-mounting flange.

## 2.4 EQUIPMENT SUPPORTS

- A. Equipment Supports: Internally reinforced metal equipment supports capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings; with welded or mechanically fastened and sealed corner joints, and integrally formed deck-mounting flange at perimeter bottom.
- 1. Manufacturers: Subject to compliance with requirements, **available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:**
    - a. [AES Industries, Inc.](#)
    - b. [Curbs Plus, Inc.](#)
    - c. [Custom Solution Roof and Metal Products.](#)
    - d. [Greenheck Fan Corporation.](#)
    - e. [LM Curbs.](#)
    - f. [Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.](#)
    - g. [Pate Company \(The\).](#)
    - h. [Roof Products, Inc.](#)
    - i. [Thybar Corporation.](#)
    - j. [Vent Products Co., Inc.](#)
- B. Size: Coordinate dimensions with existing equipment to be supported.
- C. Loads: Coordinate with existing equipment.
- D. Material: **Zinc-coated (galvanized)** steel sheet, **0.079 inch** thick.
- 1. Finish: **Two-coat fluoropolymer.**

2. Color: **As selected by Architect from manufacturer's full range.**

E. Construction:

1. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as equipment support.
2. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
3. Fabricate equipment supports to minimum height of **12 inches** unless otherwise indicated.

## 2.5 PREFORMED FLASHING SLEEVES

- A. Exhaust Vent Flashing: Double-walled metal flashing sleeve or boot, insulation filled, with integral deck flange, **12 inches** high, with removable metal hood and **slotted or perforated** metal collar.

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. [Custom Solution Roof and Metal Products.](#)
  - b. [Thaler Metal USA Inc.](#)
  - c. Or approved equal.
2. Metal: **Aluminum sheet, 0.063 inch thick.**
3. Diameter: Field verify existing.
4. Finish: **Manufacturer's standard.**

- B. Vent Stack Flashing: Metal flashing sleeve, uninsulated, with integral deck flange.

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. [Custom Solution Roof and Metal Products.](#)
  - b. [Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.](#)
  - c. [Thaler Metal USA Inc.](#)
2. Metal: **Aluminum sheet, 0.063 inch thick.**
3. Height: **Field verify existing.**
4. Diameter: Field verify existing.
5. Finish: **Manufacturer's standard.**

## 2.6 BUILDING SIGNAGE

- A. The building signage shall be 36"X36" square.
1. Font size shall fit the 36"X36" sign.
  2. Lettering and background shall be reflective.
  3. The building number shall be black with a reflective white background.

4. Metal: .080 thick flat aluminum with 3M #3930, HIP Silver/White prismatic engineer grade reflective sheeting applied.
- B. Signage shall be secured to the roof in a manner that meets the standing seam roof manufacturer's requirements and warranty. Verify attachment requirements with standing seam manufacturer during submittals.

## 2.7 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- C. Verify dimensions of roof openings for roof accessories.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. General: Install roof accessories according to manufacturer's written instructions.
  1. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
  2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
  3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
  4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
  1. Coat concealed side of **uncoated aluminum** and **stainless-steel** roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.

2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene sheet.
  3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.
- C. Roof Curb Installation: Install each roof curb so top surface is level.
  - D. Equipment Support Installation: Install equipment supports so top surfaces are level with each other.
  - E. Preformed Flashing-Sleeve Installation: Secure flashing sleeve to roof membrane according to flashing-sleeve manufacturer's written instructions.
  - F. Seal joints with **elastomeric or butyl** sealant as required by roof accessory manufacturer.

### **3.3 REPAIR AND CLEANING**

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780.
- B. Clean exposed surfaces according to manufacturer's written instructions.
- C. Clean off excess sealants.
- D. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

**END OF SECTION 077200**

## SECTION 077253 - SNOW GUARDS

### 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. Pad-type, flat-mounted snow guards.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for snow guards.
- B. Shop Drawings: Include roof plans showing layouts and attachment details of snow guards.
  - 1. Include calculation of number and location of snow guards based on snow load, roof slope, roof type, components, spacing, and finish.
- C. Samples: **Full-size unit.**

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Performance Requirements: Provide snow guards that withstand exposure to weather and resist thermally induced movement without failure, rattling, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

#### 2.2 PAD-TYPE SNOW GUARDS

- A. Flat-Mounted Metal Snow Guard Pads:
  - 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. [Alpine SnowGuards; a division of Vermont Slate & Copper Services, Inc.](#)
    - b. [Berger Building Products.](#)
    - c. [Sieger Snow Guards Inc.](#)

- d. SnoGuard.
2. Material: **Manufacturer's standard noncorrosive metal.**
3. Finish and Color: Powder coat; **color as selected by Architect from manufacturer's full range.**

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, snow guard attachment, and other conditions affecting performance of the Work.
  1. Verify compatibility with and suitability of substrates including compatibility with existing finishes or primers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.2 PREPARATION**

- A. Clean and prepare substrates for bonding snow guards.
- B. Prime substrates according to snow guard manufacturer's written instructions.

#### **3.3 INSTALLATION**

- A. Install snow guards according to manufacturer's written instructions.
- B. Attachment for Standing-Seam Metal Roofing:
  1. Do not use fasteners that will penetrate metal roofing, or fastening methods that void metal roofing finish warranty.

**END OF SECTION 077253**

## 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. Urethane joint sealants.
  - 3. Butyl-Rubber-Based Joint Sealant.
- B. Related Sections:
  - 1. Section 076200 "Sheet Metal Flashing and Trim"
  - 2. Section 077200 "Roof Accessories"
  - 3. Section 074113.16 "Standing Seam Metal Roofing Panels"

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Joint-Sealant Schedule: Include the following information:
  - 1. Joint-sealant application, joint location, and designation.
  - 2. Joint-sealant manufacturer and product name.
  - 3. Joint-sealant formulation.
  - 4. Joint-sealant color.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified **Installer and testing agency**.
- B. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.

- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.
- D. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
  - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
  - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- E. Preconstruction Field-Adhesion Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.
- F. Field-Adhesion Test Reports: For each sealant application tested.
- G. Warranties: Sample of special warranties.

## 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.
- C. Product Testing: Test joint sealants using a qualified testing agency.
  - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
  - 2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.

## 1.6 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
  - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer **or are below 40 deg F**.
  - 2. When joint substrates are wet.
  - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
  - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

## 1.7 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: **Two** years from date of Substantial Completion.
- B. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
  - 1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
  - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
  - 3. Mechanical damage caused by individuals, tools, or other outside agents.
  - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

## PART 2 - PRODUCTS

### 2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- C. Colors of Exposed Joint Sealants: **As selected by Architect from manufacturer's full range.**

### 2.2 SILICONE JOINT SEALANTS

- A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 50, for Use NT.
  - 1. Products: Subject to compliance with requirements, **available products that may be incorporated into the Work include, but are not limited to, the following:**
    - a. BASF Building Systems;
    - b. Dow Corning Corporation;
    - c. Pecora Corporation;
    - d. Sika Corporation, Construction Products Division;
    - e. Tremco Incorporated; Spectrem 3.

## 2.3 URETHANE JOINT SEALANTS

- A. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
  - 1. **Products:** Subject to compliance with requirements, **available products that may be incorporated into the Work include, but are not limited to, the following:**
    - a. Uniflex
    - b. Pecora Corporation;
    - c. Polymeric Systems, Inc.;
    - d. Sika Corporation, Construction Products Division;
    - e. Tremco Incorporated;

## 2.4 SOLVENT-RELEASE-CURING JOINT SEALANTS

- A. Butyl-Rubber-Based Joint Sealant: ASTM C 1311.
  - 1. **Products:** Subject to compliance with requirements, **available products that may be incorporated into the Work include, but are not limited to, the following:**
    - a. Bostik, Inc.; Chem-Calk 300.
    - b. Pecora Corporation; BC-158.
    - c. Tremco Incorporated; Tremco Butyl Sealant.

## 2.5 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

## 2.6 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 PREPARATION**

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
  - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
  - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
    - a. Concrete.
    - b. Masonry.
  - 3. Remove laitance and form-release agents from concrete.
  - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
    - a. Metal.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

### **3.3 INSTALLATION OF JOINT SEALANTS**

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  - 1. Do not leave gaps between ends of sealant backings.
  - 2. Do not stretch, twist, puncture, or tear sealant backings.
  - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
  - 1. Place sealants so they directly contact and fully wet joint substrates.
  - 2. Completely fill recesses in each joint configuration.
  - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
  - 1. Remove excess sealant from surfaces adjacent to joints.
  - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
  - 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.

### **3.4 CLEANING**

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

### **3.5 PROTECTION**

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

### 3.6 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exposed exterior joints in standing seam metal roofing per manufacturer's recommendations.
  - 1. Joint Locations:
    - a. Exposed standing seam metal roofing joints.
  - 2. Urethane Joint Sealant:
  - 3. Joint-Sealant Color: **As selected by Architect from manufacturer's full range of colors.**
  
- B. Joint-Sealant Application: Non-exposed joints in standing seam metal roofing per manufacturer's recommendations.
  - 1. Joint Locations:
    - a. Non-exposed standing seam metal roofing joints.
  - 2. Butyl-Rubber-Based Joint Sealant:
  - 3. Joint-Sealant Color: **As selected by Architect from manufacturer's full range of colors.**
  
- C. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surface.
  - 1. Joint Locations:
    - a. Sheet metal flashing and trim joints.
  - 2. Silicone Joint Sealant
  - 3. Joint-Sealant Color: **As selected by Architect from manufacturer's full range of colors.**

**END OF SECTION 079200**

## **SECTION 099113 - EXTERIOR PAINTING**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. Section includes surface preparation and the application of paint systems on **exterior substrates**.
  - 1. Wood.
- B. Related Requirements:
  - 1. Section 061000 "Rough Carpentry"

#### **1.3 DEFINITIONS**

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- D. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- E. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- F. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

#### **1.4 ACTION SUBMITTALS**

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
  - 1. Submit Samples on rigid backing, 8 inches square.
  - 2. Label each Sample for location and application area.

D. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
3. VOC content.

## 1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, **from the same product run**, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than **1 gal.** of each material and color applied.

## 1.6 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.

## 1.7 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 in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures 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, **available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**:

1. Behr Process Corporation.
2. Benjamin Moore & Co.
3. ICI Paints.
4. PPG Architectural Finishes, Inc.
5. Sherwin-Williams Company (The).

## **2.2 PAINT, GENERAL**

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- B. Material Compatibility:
  - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- C. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.
- D. Colors: match existing

## **2.3 WOOD PRIMERS**

- A. Primer, Latex for Exterior Wood, MPI #6:
  - 1. Benjamin Moore – Ultra Spec EXT Latex Primer (Basis of Design)

## **2.4 LATEX PAINTS**

- A. Acrylic Latex, Exterior, Low Lustre (Gloss Level 3), MPI #214
  - 1. Benjamin Moore – Ultra Spec EXT Low Luster Finish (Basis of Design)

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
  - 1. Concrete: 12 percent.
  - 2. Masonry (Clay and CMU): 12 percent.
  - 3. Wood: 15 percent.
  - 4. Portland Cement Plaster: 12 percent.
  - 5. Gypsum Board: 12 percent.
- C. Portland Cement Plaster Substrates: Verify that plaster is fully cured.
- D. Exterior Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

- E. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- F. Proceed with coating application only after unsatisfactory conditions have been corrected.
  - 1. Application of coating indicates acceptance of surfaces and conditions.

### **3.2 PREPARATION**

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
  - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Wood Substrates:
  - 1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
  - 2. Sand surfaces that will be exposed to view, and dust off.
  - 3. Prime edges, ends, faces, undersides, and backsides of wood.
  - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

### **3.3 APPLICATION**

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
  - 1. Use applicators and techniques suited for paint and substrate indicated.
  - 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
    - a. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
  - 3. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.

- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

### **3.4 CLEANING AND PROTECTION**

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

### **3.5 EXTERIOR PAINTING SCHEDULE**

- A. Wood Substrates: Including **wood trim**.
  - 1. Latex System:
    - a. Prime Coat: Primer, latex for exterior wood, **MPI #6**.
    - b. Base Coat: Acrylic Latex, exterior, Low Lustre (Gloss Level 3), **MPI #214**.
    - c. Topcoat: Acrylic Latex, exterior, Low Lustre (Gloss Level 3), **MPI #214**.

**END OF SECTION 099113**

## SECTION 230500 -BASIC HVAC REQUIREMENTS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Requirements applicable to all Division 23 Sections. Also refer to Division 1 - General Requirements.
- B. All materials and installation methods shall conform to the applicable standards, guidelines and codes referenced herein and within each specification section.

#### 1.2 SCOPE OF WORK

- A. This Specification and the associated drawings govern the furnishing, installing, testing and placing into satisfactory operation the Mechanical Systems.
- B. Each Contractor shall provide all new materials indicated on the drawings and/or in these specifications, and all items required to make his portion of the Mechanical Work a finished and working system.
- C. All work will be awarded under a single General Contract. The division of work listed below is for the Contractor's convenience and lists normal breakdown of the work.
- D. Scope of Work:
  - 1. Air Conditioning and Ventilating Work shall include, but is not necessarily limited to:
    - a. Furnish and install exhaust ductwork systems including all fittings, insulation, inlets, and fans.
    - b. Furnish and install mechanical room ventilation systems including louvers, ductwork, insulation, and fans.
    - c. Furnish and install all temperature control systems.
    - d. Remove and reinstall existing rooftop exhaust fans and dampers.
  - 2. Testing, Adjusting, and Balancing Work shall include, but is not necessarily limited to:
    - a. Furnish complete testing, adjusting, and balancing as specified in Section 230593, including, but not limited to, air systems, hydronic systems, plumbing systems, and verification of control systems.

#### 1.3 WORK SEQUENCE

- A. All work that will produce excessive noise or interference with normal building operations, as determined by the Owner, shall be scheduled with the Owner. It may be necessary to schedule such work during unoccupied hours. The Owner reserves the right to determine when restricted construction hours will be required.

## 1.4 DIVISION OF WORK BETWEEN MECHANICAL, ELECTRICAL & CONTROL CONTRACTORS

### A. Definitions:

1. "Mechanical Contractors" refers to the following:
  - a. Air Conditioning and Ventilating Contractor.
  - b. Testing, Adjusting, and Balancing Contractor.
2. Motor Control Wiring: The wiring associated with the remote operation of the magnetic coils of magnetic motor starters or relays, or the wiring that permits direct cycling of motors by means of devices in series with the motor power wiring. In the latter case the devices are usually single phase and are usually connected to the motor power wiring through a manual motor starter having "Manual-Off-Auto" provisions.
3. Control devices such as start-stop push buttons, thermostats, pressure switches, flow switches, relays, etc., generally represent the types of equipment associated with motor control wiring.
4. Motor control wiring is single phase and usually 120 volts. In some instances, the voltage will be the same as the motor power wiring. Generally, where the motor power wiring exceeds 120 volts, a control transformer is used to give a control voltage of 120 volts.
5. Temperature Control Wiring: The wiring associated with the operation of a motorized damper, solenoid valve or motorized valve, etc., either modulating or two-position, as opposed to wiring which directly powers or controls a motor used to drive equipment such as fans, pumps, etc.
  - a. This wiring will be from a 120 volt source and may continue as 120 volt, or be reduced in voltage (24 volt) in which case a control transformer shall be furnished as part of the temperature control wiring.
6. Control Motor: An electric device used to operate dampers, valves, etc. It may be two-position or modulating. Conventional characteristics of such a motor are 24 volts, 60 cycles, 1 phase, although other voltages may be encountered.
7. Voltage is generally specified and scheduled as distribution voltage. Motor submittals may be based on utilization voltage if it corresponds to the correct distribution voltage.

Distribution/Nominal Voltage	Utilization Voltage
120	115
208	200
240	230
277	265
480	460

B. General:

1. The purpose of these Specifications is to outline the Electrical and Mechanical Contractor's responsibilities related to electrical work required for items such as temperature controls, mechanical equipment, fans, chillers, compressors and the like. The exact wiring requirements for much of the equipment cannot be determined until the systems have been selected and submittals reviewed. Therefore, the electrical drawings show only known wiring related to such items. All wiring not shown on the electrical drawings, but required for mechanical systems, is the responsibility of the Mechanical Contractor.
2. Where the drawings require the Electrical Contractor to wire between equipment furnished by the Mechanical Contractor, such wiring shall terminate at terminals provided in the equipment. The Mechanical Contractor shall provide complete electrical power/controls wiring diagrams and supervision to the Electrical Contractor and designate the terminal numbers for correct wiring.
3. All electrical work shall conform to the National Electrical Code. All provisions of the Electrical Specifications concerning wiring, protection, etc., apply to wiring provided by the Mechanical Contractor unless noted otherwise.
4. Control low (24V) and control line (120V) voltage wiring, conduit, and related switches and relays required for the automatic control and/or interlock of motors and equipment, including final connection, are to be furnished and installed under Divisions 21, 22 and 23. Materials and installation to conform to Class 1 or 2 requirements.

C. Mechanical Contractor's Responsibility:

1. Assumes responsibility for internal wiring of all equipment provided by the Mechanical Contractor, for example:
  - a. Package Air Handling Units.
  - b. Packaged Rooftop Units.
  - c. Rooftop Exhaust Fans.
2. Assumes all responsibility for the Temperature Control wiring, when the Temperature Control Contractor is a Subcontractor to the Mechanical Contractor.
3. Shall verify all existing equipment sizes and capacities where units are to be modified, moved or replaced. Contractor shall notify Architect/Engineer of any discrepancies prior to ordering new units or replacement parts, including replacements of equipment motors.
4. Temperature Control Subcontractor's Responsibility:
  - a. Wiring of all devices needed to make the Temperature Control System functional.
  - b. Verifying any control wiring on the electrical drawings as being by the Electrical Contractor. All wiring required for the Control System, but not

shown on the electrical drawings, is the responsibility of the Temperature Control Subcontractor.

c. Coordinating equipment locations (such as relays, transformers, etc.) with the Electrical Contractor, where wiring of the equipment is by the Electrical Contractor.

5. This Contractor is responsible for coordination of utilities with all other Contractors. If any field coordination conflicts are found, the Contractor shall coordinate with other Contractors to determine a viable layout.

D. Electrical Contractor's Responsibility:

1. Provides all combination starters, manual starters and disconnect devices shown on the Electrical Drawings or indicated to be by the Electrical Contractor on the Mechanical Drawings or Specifications.

2. Installs and wires all remote-control devices furnished by the Mechanical Contractor or Temperature Control Subcontractor when so noted on the Electrical Drawings.

3. Provides motor control and temperature control wiring, where so noted on the drawings.

4. Coordinate with the Mechanical Contractor for size of motors and/or other electrical devices involved with repair or replacement of existing equipment.

5. Furnishes, installs and connects all relays, etc., for automatic shutdown of certain fans upon actuation of the Fire Alarm System as indicated and specified in Division 28.

6. This Contractor is responsible for coordination of utilities with all other Contractors. If any field coordination conflicts are found, the Contractor shall coordinate with other Contractors to determine a viable layout.

## 1.5 QUALITY ASSURANCE

A. Contractor's Responsibility Prior to Submitting Pricing Data:

1. The Contractor is responsible for constructing complete and operating systems. The Contractor acknowledges and understands that the Contract Documents are a two-dimensional representation of a three-dimensional object, subject to human interpretation. This representation may include imperfect data, interpreted codes, utility guidelines, three-dimensional conflicts, and required field coordination items. Such deficiencies can be corrected when identified prior to ordering material and starting installation. The Contractor agrees to carefully study and compare the individual Contract Documents and report at once in writing to the Design Team any deficiencies the Contractor may discover. The Contractor further agrees to require each subcontractor to likewise study the documents and report at once any deficiencies discovered.

2. The Contractor shall resolve all reported deficiencies with the Architect/Engineer prior to awarding any subcontracts, ordering material, or starting any work with the Contractor's own employees. Any work performed prior to receipt of instructions from the Design Team will be done at the Contractor's risk.
- B. Qualifications:
1. Only products of reputable manufacturers are acceptable.
  2. All Contractors and subcontractors shall employ only workers skilled in their trades.
- C. Compliance with Codes, Laws, Ordinances:
1. Conform to all requirements of the City of Farmington, Missouri Codes, Laws, Ordinances and other regulations having jurisdiction.
  2. Conform to all State Codes.
  3. If there is a discrepancy between the codes and regulations and these specifications, the Architect/Engineer shall determine the method or equipment used.
  4. If the Contractor notes, at the time of bidding, any parts of the drawings or specifications that do not comply with the codes or regulations, he shall inform the Architect/Engineer in writing, requesting a clarification. If there is insufficient time for this procedure, he shall submit with his proposal a separate price to make the system comply with the codes and regulations.
  5. All changes to the system made after letting of the contract, to comply with codes or requirements of Inspectors, shall be made by the Contractor without cost to the Owner.
  6. If there is a discrepancy between manufacturer's recommendations and these specifications, the manufacturer's recommendations shall govern.
  7. All rotating shafts and/or equipment shall be completely guarded from all contact. Partial guards and/or guards that do not meet all applicable OSHA standards are not acceptable. Contractor is responsible for providing this guarding if it is not provided with the equipment supplied.
- D. Permits, Fees, Taxes, Inspections:
1. Procure all applicable permits and licenses.
  2. Abide by all laws, regulations, ordinances, and other rules of the State or Political Subdivision where the work is done, or as required by any duly constituted public authority.
  3. Pay all charges for permits or licenses.
  4. Pay all fees and taxes imposed by the State, Municipal and/or other regulatory bodies.

5. Pay all charges arising out of required inspections by an authorized body.
  6. Pay all charges arising out of required contract document reviews associated with the project and as initiated by the Owner or authorized agency/consultant.
  7. Where applicable, all fixtures, equipment and materials shall be approved or listed by Underwriter's Laboratories, Inc.
- E. Utility Company Requirements:
1. Secure from the appropriate private or public utility company all applicable requirements.
  2. Comply with all utility company requirements.
  3. Make application for and pay for service connections, such as gas.
  4. Make application for and pay for all meters and metering systems required by the utility company.
- F. Examination of Drawings:
1. The drawings for the mechanical work are completely diagrammatic, intended to convey the scope of the work and to indicate the general arrangements and locations of equipment, outlets, etc., and the approximate sizes of equipment.
  2. Contractor shall determine the exact locations of equipment and rough-ins, and the exact routing of pipes and ducts to best fit the layout of the job.
  3. Scaling of the drawings is not sufficient or accurate for determining these locations.
  4. Where job conditions require reasonable changes in indicated arrangements and locations, such changes shall be made by the Contractor at no additional cost to the Owner.
  5. Because of the scale of the drawings, certain basic items, such as fittings, boxes, valves, unions, etc., may not be shown, but where required by other sections of the specifications or required for proper installation of the work, such items shall be furnished and installed.
  6. If an item is either on the drawings or in the specifications, it shall be included in this contract.
  7. Determination of quantities of material and equipment required shall be made by the Contractor from the documents. Where discrepancies arise between drawings, schedules and/or specifications, the greater number shall govern.
  8. Where used in mechanical documents, the word "furnish" shall mean supply for use, the word "install" shall mean connect complete and ready for operation, and the word "provide" shall mean to supply for use and connect complete and ready for operation.

- a. Any item listed as furnished shall also be installed, unless otherwise noted.
- b. Any item listed as installed shall also be furnished, unless otherwise noted.

G. Field Measurements:

- 1. Verify all pertinent dimensions at the job site before ordering any materials or fabricating any supports, pipes or ducts.

H. Electronic Media/Files:

- 1. Construction drawings for this project have been prepared utilizing Revit.
- 2. Contractors and Subcontractors may request electronic media files of the contract drawings and/or copies of the specifications. Specifications will be provided in PDF format.
- 3. Upon request for electronic media, the Contractor shall complete and return a signed "Electronic File Transmittal" form provided by IMEG.
- 4. If the information requested includes floor plans prepared by others, the Contractor will be responsible for obtaining approval from the appropriate Design Professional for use of that part of the document.
- 5. The electronic contract documents can be used for preparation of shop drawings and as-built drawings only. The information may not be used in whole or in part for any other project.
- 6. The drawings prepared by IMEG for bidding purposes may not be used directly for ductwork layout drawings or coordination drawings.
- 7. The use of these CAD documents by the Contractor does not relieve them from their responsibility for coordination of work with other trades and verification of space available for the installation.
- 8. The information is provided to expedite the project and assist the Contractor with no guarantee by IMEG as to the accuracy or correctness of the information provided. IMEG accepts no responsibility or liability for the Contractor's use of these documents.

**1.6 SUBMITTALS**

- A. Submittals shall be required for the following items, and for additional items where required elsewhere in the specifications or on the drawings.

- 1. Submittals list:

<b>Referenced Specification <u>Section</u></b>	<b><u>Submittal Item</u></b>
230593	Testing, Adjusting, and Balancing
230900	Controls
233423	Power Ventilators
233700	Roof Hoods

- B. General Submittal Procedures: In addition to the provisions of Division 1, the following are required:
1. Transmittal: Each transmittal shall include the following:
    - a. Date
    - b. Project title and number
    - c. Contractor's name and address
    - d. Division of work (e.g., plumbing, heating, ventilating, etc.)
    - e. Description of items submitted and relevant specification number
    - f. Notations of deviations from the contract documents
    - g. Other pertinent data
  2. Submittal Cover Sheet: Each submittal shall include a cover sheet containing:
    - a. Date
    - b. Project title and number
    - c. Architect/Engineer
    - d. Contractor and subcontractors' names and addresses
    - e. Supplier and manufacturer's names and addresses
    - f. Division of work (e.g., plumbing, heating, ventilating, etc.)
    - g. Description of item submitted (using project nomenclature) and relevant specification number
    - h. Notations of deviations from the contract documents
    - i. Other pertinent data
    - j. Provide space for Contractor's review stamps
  3. Composition:
    - a. Submittals shall be submitted using specification sections and the project nomenclature for each item.
    - b. Individual submittal packages shall be prepared for items in each specification section. All items within a single specification section shall be packaged together where possible. An individual submittal may contain items from multiple specifications sections if the items are intimately linked (e.g., pumps and motors).
    - c. All sets shall contain an index of the items enclosed with a general topic description on the cover.
  4. Content: Submittals shall include all fabrication, erection, layout, and setting drawings; manufacturers' standard drawings; schedules; descriptive literature, catalogs and brochures; performance and test data; electrical power criteria (e.g., voltage, phase, amps, horsepower, kW, etc.) wiring and control diagrams; Short Circuit Current Rating (SCCR); dimensions; shipping and operating weights; shipping splits; service clearances; and all other drawings and descriptive data of materials of construction as may be required to show that the materials, equipment or systems and the location thereof conform to the requirements of the contract documents.

5. Contractor's Approval Stamp:
  - a. The Contractor shall thoroughly review and approve all shop drawings before submitting them to the Architect/Engineer. The Contractor shall stamp, date and sign each submittal certifying it has been reviewed.
  - b. Unstamped submittals will be rejected.
  - c. The Contractor's review shall include, but not be limited to, verification of the following:
    - 1) Only approved manufacturers are used.
    - 2) Addenda items have been incorporated.
    - 3) Catalog numbers and options match those specified.
    - 4) Performance data matches that specified.
    - 5) Electrical characteristics and loads match those specified.
    - 6) Equipment connection locations, sizes, capacities, etc. have been coordinated with other affected trades.
    - 7) Dimensions and service clearances are suitable for the intended location.
    - 8) Equipment dimensions are coordinated with support steel, housekeeping pads, openings, etc.
    - 9) Constructability issues are resolved (e.g., weights and dimensions are suitable for getting the item into the building and into place, sinks fit into countertops, etc.).
  - d. The Contractor shall review, stamp and approve all subcontractors' submittals as described above.
  - e. **The Contractor's approval stamp is required on all submittals. Approval will indicate the Contractor's review of all material and a complete understanding of exactly what is to be furnished. Contractor shall clearly mark all deviations from the contract documents on all submittals. If deviations are not marked by the Contractor, then the item shall be required to meet all drawing and specification requirements.**
6. Submittal Identification and Markings:
  - a. The Contractor shall clearly mark each item with the same nomenclature applied on the drawings or in the specifications.
  - b. The Contractor shall clearly indicate the size, finish, material, etc.
  - c. Where more than one model is shown on a manufacturer's sheet, the Contractor shall clearly indicate exactly which item and which data is intended.
  - d. All marks and identifications on the submittals shall be unambiguous.
7. Schedule submittals to expedite the project. Coordinate submission of related items.

8. Identify variations from the contract documents and product or system limitations that may be detrimental to the successful performance of the completed work.
9. Reproduction of contract documents alone is not acceptable for submittals.
10. Incomplete submittals will be rejected without review. Partial submittals will only be reviewed with prior approval from the Architect/Engineer.
11. Submittals not required by the contract documents may be returned without review.
12. The Architect/Engineer's responsibility shall be to review one set of shop drawing submittals for each product. If the first submittal is incomplete or does not comply with the drawings and/or specifications, the Contractor shall be responsible to bear the cost for the Architect/Engineer to recheck and handle the additional shop drawing submittals.
13. Submittals shall be reviewed and approved by the Architect/Engineer **before** releasing any equipment for manufacture or shipment.
14. Contractor's responsibility for errors, omissions or deviation from the contract documents in submittals is not relieved by the Architect/Engineer's approval.

C. Electronic Submittal Procedures:

1. Distribution: Email submittals as attachments to all parties designated by the Architect/Engineer, unless a web-based submittal program is used.
2. Transmittals: Each submittal shall include an individual electronic letter of transmittal.
3. Format: Electronic submittals shall be in PDF format only. Scanned copies, in PDF format, of paper originals are acceptable. Submittals that are not legible will be rejected. Do not set any permission restrictions on files; protected, locked, or secured documents will be rejected.
4. File Names: Electronic submittal file names shall include the relevant specification section number followed by a description of the item submitted, as follows. Where possible, include the transmittal as the first page of the PDF instead of using multiple electronic files.
  - a. Submittal file name: 23XXXX.description.YYYYMMDD
  - b. Transmittal file name: 23XXXX.description.YYYYMMDD
5. File Size: Electronic file size shall be limited to a maximum of 4MB. Larger files shall be transmitted via a pre-approved method.

## 1.7 SCHEDULE OF VALUES

- A. The requirements herein are in addition to the provisions of Division 1.

- B. Format:
  - 1. Use AIA Document Continuation Sheets G703 or another similar form approved by the Owner and Architect/Engineer.
  - 2. Submit in Excel format.
  - 3. Support values given with substantiating data.
- C. Preparation:
  - 1. Itemize work required by each specification section and list all providers. All work provided by subcontractors and major suppliers shall be listed on the Schedule of Values. List each subcontractor and supplier by company name.
  - 2. Break down all costs into:
    - a. Material: Delivered cost of product with taxes paid.
    - b. Labor: Labor cost, excluding overhead and profit.

## **1.8 CHANGE ORDERS**

- A. A detailed material and labor takeoff shall be prepared for each change order, along with labor rates and markup percentages. Change orders with inadequate breakdown will be rejected.
- B. Change order work shall not proceed until authorized.

## **1.9 PRODUCT DELIVERY, STORAGE, HANDLING & MAINTENANCE**

- A. Exercise care in transporting and handling to avoid damage to materials. Store materials on the site to prevent damage. Keep materials clean, dry and free from harmful conditions. Immediately remove any materials that become wet or that are suspected of becoming contaminated with mold or other organisms.
- B. Keep all bearings properly lubricated and all belts properly tensioned and aligned.
- C. Coordinate the installation of heavy and large equipment with the General Contractor and/or Owner. If the Mechanical Contractor does not have prior documented experience in rigging and lifting similar equipment, he/she shall contract with a qualified lifting and rigging service that has similar documented experience. Follow all equipment lifting and support guidelines for handling and moving.
- D. Contractor is responsible for moving equipment into the building and/or site. Contractor shall review site prior to bid for path locations and any required building modifications to allow movement of equipment. Contractor shall coordinate his/her work with other trades.

## **1.10 WARRANTY**

- A. Provide one-year warranty, unless otherwise noted, to the Owner for all fixtures, equipment, materials, and workmanship.
- B. The warranty period for all work in this Division of the specifications shall commence on the date of final acceptance, unless a whole or partial system or any separate piece of equipment or component is put into use for the benefit of any party other than the installing

contractor with prior written authorization. In this instance, the warranty period shall commence on the date when such whole system, partial system or separate piece of equipment or component is placed in operation and accepted in writing by the Owner.

- C. Warranty requirements shall extend to correction, without cost to the Owner, of all Work found to be defective or nonconforming to the contract documents. The Contractor shall bear the cost of correcting all damage resulting from defects or nonconformance with contract documents.

#### **1.11 INSURANCE**

- A. Contractor shall maintain insurance coverage as set forth in Division 0 of these specifications.

#### **1.12 CONTINGENCY**

- A. The Mechanical Contractors shall include in the Base Bid a contingency of one percent (1%) to be used only by change orders issued by the Architect/Engineer. The unused portion of the contingency shall be deducted from the Contract price before final payment is made.

#### **1.13 MATERIAL SUBSTITUTION**

- A. Where several manufacturers' names are given, the manufacturer for which a catalog number is given is the basis for job design and establishes the quality required.
- B. Equivalent equipment manufactured by the other named manufacturers may be used. Contractor shall ensure that all items submitted by these other manufacturers meet all requirements of the drawings and specifications, and fits in the allocated space.
- C. Any material, article or equipment of other unnamed manufacturers which will adequately perform the services and duties imposed by the design and is of a quality equal to or better than the material, article or equipment identified by the drawings and specifications may be used if approval is secured in writing from the Architect/Engineer not later than ten days prior to the bid opening.
- D. This Contractor assumes all costs incurred as a result of using the offered material, article or equipment, on his part or on the part of other Contractors whose work is affected.
- E. This Contractor may list voluntary add or deduct prices for alternate materials on the bid form. These items will not be used in determining the low bidder.
- F. All material substitutions requested later than ten (10) days prior to bid opening must be listed as voluntary changes on the bid form.

### **PART 2 - PRODUCTS**

NOT APPLICABLE

## **PART 3 - EXECUTION**

### **3.1 JOBSITE SAFETY**

- A. Neither the professional activities of the Architect/Engineer, nor the presence of the Architect/Engineer or his or her employee and subconsultants at a construction site, shall relieve the Contractor and other entity of their obligations, duties and responsibilities including, but not limited to, construction means, methods, sequence, techniques or procedures necessary for performing, superintending or coordinating all portions of the work of construction in accordance with the contract documents and any health or safety precautions required by any regulatory agencies. The Architect/Engineer and his or her personnel have no authority to exercise any control over any construction contractor or other entity or their employees in connection with their work or any health or safety precautions. The Contractor is solely responsible for jobsite safety. The Architect/Engineer and the Architect/Engineer's consultants shall be indemnified and shall be made additional insureds under the Contractor's general liability insurance policy.

### **3.2 PROJECT CLOSEOUT**

- A. The following paragraphs supplement the requirements of Division 1.
- B. Final Jobsite Observation:
  - 1. In order to prevent the Final Jobsite Observation from occurring too early, the Contractor is required to review the completion status of the project and certify that the job is ready for the final jobsite observation.
  - 2. Attached to the end of this section is a typical list of items that represent the degree of job completeness expected prior to requesting a review.
  - 3. Upon Contractor certification that the project is complete and ready for a final observation, the Contractor shall sign the attached certification and return it to the Architect/Engineer so that the final observation can be scheduled.
  - 4. It is understood that if the Architect/Engineer finds the job not ready for the final observation and that additional trips and observations are required to bring the project to completion, the costs incurred by the Architect/Engineer's additional time and expenses will be deducted from the Contractor's contract retainage prior to final payment at the completion of the job.
- C. Before final payment is authorized, this Contractor must submit the following:
  - 1. Operation and maintenance manuals with copies of approved shop drawings.
  - 2. Record documents including marked-up or reproducible drawings and specifications.
  - 3. A report documenting the instructions given to the Owner's representatives complete with the number of hours spent in the instruction. The report shall bear the signature of an authorized agent of This Contractor and shall be signed by the Owner's representatives.

4. Start-up reports on all equipment requiring a factory installation inspection or start-up.
5. Provide spare parts, maintenance, and extra materials in quantities specified in individual specification sections. Deliver to project site and place in location as directed; receipt by Architect/Engineer required prior to final payment approval.

### **3.3 OPERATION AND MAINTENANCE MANUALS**

#### **A. General:**

1. Provide an electronic copy of the O&M manuals as described below for Architect/Engineer's review and approval. The electronic copy shall be corrected as required to address the Architect/Engineer's comments. Once corrected, electronic copies and paper copies shall be distributed as directed by the Architect/Engineer.
2. Approved O&M manuals shall be completed and in the Owner's possession prior to Owner's acceptance and at least 10 days prior to instruction of operating personnel.

#### **B. Electronic Submittal Procedures:**

1. Distribution: Email the O&M manual as attachments to all parties designated by the Architect/Engineer.
2. Transmittals: Each submittal shall include an individual electronic letter of transmittal.
3. Format: Electronic submittals shall be in PDF format only. Scanned copies, in PDF format, of paper originals are acceptable. Submittals that are not legible will be rejected. Do not set any permission restrictions on files; protected, locked, or secured documents will be rejected.
4. File Names: Electronic submittal file names shall include the relevant specification section number followed by a description of the item submitted, as follows. Where possible, include the transmittal as the first page of the PDF instead of using multiple electronic files.
  - a. O&M file name: O&M.div23.contractor.YYYYMMDD
  - b. Transmittal file name: O&Mtransmittal.div23.contractor.YYYYMMDD
5. File Size: Electronic file size shall be limited to a maximum of 4MB. Larger files shall be divided into files that are clearly labeled as "1 of 2", "2 of 2", etc.
6. Provide the Owner with an approved copy of the O&M manual on compact discs (CD), digital video discs (DVD), or flash drives with a permanently affixed label, printed with the title "Operation and Maintenance Instructions", title of the project and subject matter of disc/flash drive when multiple disc/flash drives are required.
7. All text shall be searchable.

8. Bookmarks shall be used, dividing information first by specification section, then systems, major equipment and finally individual items. All bookmark titles shall include the nomenclature used in the construction documents and shall be an active link to the first page of the section being referenced.
- C. Operation and Maintenance Instructions shall include:
1. Title Page: Include title page with project title, Architect, Engineer, Contractor, all subcontractors, and major equipment suppliers, with addresses, telephone numbers, website addresses, email addresses and point of contacts. Website URLs and email addresses shall be active links in the electronic submittal.
  2. Table of Contents: Include a table of contents describing specification section, systems, major equipment, and individual items.
  3. Copies of all final approved shop drawings and submittals. Include Architect's/Engineer's shop drawing review comments. Insert the individual shop drawing directly after the Operation and Maintenance information for the item(s) in the review form.
  4. Refer to Section 23 09 00 for additional requirements for Temperature Control submittals.
  5. Copy of final approved test and balance reports.
  6. Copies of all factory inspections and/or equipment startup reports.
  7. Copies of warranties.
  8. Schematic electrical power/controls wiring diagrams of the equipment that have been updated for field conditions. Field wiring shall have label numbers to match drawings.
  9. Dimensional drawings of equipment.
  10. Capacities and utility consumption of equipment.
  11. Detailed parts lists with lists of suppliers.
  12. Operating procedures for each system.
  13. Maintenance schedule and procedures. Include a chart listing maintenance requirements and frequency.
  14. Repair procedures for major components.
  15. List of lubricants in all equipment and recommended frequency of lubrication.
  16. Instruction books, cards, and manuals furnished with the equipment.

### **3.4 INSTRUCTING THE OWNER'S REPRESENTATIVES**

- A. Adequately instruct the Owner's designated representatives in the maintenance, care, and operation of all systems installed under this contract.
- B. Provide verbal and written instructions to the Owner's representatives by **FACTORY PERSONNEL** in the care, maintenance, and operation of the equipment and systems.
- C. The Owner has the option to make a video recording of all instructions. Coordinate schedule of instructions to facilitate this recording.
- D. The instructions shall include:
  - 1. Explanation of all system flow diagrams.
  - 2. Explanation of all air handling systems.
  - 3. Temperature control system operation including calibration, adjustment and proper operating conditions of all sensors.
  - 4. Maintenance of equipment.
  - 5. Start-up procedures for all major equipment.
  - 6. Explanation of seasonal system changes.
  - 7. Description of emergency system operation.
- E. The Architect/Engineer shall be notified of the time and place instructions will be given to the Owner's representatives so he or his representative can attend if desired.
- F. Minimum hours of instruction for each item shall be:
  - 1. Exhaust System(s) - One (1) hours.
  - 2. Temperature Controls - As defined in Section 230900.
- G. The Contractor shall prepare a detailed, written training agenda and submit it to the Architect/Engineer a minimum of two weeks prior to the formal training for approval. The written agenda shall include specific training points within the items described above. For example: how to adjust setpoints, troubleshooting, proper start-up, proper shut-down, seasonal changes, draining, venting, changing filters, changing belts, etc. Failure to provide and follow an approved training agenda may result in additional training required at the expense of the Contractor.
- H. Operating Instructions:
  - 1. Contractor is responsible for all instructions to the Owner's representatives for the mechanical and control systems.
  - 2. If the Contractor does not have staff that can adequately provide the required instructions he shall include in his bid an adequate amount to reimburse the Owner for the Architect/Engineer to perform these services.

### **3.5 SYSTEM STARTING AND ADJUSTING**

- A. The mechanical systems shall be complete and operating. System startup, testing, adjusting, and balancing to obtain satisfactory system performance is the responsibility of the Contractor. This includes calibration and adjustments of all controls, noise level adjustments and final comfort adjustments as required.

- B. Complete all manufacturer-recommended startup procedures and checklists to verify proper motor rotation, electrical power voltage is within equipment limitations, equipment controls maintain pressures and temperatures within acceptable ranges, all filters and protective guards are in-place, acceptable access is provided for maintenance and servicing, and equipment operation does not pose a danger to personnel or property.
- C. Operate all HVAC systems continuously for at least one week prior to occupancy to bring construction materials to suitable moisture levels. Areas with mechanical cooling shall be maintained below 60% RH.
- D. Contractor shall adjust the mechanical systems and controls at season changes during the one year warranty period, as required, to provide satisfactory operation and to prove performance of all systems in all seasons.
- E. All operating conditions and control sequences shall be tested during the start-up period. Test all interlocks, safety shutdowns, controls, and alarms.
- F. The Contractor, subcontractors, and equipment suppliers shall have skilled technicians to ensure that all systems perform properly. If the Architect/Engineer is requested to visit the job site for trouble shooting, assisting in start-up, obtaining satisfactory equipment operation, resolving installation and/or workmanship problems, equipment substitution issues or unsatisfactory system performance, including call backs during the warranty period, through no fault of the design; the Contractor shall reimburse the Owner on a time and materials basis for services rendered at the Architect/Engineer's standard hourly rates in effect when the services are requested. The Contractor shall pay the Owner for services required that are product, installation or workmanship related. Payment is due within 30 days after services are rendered.

### **3.6 RECORD DOCUMENTS**

- A. The following paragraph supplements Division 1 requirements:

Contractor shall maintain at the job site a separate and complete set of mechanical drawings and specifications on which he shall clearly and permanently mark in complete detail all changes made to the mechanical systems.
- B. Mark drawings to indicate revisions to piping and ductwork, size and location, both exterior and interior; including locations of coils, dampers, other control devices, filters, and other units requiring periodic maintenance or repair; actual equipment locations, dimensioned from column lines; actual inverts and locations of underground piping; concealed equipment, dimensioned from column lines; mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (e.g., traps, strainers, expansion compensators, tanks, etc.); Change Orders; concealed control system devices.
- C. Refer to Section 230900 for additional requirements for Temperature Control documents.

### **3.7 ADJUST AND CLEAN**

- A. Thoroughly clean all equipment and systems prior to the Owner's final acceptance of the project. Clean all foreign paint, grease, oil, dirt, labels, stickers, and other foreign material from all equipment.

- B. Clean all drain pans and areas where moisture is present. Immediately report any mold, biological growth, or water damage.
- C. Remove all rubbish, debris, etc., accumulated during construction from the premises.

### **3.8 SPECIAL REQUIREMENTS**

- A. Contractor shall coordinate the installation of all equipment, valves, dampers, operators, etc., with other trades to maintain clear access area for servicing.
- B. All equipment shall be installed in such a way to maximize access to parts needing service or maintenance. Review the final field location, placement, and orientation of equipment with the Owner's designated representative prior to setting equipment.
- C. Installation of equipment or devices without regard to coordination of access requirements and confirmation with the Owner's designated representative will result in removal and reinstallation of the equipment at the Contractor's expense.

### **3.9 IAQ MAINTENANCE FOR OCCUPIED FACILITIES UNDER CONSTRUCTION**

- A. Contractors shall make all reasonable efforts to prevent construction activities from affecting the air quality of the occupied areas of the building or outdoor areas near the building. These measures shall include, but not be limited to:
  - 1. All contractors shall endeavor to minimize the amount of contaminants generated during construction. Methods to be employed shall include, but not be limited to:
    - a. Minimizing the amount of dust generated.
    - b. Reducing solvent fumes and VOC emissions.
    - c. Maintain good housekeeping practices, including sweeping and periodic dust and debris removal. There should be no visible haze in the air.
    - d. Protect stored on-site and installed absorptive materials from moisture damage.
  - 2. Request that the Owner designate an IAQ representative.
  - 3. Review and receive approval from the Owner's IAQ representative for all IAQ-related construction activities and negative pressure containment plans.
  - 4. Inform the IAQ representative of all conditions that could adversely impact IAQ, including operations that will produce higher than normal dust production or odors.
  - 5. Schedule activities that may cause IAQ conditions that are not acceptable to the Owner's IAQ representative during unoccupied periods.
  - 6. Request copies of and follow all of the Owner's IAQ and infection control policies.
  - 7. Unless no other access is possible, the entrance to construction site shall not be through the existing facility.
  - 8. To minimize growth of infectious organisms, do not permit damp areas in or near the construction area to remain for over 24 hours.

9. In addition to the criteria above, provide measures as recommended in the SMACNA “IAQ Guidelines for Occupied Buildings Under Construction”.
10. If permanently installed air handlers are used to serve both construction and occupied areas, all return grilles throughout construction areas shall be sealed to prevent air from construction areas being supplied to occupied areas.
11. If permanently installed air handlers are used during construction to serve only construction areas and do not supply air to adjacent occupied areas, MERV 8 filtration media shall be used to protect each return air grille or opening. The intent of this will be to prevent construction dust and debris from entering any return or supply air ductwork in the facility. All filtration media shall be replaced immediately prior to occupancy.

**END OF SECTION 230500**

READINESS CERTIFICATION PRIOR TO FINAL JOBSITE OBSERVATION

To prevent the final job observation from occurring too early, we require that the Contractor review the completion status of the project and, by copy of this document, certify that the job is indeed ready for the final job observation. The following is a typical list of items that represent the degree of job completeness expected prior to your requesting a final job observation.

1. Penetrations fire sealed and labeled in accordance with specifications.
2. All air handling units operating and balanced.
3. All fans shall be operating and balanced.
4. All miscellaneous mechanical systems (unit heaters, fan coil units, cabinet heaters, etc.) operating.
5. All temperature control systems operating, programmed and calibrated.

Accepted by:

Prime Contractor \_\_\_\_\_

By \_\_\_\_\_ Date \_\_\_\_\_

Upon Contractor certification that the project is complete and ready for a final job observation, we require the Contractor to sign this agreement and return it to the Architect/Engineer so that the final observation can be scheduled.

It is understood that if the Architect/Engineer finds the job not ready for the final observation and that additional trips and observations are required to bring the project to completion, the costs incurred by the Architect/Engineers for additional time and expenses will be deducted from the Contractor's contract retainage prior to final payment at the completion of the job.

\* \* \* \* \*

## **SECTION 230505 - HVAC DEMOLITION FOR REMODELING**

### **PART 1 - GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Mechanical demolition.
- B. Cutting and Patching.

### **PART 2 - PRODUCTS**

#### **2.1 MATERIALS AND EQUIPMENT**

- A. Materials and equipment shall be as specified in individual Sections.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. THE DRAWINGS ARE INTENDED TO INDICATE THE GENERAL SCOPE OF WORK AND DO NOT SHOW EVERY PIPE, DUCT, OR PIECE OF EQUIPMENT THAT MUST BE REMOVED. THE CONTRACTOR SHALL VISIT THE SITE AND VERIFY CONDITIONS PRIOR TO SUBMITTING A BID.
- B. Where walls, ceilings, etc., are shown as being removed on general drawings, the Contractor shall remove all mechanical equipment, devices, fixtures, piping, ducts, systems, etc., from the removed area.
- C. Where ceilings, walls, partitions, etc., are temporarily removed and replaced by others, This Contractor shall remove, store, and replace equipment, devices, fixtures, pipes, ducts, systems, etc.
- D. Verify that abandoned utilities serve only abandoned equipment or facilities. Extend services to facilities or equipment that shall remain in operation following demolition.
- E. Coordinate work with all other Contractors and the Owner. Schedule removal of equipment to avoid conflicts.
- F. This Contractor shall verify all existing equipment sizes and capacities where equipment is scheduled to be replaced or modified, prior to ordering new equipment.
- G. Bid submittal shall mean the Contractor has visited the project site and verified existing conditions and scope of work.

#### **3.2 PREPARATION**

- A. Disconnect mechanical systems in walls, floors, and ceilings scheduled for removal.

- B. Provide temporary connections to maintain existing systems in service during construction. When work must be performed on operating equipment, use personnel experienced in such operations.

### **3.3 DEMOLITION AND EXTENSION OF EXISTING MECHANICAL WORK**

- A. Demolish and extend existing mechanical work under provisions of Division 2 and this Section.
- B. Remove, relocate, and extend existing installations to accommodate new construction.
- C. Remove abandoned ducts and piping to source of supply and/or main lines.
- D. Remove exposed abandoned pipes and ducts, including abandoned pipes and ducts above accessible ceilings. Cut ducts flush with walls and floors, cap duct that remains, and patch surfaces. Cut pipes above ceilings, below floors and behind walls. Cap remaining lines. Repair building construction to match original. Remove all clamps, hangers, supports, etc. associated with pipe and duct removal.
- E. Disconnect and remove mechanical devices and equipment serving equipment that has been removed.
- F. Repair adjacent construction and finishes damaged during demolition and extension work.
- G. Maintain access to existing mechanical installations which remain. Modify installation or provide access panels as appropriate.
- H. Extend existing installations using materials and methods compatible with existing installations, or as specified.

### **3.4 CUTTING AND PATCHING**

- A. This Contractor is responsible for all penetrations of existing construction required to complete the work of this project. Refer to Section 23 05 29 for additional requirements.
- B. Penetrations in existing construction should be reviewed carefully prior to proceeding with any work.
- C. Penetrations shall be neat and clean with smooth and/or finished edges. Core drill where possible for clean opening.
- D. Repair existing construction as required after penetration is complete to restore to original condition. Use similar materials and match adjacent construction unless otherwise noted or agreed to by the Architect/Engineer prior to start of work.

### **3.5 CLEANING AND REPAIR**

- A. Clean and repair existing materials and equipment which remain or are to be reused.
- B. Clean all systems adjacent to project which are affected by the dust and debris caused by this construction.

- C. MECHANICAL ITEMS REMOVED AND NOT RELOCATED REMAIN THE PROPERTY OF THE OWNER. CONTRACTOR SHALL PLACE ITEMS RETAINED BY THE OWNER IN A LOCATION COORDINATED WITH THE OWNER. THE CONTRACTOR SHALL DISPOSE OF MATERIAL THE OWNER DOES NOT WANT TO REUSE OR RETAIN FOR MAINTENANCE PURPOSES.

**END OF SECTION 230505**

## SECTION 230513 - MOTORS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Single Phase and Three Phase Electric Motors.

#### 1.2 SUBMITTALS

- A. Submit shop drawings under provisions of Section 230500. Include nominal efficiency and power factor for all premium efficiency motors. Efficiencies must meet or exceed the nominal energy efficiency levels presented below.
- B. Submit shop drawings for all three phase motors.
- C. Submit motor data with equipment when motor is installed by the manufacturer at the factory.
- D. Submit shaft grounding device for all motors as required.

#### 1.3 DELIVERY, STORAGE, AND HANDLING

- A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weatherproof coverings. For extended outdoor storage, follow manufacturer's recommendations for equipment and motor.

#### 1.4 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data including assembly drawings, bearing data including replacement sizes, and lubrication instructions.

#### 1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in the manufacture of commercial and industrial motors and accessories, with a minimum of three years documented manufacturing experience.

### PART 2 - PRODUCTS

#### 2.1 MOTORS - GENERAL CONSTRUCTION AND REQUIREMENTS

- A. Refer to the drawings for required electrical characteristics. Voltage is generally specified and scheduled as distribution voltage. Motor submittals may be based on utilization voltage if it corresponds to the correct distribution voltage.

Distribution/Nominal Voltage	Utilization Voltage
120	115
208	200
240	230

277	265
480	460

- B. Design motors for continuous operation in 40°C environment, and for temperature rise in accordance with ANSI/NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
- C. Explosion-Proof Motors: UL listed and labeled for the hazard classification shown on the drawing, with over-temperature protection.
- D. Visible Nameplate: Indicating horsepower, voltage, phase, hertz, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, insulation class.
- E. Electrical Connection: Boxes, threaded for conduit. For fractional horsepower motors where connection is made directly, provide conduit connection in end frame.
- F. Unless otherwise indicated, motors 3/4 HP and smaller shall be single phase, 60 hertz, open drip-proof or totally enclosed fan-cooled type.
- G. Unless otherwise indicated, motors 1 HP and larger shall be three phase, 60 hertz, squirrel cage type, NEMA Design Code B (low current in-rush, normal starting torque), open drip-proof or totally enclosed fan-cooled type.
- H. Each contractor shall set all motors furnished by him.
- I. All motors shall have a minimum service factor of 1.15.
- J. All motors shall have ball or roller bearings with a minimum L-10 fatigue life of 150,000 hours in direct-coupled applications and 50,000 hours for belted applications. Belted rating shall be based on radial loads and pulley sizes called out in NEMA MG1-14.43.
- K. Bearings shall be sealed type for 10 HP and smaller motors. Bearings shall be regreasable type for larger motors.
- L. Aluminum end housings are not permitted on motors 15 HP or larger.
- M. Provide all belted motors with a means of moving and securing the motor to tighten belts. Motors over 2 HP shall have screw type tension adjustment. Motors over 40 HP shall have dual screw adjusters. Slide bases shall conform to NEMA standards.
- N. Motors for fans and pumps 1/12 HP or greater and less than 1 HP shall be electronically-commutated motors or shall have a minimum motor efficiency of 70% when rated in accordance with DOE 10 CFR 431. These motors shall also have the means to adjust motor speed for either balancing or remote control. Belt-driven fans may use sheave adjustments for airflow balancing in lieu of varying motor speed.

**2.2 PREMIUM EFFICIENCY MOTORS (INCLUDING MOST 3-PHASE GENERAL PURPOSE MOTORS)**

- A. All motors, unless exempted by EPCAct legislation that became federal law on December 19, 2010, shall comply with the efficiencies listed in that standard, which are reprinted below. These match the 2010 NEMA premium efficiency ratings. All ratings listed are

nominal full load efficiencies, verified in accordance with IEEE Standard 112, Test Method B. Average expected (not guaranteed minimum) power factors shall also be at least the following:

HP	Full-Load Efficiencies %					
	Open Drip-Proof			Totally Enclosed Fan Cooled		
	1200 rpm	1800 rpm	3600 rpm	1200 rpm	1800 rpm	3600 rpm
1.0	82.5	85.5	77.0	82.5	85.5	77.0
1.5	86.5	86.5	84.0	87.5	86.5	84.0
2.0	87.5	86.5	85.5	88.5	86.5	85.5
3.0	88.5	89.5	85.5	89.5	89.5	86.5
5.0	89.5	89.5	86.5	89.5	89.5	88.5
7.5	90.2	91.0	88.5	91.0	91.7	89.5
10.0	91.7	91.7	89.5	91.0	91.7	90.2

B. Motor nameplate shall be noted with the above ratings.

### 2.3 MOTOR DRIVEN EQUIPMENT

- A. No equipment shall be selected or operate above 90% of its motor nameplate rating. Motor size may not be increased to compensate for equipment with efficiency lower than that specified.
- B. If a larger motor than specified is required on equipment, the contractor supplying the equipment is responsible for all additional costs due to larger starters, wiring, etc.

### 2.4 SHEAVES

- A. All sheaves shall conform to NEMA Standard MG1-14.42, which lists minimum diameters and maximum overhangs. Locate motors to minimize overhang.
- B. When replacing sheaves, use sheaves of at least the originally supplied sizes.
- C. Contractor responsible for motor shall also be responsible for replacement sheaves. Coordinate with testing and balancing of the equipment.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. All rotating shafts and/or equipment shall be completely guarded from all contact. Partial guards and/or guards that do not meet all applicable OSHA standards are not acceptable. Contractor is responsible for providing this guarding if it is not provided with the equipment supplied.
- B. For flexible coupled drive motors, mount coupling to the shafts in accordance with the coupling manufacturer's recommendations. Align shafts to manufacturer's requirements or within 0.002 inch per inch diameter of coupling hub.
- C. For belt drive motors, mount sheaves on the appropriate shafts per manufacturer's instructions. Use a straight edge to check alignment of the sheaves. Reposition sheaves as

necessary so the straight edge contacts both sheave faces squarely. After sheaves are aligned, loosen the adjustable motor base so the belt(s) can be added, and tighten the base so the belt tension is in accordance with the drive manufacturer's recommendations. Frequently check belt tension and adjust if necessary during the first day of operation and again after 80 hours of operation.

**END OF SECTION 230513**

## **SECTION 230529 - HVAC SUPPORTS AND ANCHORS**

### **PART 1 - GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Equipment Bases and Supports.
- B. Cutting of Openings.

#### **1.2 WORK FURNISHED BUT INSTALLED UNDER OTHER SECTIONS**

- A. Furnish sleeves and hanger inserts to General Contractor for placement into formwork.

### **PART 2 - PRODUCTS**

#### **2.1 FOUNDATIONS, BASES, AND SUPPORTS**

- A. Basic Requirements:
  - 1. Furnish and install foundations, bases, and supports (not specifically indicated on the Drawings or in the Specifications of either the General Construction or Mechanical work as provided by another Contractor) for mechanical equipment.
  - 2. All concrete foundations, bases and supports, shall be reinforced. All steel bases and supports shall receive a prime coat of zinc chromate or red metal primer. After completion of work, give steel supports a final coat of gray enamel.
- B. Equipment Roof Support (Curbs and Rails):
  - 1. Rooftop equipment such as packaged air handling units, roof hoods and rooftop exhaust fans shall be provided with curbs by the unit manufacturer.
  - 2. Where not furnished with rooftop equipment, provide prefabricated curbs or rails as follows:
    - a. 12" high above the top surface of the roof (not the roof structure).
    - b. 18 gauge galvanized sheet metal, as required for the equipment weight.
    - c. Internal reinforcing.
    - d. Pressure treated wood nailer.
    - e. 18 gauge counter flashing completely covering nailer.
    - f. Factory insulated with rigid fiberglass.
  - 3. Match units to the building roof with either a raised cant to match roof insulation (for built-up roofs), or with no cant (for single-ply roofs).
  - 4. Where legs of equipment rest on rails, provide 1/4" bent plates 18" long.
  - 5. Acceptable Manufacturers: Thy, Pate, United, Roof Products Systems or Portals Plus.

6. Equipment requiring curbs or rails is as follows:
  - a. Exhaust fans
- C. Supports:
  1. Provide sufficient clips, inserts, hangers, racks, rods, and auxiliary steel to securely support all suspended material, equipment and conduit without sag.
  2. Hang heavy equipment from concrete floors or ceilings with Architect/Engineer-approved concrete inserts, furnished and installed by the Contractor whose work requires them, except where indicated otherwise.

## **2.2 OPENINGS IN FLOORS, WALLS AND CEILINGS**

- A. Exact locations of all openings for the installation of materials shall be determined by the Contractor and given to the General Contractor for installation or construction as the structure is built.
- B. Coordinate all openings with other Contractors.
- C. Hire the proper tradesman and furnish all labor, material and equipment to cut openings in or through existing structures, or openings in new structures that were not installed, or additional openings. Repair all spalling and damage to the satisfaction of the Architect/Engineer. Make saw cuts before breaking out concrete to ensure even and uniform opening edges.
- D. Said cutting shall be at the complete expense of each Contractor. Failure to coordinate openings with other Contractors shall not exempt the Contractor from providing openings at his expense.
- E. Do not cut structural members without written approval of the Architect or Structural Engineer.

## **PART 3 - EXECUTION**

### **3.1 HVAC SUPPORTS AND ANCHORS**

- A. General Installation Requirements:
  1. Install all items per manufacturer's instructions.
- B. Provided the installation complies with all loading requirements of truss and joist manufacturers, the following practices are acceptable:
  1. Loads of 100 lbs. or less may be attached anywhere along the top or bottom chords of trusses or joists with a minimum 3' spacing between loads.
  2. Loads greater than 100 lbs. must be hung concentrically and may be hung from top or bottom chord, provided one of the following conditions is met:
    - a. The hanger is attached within 6" from a web/chord joint.

- b. Additional L2x2x1/4 web reinforcement is installed per manufacturer's requirements.
  - 3. It is prohibited to cantilever a load using an angle or other structural component that is attached to a truss or joist in such a fashion that a torsional force is applied to that structural member.
  - 4. If conditions cannot be met, coordinate installation with truss or joist manufacturer and contact Architect/Engineer.
- C. Do not exceed the manufacturer's recommended maximum load for any hanger or support.

**END OF SECTION 230529**

## **SECTION 230553 - HVAC IDENTIFICATION**

### **PART 1 - GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Identification of products installed under Division 23.

### **PART 2 - PRODUCTS**

#### **2.1 ACCEPTABLE MANUFACTURERS**

- A. 3M, Bunting, Calpico, Craftmark, Emedco, Kolbi Industries, Seton, W.H. Brady, Marking Services.

#### **2.2 MATERIALS**

- A. Aluminum Nameplates: Black enamel background with natural aluminum border and engraved letters furnished with two mounting holes and screws.
- B. Plastic Tags: Minimum 1-1/2" square or round laminated three-layer phenolic with engraved, 1/4" minimum black letters on light contrasting background.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Install all products per manufacturer's recommendations.
- B. Degrease and clean surfaces to receive adhesive for identification materials.
- C. Equipment:
  - 1. All equipment not easily identifiable such as controls, relays, gauges, etc.; and all equipment in an area remote from its function such as air handling units, exhaust fans, filters, reheat coils, dampers, etc.; shall have nameplates or plastic tags listing name, function, and drawing symbol. Do not label exposed equipment in public areas.
  - 2. Fasten nameplates or plastic tags with stainless steel self-tapping screws or permanently bonding cement.
  - 3. Mechanical equipment that is not covered by the U.S. National Appliance Energy Conservation Act (NAECA) of 1987 shall carry a permanent label installed by the manufacturer stating that the equipment complies with the requirements of ASHRAE 90.1.

**END OF SECTION 230553**

## **SECTION 230593 - TESTING, ADJUSTING, AND BALANCING**

### **PART 1 - GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Testing, adjusting, and balancing of air systems.
- B. Measurement of final operating condition of HVAC systems.

#### **1.2 QUALITY ASSURANCE**

- A. Agency shall be a company specializing in the adjusting and balancing of systems specified in this section with minimum three years' experience. Perform work under supervision of AABC Certified Test and Balance Engineer, NEBB Certified Testing, Balancing and Adjusting Supervisor, SMARTA Certified Air and Hydronic Balancer, or TABB Certified Supervisor.
- B. Work shall be performed in accordance with the requirements of the references listed at the start of this section.

#### **1.3 REFERENCES**

- A. AABC - National Standards for Total System Balance, 2002.
- B. ADC – Test Code for Grilles, Registers, and Diffusers.
- C. AMCA – Publication 203-90; Field Performance Measurement of Fan Systems.
- D. ASHRAE - 2003 HVAC Applications Handbook; Chapter 37, Testing, Adjusting and Balancing.
- E. ASHRAE/ANSI - Standard 111-1988; Practices for Measurement, Testing, Adjusting and Balancing of Building HVAC&R Systems.
- F. NEBB - Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems, Sixth Edition, 1998.
- G. SMACNA - HVAC Systems; Testing, Adjusting and Balancing, Third Edition, 2002.
- H. TABB – International Standards for Environmental Systems Balance.

#### **1.4 SUBMITTALS**

- A. Submit copies of report forms, balancing procedures, and the name and qualifications of testing and balancing agency for approval within 30 days after award of Contract.
- B. Electronic Copies:
  - 1. Submit a certified copy of test reports to the Architect/Engineer for approval. Electronic copies shall be in PDF format only. Scanned copies, in PDF format, of paper originals are acceptable. Copies that are not legible will be returned to the Contractor for resubmittal. Do not set any permission restrictions on files; protected, locked, or secured documents will be rejected.
  - 2. Electronic file size shall be limited to a maximum of 10MB. Larger files shall be divided into files that are clearly labeled as “1 of 2”, “2 of 2”, etc.
  - 3. All text shall be searchable.

4. Bookmarks shall be used. All bookmark titles shall be an active link to the index page and index tabs.

## **1.5 REPORT FORMS**

- A. Submit reports on AABC, SMACNA or NEBB forms. Use custom forms approved by the Architect/Engineer when needed to supply specified information.
- B. Include in the final report a schematic drawing showing each system component, including balancing devices, for each system. Each drawing shall be included with the test reports required for that system. The schematic drawings shall identify all testing points and cross-reference these points to the report forms and procedures.
- C. Refer to PART 4 for required reports.

## **1.6 WARRANTY/GUARANTEE**

- A. The TAB Contractor shall include an extended warranty of 90 days after owner receipt of a completed balancing report, during which time the Owner may request a recheck of terminals, or resetting of any outlet, coil, or device listed in the test report. This warranty shall provide a minimum of 24 manhours of onsite service time. If it is determined that the new test results are not within the design criteria, the balancer shall rebalance the system according to design criteria.
- B. Warranty/Guarantee must meet one of the following programs: TABB International Quality Assurance Program, AABC National Project Performance Guarantee, NEBB's Conformance Certification.

## **1.7 SCHEDULING**

- A. Coordinate schedule with other trades. Provide a minimum of seven days' notice to all trades and the Architect/Engineer prior to performing each test.

## **PART 2 - PRODUCTS**

NOT APPLICABLE

## **PART 3 - EXECUTION**

### **3.1 GENERAL REQUIREMENTS**

- A. All procedures must conform to a published standard listed in the References article of this section. All equipment shall be adjusted in accordance with the manufacturer's recommendations. Any system not listed in this specification but installed under the contract documents shall be balanced using a procedure from a published standard listed in the References article.
- B. The Balancing Contractor shall incorporate all pertinent documented construction changes (e.g. submittals/shop drawings, change orders, RFIs, ASIs, etc.) and include in the balancing report.

- C. Recorded data shall represent actual measured or observed conditions.
- D. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing is complete, close probe holes and patch insulation with new materials as specified. Restore vapor barrier and finish as specified.
- E. Permanently mark setting of valves, dampers, and other adjustment devices allowing for settings to be restored. Set and lock memory stops.
- F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, plugging test holes, and restoring thermostats to specified settings.
- G. Installations with systems consisting of multiple components shall be balanced with all system components operating.

### **3.2 EXAMINATION**

- A. Before beginning work, verify that systems are complete and operable. Ensure the following:
  - 1. General Equipment Requirements:
    - a. Equipment is safe to operate and in normal condition.
    - b. Equipment with moving parts is properly lubricated.
    - c. Temperature control systems are complete and operable.
    - d. Proper thermal overload protection is in place for electrical equipment.
    - e. Direction of rotation of all fans and pumps is correct.
    - f. Access doors are closed and end caps are in place.
  - 2. Duct System Requirements:
    - a. All filters are clean and in place. If required, install temporary media.
    - b. Duct systems are clean and free of debris.
    - c. Fire/smoke and manual volume dampers are in place, functional and open.
    - d. Air outlets are installed and connected.
    - e. Duct system leakage has been minimized.
- B. Report any defects or deficiencies to Architect/Engineer.
- C. Promptly report items that are abnormal or prevent proper balancing.
- D. If, for design reasons, system cannot be properly balanced, report as soon as observed.
- E. Beginning of work means acceptance of existing conditions.

### **3.3 PREPARATION**

- A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to the Architect/Engineer for spot checks during testing.

- B. Instruments shall be calibrated within six months of testing performed for project, or more recently if recommended by the instrument manufacturer.

### **3.4 INSTALLATION TOLERANCES**

- A.  $\pm 10\%$  of scheduled values:
  - 1. Adjust air inlets and outlets to  $\pm 10\%$  of scheduled values.
- B. Adjust supply, return, and exhaust air-handling systems to  $+10\%$  /  $-5\%$  of scheduled values.

### **3.5 ADJUSTING**

- A. After adjustment, take measurements to verify balance has not been disrupted or that disruption has been rectified.
- B. Once balancing of systems is complete, at least one damper or valve must be 100% open.
- C. After testing, adjusting and balancing are complete, operate each system and randomly check measurements to verify system is operating as reported in the report. Document any discrepancies.
- D. Contractor responsible for each motor shall also be responsible for replacement sheaves. Coordinate with contractor.

### **3.6 SUBMISSION OF REPORTS**

- A. Fill in test results on appropriate forms.

## **PART 4 - SYSTEMS TO BE TESTED, ADJUSTED AND BALANCED**

### **4.1 VERIFICATION OF EXISTING SYSTEMS**

- A. Perform a pre-balance of systems serving the area of construction prior to the start of any other work. Do not make adjustments to the systems. If the systems are not operating at maximum capacity, temporarily drive system to maximum and take readings for the system. Return the system to its original state when measurements are complete.
  - 1. Air Handling Unit
    - a. General Requirements:
      - 1) Existing Equipment Tag (if available).
      - 2) Location.
      - 3) Manufacturer, model, arrangement, class, discharge.
      - 4) Fan RPM.
    - b. Flow Rate:
      - 1) Supply flow rate (cfm)
      - 2) Return flow rate (cfm)
      - 3) Outside flow rate (cfm)
      - 4) Exhaust flow rate (cfm)

- c. Pressure Drop and Pressure:
  - 1) Filter pressure drop.
  - 2) Total static pressure. (Indicate if across fan or external to unit).
  - 3) Inlet pressure.
  - 4) Discharge pressure.

2. Exhaust Fan

- a. Drawing symbol.
- b. Location.
- c. Manufacturer and model.
- d. Flow rate (cfm).
- e. Total static pressure. (Indicate measurement locations).
- f. Inlet pressure.
- g. Discharge pressure.
- h. Fan RPM.

3. Air Terminal (Inlet or Outlet):

- a. Room number/location.
- b. Terminal type and size.
- c. Velocity.
- d. Flow rate (cfm)
- e. Percent of design flow rate.

B. Report findings to Architect/Engineer on standard forms. Provide four (4) copies of report.

## 4.2 GENERAL REQUIREMENTS

A. Title Page:

- 1. Project name.
- 2. Project location.
- 3. Project Architect.
- 4. Project Engineer (IMEG Corp.).
- 5. Project General Contractor.
- 6. TAB Company name, address, phone number.
- 7. TAB Supervisor's name and certification number.
- 8. TAB Supervisor's signature and date.
- 9. Report date.

B. Report Index

C. General Information:

- 1. Test conditions.
- 2. Nomenclature used throughout report.
- 3. Notable system characteristics/discrepancies from design.
- 4. Test standards followed.
- 5. Any deficiencies noted.
- 6. Quality assurance statement.

- D. Instrument List:
1. Instrument.
  2. Manufacturer, model, and serial number.
  3. Range.
  4. Calibration date.

### 4.3 AIR SYSTEMS

- A. Air Moving Equipment:
1. General Requirements:
    - a. Drawing symbol.
    - b. Location.
    - c. Manufacturer, model, arrangement, class, discharge.
    - d. Fan RPM.
    - e. Multiple RPM fan curve with operating point marked. (Obtain from equipment supplier).
    - f. Final frequency of motor at maximum flow rate (on fans driven by VFD).
  2. Flow Rate:
    - a. Supply flow rate (cfm): specified and actual.
    - b. Return flow rate (cfm): specified and actual.
    - c. Outside flow rate (cfm): specified and actual.
    - d. Exhaust flow rate (cfm): specified and actual.
  3. Pressure Drop and Pressure:
    - a. Filter pressure drop: specified and actual.
    - b. Total static pressure: specified and actual. (Indicate if across fan or external to unit).
    - c. Inlet pressure.
    - d. Discharge pressure.
- B. Fan Data:
1. Drawing symbol.
  2. Location.
  3. Manufacturer and model.
  4. Flow rate (cfm): specified and actual.
  5. Total static pressure: specified and actual. (Indicate measurement locations).
  6. Inlet pressure.
  7. Discharge pressure.
  8. Fan RPM.
- C. Electric Motors:
1. Drawing symbol of equipment served.
  2. Manufacturer, Model, Frame.
  3. Nameplate: HP, phase, service factor, RPM, operating amps, efficiency.
  4. Measured: Amps in each phase.

- D. Air Terminal (Inlet or Outlet):
1. Drawing symbol.
  2. Room number/location.
  3. Terminal type and size.
  4. Velocity: specified and actual.
  5. Flow rate (cfm): specified and actual.
  6. Percent of design flow rate.

**END OF SECTION 230593**

## **SECTION 230713 - DUCTWORK INSULATION**

### **PART 1 - GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Ductwork Insulation.
- B. Insulation Jackets.

#### **1.2 QUALITY ASSURANCE**

- A. Applicator: Company specializing in ductwork insulation application with five years minimum experience. When requested, installer shall submit manufacturer's certificate indicating qualifications.
- B. Materials: UL listed in Category HNKT; flame spread/smoke developed rating of 25/50 in accordance with ASTM E84, NFPA 255, or UL 723.
- C. Adhesives: UL listed, meeting NFPA 90A/90B requirements.

### **PART 2 - PRODUCTS**

#### **2.1 MATERIALS**

- A. Type B: Semi-rigid Fiberglass Board Wrap - Outside Application; ANSI/ASTM C612, Class 1; 0.25 maximum 'K' value at 75°F; foil scrim Kraft facing, 3 lb./cu. ft. density.

#### **2.2 JACKETS**

- A. Vapor Barrier Jackets: Kraft reinforced foil scrim vapor barrier with self-sealing adhesive joints. Beach puncture resistance ratio of at least 25 units. Tensile strength: 35 psi minimum. Single, self-seal acrylic adhesive on longitudinal jacket laps and butt strips.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Install materials in accordance with manufacturer's instructions, codes, and industry standards.
- B. Install materials after ductwork has been tested.
- C. Clean surfaces for adhesives.
- D. Provide insulation with vapor barrier when air conveyed may be below ambient temperature.
- E. Semi Rigid Fiberglass Board Wrap - Type B (Indoor Use):
  - 1. Impale on pins welded to the duct and secured with speed clips. Clip pins off close to speed clips.

2. Space pins as needed to hold insulation firmly against duct, but not less than one pin per square foot. Pins must be long enough to avoid compressing the insulation.
3. Seal all joints and speed clips with glass fabric set in adhesive or a 3" wide strip of Royal Tapes #RT 350 (216-439-7229), Venture Tape 1525CW, or Compac Type FSK facing tape.
4. For small areas, secure insulation with adhesive over the entire surface of the duct. Use adhesive in addition to pins as needed to prevent sagging on horizontal surfaces.

### **3.2 SCHEDULE**

- A. Refer to Section 233100 for scheduling of insulation.

**END OF SECTION 230713**

## SECTION 230900 - CONTROLS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Control Devices, Components, Wiring and Material.
- B. Instructions for Owners.
- C. Remodeling.

#### 1.2 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum five years' experience.
- B. TCC: Company specializing in the work of this section with minimum five years temperature control experience.
- C. Technician: Minimum five years' experience installing commercial temperature control systems.
- D. TCCs are limited to firms regularly employing a minimum of five full-time temperature control technicians within 100 miles of the job site.

#### 1.3 SUBMITTALS

- A. Equipment Coordination:
  - 1. The Controls Contractor shall obtain approved equipment submittals from other contractors to determine equipment wiring connections, to choose appropriate controllers, and to provide programming.
  - 2. Coordinate the control interface of all equipment with the equipment manufacturers prior to submittal submission.
- B. Shop Drawings:
  - 1. Submit shop drawings per Section 23 05 00. In addition, submit an electronic copy of the shop drawings in Adobe Acrobat (.pdf) format to the Owner for review.
  - 2. Cross-reference **all** control components and point names in a single table located at the beginning of the submittal with the **identical** nomenclature used in this section.
  - 3. Diagrams shall include:
    - a. A schematic wiring diagram for each controlled system. Each schematic shall have all elements labeled. Where a control element is the same as that shown on the control system schematic, label it with the same name. Label all terminals.

- b. A tabular instrumentation list for each controlled system. The table shall show element name, type of device, manufacturer, model number and product data sheet number.
  - c. All installation details and any other details required to demonstrate that the system will function properly.
- 4. Sequences: Submit a complete description of the operation of the control system, including sequences of operation. The description shall include and reference a schematic diagram of the controlled system. **The wording of the control sequences in the submittal shall match verbatim that included in the construction documents to ensure there are no sequence deviations from that intended by the Architect/Engineer. Clearly highlight any deviations from the specified sequences on the submittals.**
- 5. Damper Schedule: Schedule shall include a separate line for each damper and a column for each of the damper attributes:
  - a. Damper Identification Tag.
  - b. Location.
  - c. Damper Type.
  - d. Damper Size.
  - e. Duct Size.
  - f. Arrangement.
  - g. Blade Type.
  - h. Velocity.
  - i. Pressure Drop.
  - j. Fail Position.
  - k. Actuator Identification Tag.
  - l. Actuator Type.
  - m. Mounting.
- 6. Product Data Sheets: Required for each component that includes: unique identification tag that is consistent throughout the submittal, manufacturer's description, technical data, performance curves, installation/maintenance instructions, and other relevant items. When manufacturer's literature applies to a product series rather than a specific product, the data specifically applicable to the project shall be highlighted or clearly indicated by other means. Each submitted piece of literature and drawings shall clearly reference the specification and/or drawing that the submittal is to cover. General catalogs shall not be accepted as cutsheets to fulfill submittal requirements.
- 7. Control System Demonstration and Acceptance: Provide a description of the proposed process, along with all reports and checklists to be used.
- 8. Clearly identify work by others in the submittal.
- 9. Quantities of items submitted may be reviewed but are the responsibility of the Contractor to verify.

- C. Operation and Maintenance Manual:
  - 1. In addition to the requirements of Section 230500, submit an electronic copy of the O&M manuals in PDF format.
  - 2. Provide three complete sets of manuals.
  - 3. Each O&M manual shall include:
    - a. Table of contents with indexed tabs dividing information as outlined below.
    - b. Definitions: List of all abbreviations and technical terms with definitions.
    - c. Warranty Contacts: Names, addresses, and 24-hour telephone numbers of contractors installing equipment and controls and service representatives of each.
    - d. Licenses, Guarantees, and Warranties: Provide documentation for all equipment and systems.
    - e. System Components: Alphabetical list of all system components, with the name, address, and telephone number of the vendor.
- D. Training Manual:
  - 1. Provide a course outline and training manuals for each training class.
- E. Record Documents:
  - 1. Submit record documentation per Section 230500.
  - 2. Submit two hard copies and one electronic copy of as-built versions of the shop drawings, including product data and record drawings with revisions clearly indicated. Provide floor plans showing actual locations of control components including panels, thermostats, sensors, and hardware.

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

- A. Provide factory-shipping cartons for each piece of equipment and control device. Maintain cartons through shipping, storage, and handling as required to prevent equipment damage. Store equipment and materials inside and protected from weather.
- B. Factory-Mounted Components: Where control devices specified in this section are indicated to be factory mounted on equipment, arrange for shipping control devices to unit manufacturer.

#### **1.5 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION**

- A. Automatic Dampers.

## **1.6 AGENCY AND CODE APPROVALS**

- A. All products shall have the following agency approvals. Provide verification that the approvals exist for all submitted products with the submittal package.
  - 1. UL-916; Energy Management Systems.
  - 2. C-UL listed to Canadian Standards Association C22.2 No. 205-M1983 "Signal Equipment."
  - 3. EMC Directive 89/336/EEC (European CE Mark).
  - 4. FCC, Part 15, Subpart J, Class A Computing Devices.

## **1.7 JOB CONDITIONS**

- A. Cooperation with Other Trades: Coordinate the Work of this section with that of other sections to ensure that the Work will be carried out in an orderly fashion. It is this Contractor's responsibility to check the Contract Documents for possible conflicts between the Work of this section and that of other crafts in equipment location; pipe, duct and conduit runs; electrical outlets and fixtures; air diffusers; and structural and architectural features.

## **1.8 WARRANTY**

- A. Refer to Section 230500 for warranty requirements.
- B. Within the warranty period, any defects in the work provided under this section due to faulty materials, methods of installation or workmanship shall be promptly (within 48 hours after receipt of notice) repaired or replaced by this Contractor at no expense to the Owner.

## **PART 2 - PRODUCTS**

### **2.1 CONTROL DAMPERS**

- A. Thermally Insulated Control Damper:
  - 1. Shall be licensed to bear the AMCA Certified Rating Seal.
  - 2. Test leakage and pressure drop per AMCA 500.
  - 3. Thermally Broken Frame: Extruded aluminum, minimum 4" deep, 0.080" minimum thickness, flanged to duct. Entire frame shall be thermally broken using polyurethane resin pockets, complete with thermal cuts.
  - 4. Blades: Minimum 12 gauge extruded aluminum airfoil design, minimum 6" wide, internally insulated with expanded polyurethane foam and thermally broken, with overlapping blades and blade seals (overlapping blade seals only is unacceptable).
  - 5. Shaft: Non-cylindrical, solid aluminum shaft with opening in blade to match profile of shaft. Shaft shall be securely fastened to the blade and of sufficient length to mount direct-coupled actuator. Damper manufacturer shall provide drive pin extensions and outboard bearing support brackets as required.

6. Bearings: Acetal (Delrin/Celcon) inner bearing fixed to an aluminum shaft, rotating within a polycarbonate outer bearing inserted in the frame. Provide thrust bearings for vertical damper applications.
7. Side Seals: Stainless steel compression type or extruded silicone gasket secured in an integral slot within the frame.
8. Linkage: Shall be concealed in the frame, constructed of aluminum or corrosion-resistant zinc plated steel, and securely fastened to shaft. Blades linked for opposed operation, unless noted otherwise on the drawings. Blades shall close evenly. Use one direct-coupled actuator per damper section. Jack-shafting is not acceptable.
9. Size Limits: 48" maximum horizontal blade length, 24 square foot maximum area per damper. Total cross-sectional area of dampers in ducts shall be at least as large as the duct without the use of blank-off sections.
10. Maximum Leakage: Class 1A at 1" w.c. pressure differential for a 24"x24" damper.
11. Maximum Pressure Drop: 0.21" for 8,000 cfm through a 24"x24" damper (2000 fpm).

## **2.2 DAMPER ACTUATORS**

### **A. Damper Actuators - Electronic - Spring Return:**

1. Damper actuators shall be UL listed, electronic direct coupled with spring return to normal position for modulating or two-position control as noted in the sequence of control. Actuator shall be 24 VAC with proportional control, electronic overload protection to prevent actuator damage due to over-rotation and "V" bolt clamp with matching "V" toothed cradle (single bolt or setscrew fasteners not acceptable).
2. Following power interruption, spring return mechanism shall close the damper. Mechanical spring shall be rated for a minimum of 60,000 full cycles. Provide breathable membrane in actuator housing to compensate for pressure differential and allow for 95% non-condensing relative humidity in the airstream.
3. Mount actuators with motor outside of airstream whenever possible. Unit casings shall have housing with proper weather, corrosive, or explosion-proof construction as required by application.
4. Actuators shall be rated for 60,000 full cycles at rated torque with 2-year unconditional warranty. Size actuators per damper manufacturer's recommendations.
5. Provide end switches as required for the sequence of operation.
6. Provide analog feedback signal for positive position indication. Refer to FMCS points list.

## **2.3 CONTROL INSTRUMENTATION**

- A. Temperature Measuring Devices:
  - 1. Electric Thermostats:
    - a. Single Temperature - Low Voltage Electric: Integral manual ON/OFF/AUTO selector switch, minimum dead band of 5°F, anticipator circuits, concealed temperature adjustment, locking cover, 24 V control transformer (if not included with unit under control), single or double pole as required.

## **2.4 CONDUIT AND BOXES**

- A. Conduit and Boxes: Refer to Electrical Section 260533 for materials, sizing, and other requirements
- B. Conduit and Box Identification (Color and Labeling):
  - 1. Refer to the Temperature Control Contractor notes located on the mechanical cover sheet for raceway and box color requirements.
  - 2. Refer to Electrical Section 260553 for raceway and box labeling requirements.

## **2.5 WIRE AND CABLE**

- A. Wire and Cable: Refer to Electrical Section 260513 for wire and cable materials.
  - 1. Wire and Cable Color: Refer to the Temperature Control Contractor notes located on the mechanical cover sheet for wire and cable color requirements.

## **PART 3 - EXECUTION**

### **3.1 GENERAL INSTALLATION**

- A. Verify that systems are ready to receive work. Beginning of installation means installer accepts existing conditions.
- B. Install system and materials in accordance with manufacturer's instructions.
- C. Install all operators, sensors, and control devices where accessible for service, adjustment, calibration, and repair. Do not install devices where blocked by piping or ductwork. Devices with manual reset or limit adjustments shall be installed below 6'-0" if practical to allow inspection without using a ladder.
- D. Verify locations of wall-mounted devices (such as thermostats, temperature and humidity sensors, and other exposed sensors) with drawings and room details before installation. Coordinate mounting heights to be consistent with other wall-mounted devices. Maximum height above finished floor shall not exceed 48". In accordance with the requirements of LEED EQc1: Outdoor Air Delivery Monitoring, install all wall-mounted CO2 sensors between 3 feet and 6 feet above the floor.

- E. Mount control panels adjacent to associated equipment on vibration-free walls or freestanding angle iron supports. One cabinet may accommodate more than one system in same equipment room.
- F. After completion of installation, test and adjust control equipment.
- G. Check calibration of instruments. Recalibrate or replace.
- H. Furnish and install conduit, wire, and cable per the National Electric Code, unless noted otherwise in this section.
- I. All hardware, software, equipment, accessories, wiring (power and sensor), piping, relays, sensors, power supplies, transformers, and instrumentation required for a complete and operational system, but not shown on the electrical drawings, are the responsibility of the TCC.
- J. Labels for Control Devices:
  - 1. Provide labels indicating service of all control devices in panels and other locations.
  - 2. Labels may be made with permanent marking pen in the control panels if clearly legible.
  - 3. Use engraved labels for items outside panel such as outside air thermostats.
  - 4. Labels are not required for room thermostats, damper actuators and other items where their function is obvious.

### **3.2 CONDUIT AND BOXES INSTALLATION**

- A. Conduit and Box Installation: Refer to Electrical Section 260533 for execution and installation.
- B. Conduit and Box Identification (color and labeling) installation. Refer to Electrical Section 26 05 53 for raceway and box identification installation.
- C. Outlet Box Schedule: Thermostat/temperature sensor:
  - 1. Dry Interior Locations: Provide 4" square galvanized steel with raised cover to fit flush with finished wall line. When located in concrete block walls, provide square edge title cover of sufficient depth to extend out to face of block or masonry boxes.
  - 2. Other Conditions: Refer to Electrical Section 26 05 33 for requirements.

### **3.3 WIRE AND CABLE INSTALLATION**

- A. Wire and Cable Installation: Refer to Electrical Section 260513 for execution and installation.
- B. Field Quality Control:
  - 1. Inspect wire and cable for physical damage and proper connection.

2. Torque test conductor connections and terminations to manufacturer's recommended values.
  3. Perform continuity test on all conductors.
  4. Protection of cable from foreign materials:
    - a. It is the Contractor's responsibility to provide adequate physical protection to prevent foreign material application or contact with any cable type. Foreign material is defined as any material that would negatively impact the validity of the manufacturer's performance warranty. This includes, but is not limited, to overspray of paint (accidental or otherwise), drywall compound, or any other surface chemical, liquid or compound that could come in contact with the cable, cable jacket or cable termination components.
    - b. Overspray of paint on any cable, cable jacket or cable termination component will not be accepted. It shall be the Contractor's responsibility to replace any component containing overspray, in its entirety, at no additional cost to the project. Cleaning of the cables with harsh chemicals is not allowed. This requirement is regardless of the PASS/FAIL test results of the cable containing overspray. Should the manufacturer and warrantor of the structured cabling system desire to physically inspect the installed condition and certify the validity of the structured cabling system (via a signed and dated statement by an authorized representative of the structured cabling manufacturer), the Owner may, at their sole discretion, agree to accept said warranty in lieu of having the affected cables replaced. In the case of plenum cabling, in addition to the statement from the manufacturer, the Contractor shall also present to the Owner a letter from the local Authority Having Jurisdiction stating that they consider the plenum rating of the cable to be intact and acceptable.
- C. Installation Schedule:
1. Conduit terminations to all devices installed in applications with rotating equipment, expansion/contraction or vibration shall be made with flexible metallic conduit, unless noted otherwise. Final terminations to exterior devices installed in damp or wet locations shall be made with liquidtight flexible metallic conduit. Terminations in hazardous areas, as defined in the National Electrical Code, shall be made with flexible conduit rated for the environment.

### **3.4 PREPARATION FOR BALANCING**

- A. Verify that all dampers are in the position indicated by the controller (e.g., open, closed or modulating).
- B. Check the calibration and setpoints of all controllers.
- C. Check the locations of all thermostats and humidistats for potential erratic operation from outside influences such as sunlight, drafts, or cold walls.
- D. Check that all sequences operate as specified.

### **3.5 TEST AND BALANCE COORDINATION**

- A. The Contractor shall furnish a single set of all tools necessary to interface to the control system for test and balance purposes.
- B. The Contractor shall provide a minimum of four (4) hours training for the Balancing Contractor in the use of these tools.
- C. In addition, the Contractor shall provide a qualified technician to assist in the test and balance process until the first 20 terminal units are balanced.
- D. The tools used during the test and balance process shall be returned at the completion of the testing and balancing.

### **3.6 DEMONSTRATION AND ACCEPTANCE**

- A. At completion of installation, provide two days minimum instruction for operators. Demonstrate operation of all controls and systems. Describe the normal operation of all equipment.

### **3.7 INSTALLATION OF SENSORS**

- A. Install sensors in accordance with the manufacturer's recommendations.
- B. Mount sensors rigidly and adequately for the environment within which the sensor operates.
- C. Room temperature sensors shall be installed on concealed junction boxes properly supported by the wall framing.
- D. All wires attached to sensors shall be air sealed in their raceways or in the wall to stop air transmitted from other areas affecting sensor readings.

**END OF SECTION 230900**

## **SECTION 233100 - DUCTWORK**

### **PART 1 - GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Galvanized Ductwork
- B. Stainless Steel Ductwork
- C. Ductwork Reinforcement
- D. Ductwork Sealants
- E. Rectangular Ductwork
- F. Grease Exhaust Duct
- G. Dishwasher Exhaust Duct

### **PART 2 - PRODUCTS**

#### **2.1 GALVANIZED DUCTWORK**

- A. General Requirements:
  - 1. Duct and reinforcement materials shall conform to ASTM A653 and A924.
  - 2. Interior Ductwork and reinforcements: G60 galvanized (0.60 ounces per square foot total zinc coating for two sides per ASTM A90) unless noted otherwise.
  - 3. Exterior Ductwork: G90 galvanized (0.90 ounces per square foot total zinc coating for two sides per ASTM A90) unless noted otherwise. G60 is not acceptable for exterior use.
  - 4. Ductwork reinforcement shall be of galvanized steel.
  - 5. Ductwork supports shall be of galvanized or painted steel.
  - 6. Strap hanger shall be a minimum of 1 inch, 18 gauge galvanized steel attached to the bottom of ducts.
  - 7. Aircraft cable and slip cable hangers are acceptable for ducts up to 18"ø. Protective sleeve tubing shall be used on the cable when supporting duct with exterior insulation. Corner saddles are required when supporting rectangular ductwork. Acceptable manufacturers are Gripple, Ductmate, Duro Dyne, or Architect/Engineer approved.
  - 8. All fasteners shall be galvanized or cadmium plated.

#### **2.2 STAINLESS STEEL DUCTWORK**

- A. General Requirements:
  - 1. Ductwork shall be Type 304L stainless steel, 16 gauge minimum.

2. Exposed ductwork shall have a #3 finish. Concealed ductwork may have milled finish.
3. Ductwork reinforcement shall be of stainless steel.
4. Ductwork supports shall be of stainless steel. Slip cable hangers are acceptable. Acceptable manufacturers are Gripple, Ductmate, Duro Dyne, or Architect/Engineer approved.
5. All fasteners shall be cadmium plated or stainless steel.

### **2.3 DUCTWORK REINFORCEMENT**

#### **A. General Requirements:**

1. All reinforcement shall be external to the duct except that tie rods may be used with the following limitations.
  - a. Ducts must be over 18" wide.
  - b. Duct dimensions must be increased 2" in one dimension (h or w) for each row of tie rods installed.
  - c. Tie rods must not exceed 1/2" diameter.
  - d. Manufacturer of tie rod system must certify pressure classifications of various arrangements, and this must be in the shop drawings.

### **2.4 DUCTWORK SEALANTS**

- A. One-part joint sealers shall be water-based mastic systems that meet the following requirements: maximum 48-hour cure time, service temperature of -20°F to +175°F, resistant to mold, mildew and water, flame spread rating below 25 and smoke-developed rating below 50 when tested in accordance with ASTM E84, suitable for all SMACNA seal classes and pressure classes. Mastic used to seal flexible ductwork shall be marked UL 181B-M. Joint sealers for use on exterior weather exposed ductwork shall be rated for -30°F to +175°F and 2000-hour minimum UV resistance per ASTM G-53.

### **2.5 RECTANGULAR DUCT - SINGLE WALL**

#### **A. General Requirements:**

1. All ductwork gauges and reinforcements shall be as listed in SMACNA Duct Construction Standards Chapter 2. Where necessary to fit in confined spaces, furnish heaviest duct gauge and least space consuming reinforcement.
2. Transitions shall not exceed the angles in Figure 4-7.

#### **B. Exceptions and modifications to the 2005 HVAC Duct Construction Standards are:**

1. All ducts shall be cross-broken or beaded.
2. Snap lock seams are not permitted.

3. Turning vanes shall be used in all 90° mitered elbows, unless clearly noted otherwise on the drawings. Vanes shall be as follows:
  - a. Type 1:
    - 1) **Description:** Single wall type with 22-gauge (0.029") or heavier vanes, 3-1/4" blade spacing, and 4" to 4-1/2" radius. Vanes hemmed if recommended by runner manufacturer. Runners shall have extra-long locking tabs. C-value independently tested at below 0.26. EZ Rail II by Sheet Metal Connectors or equal.
    - 2) **Usage:** Limited to 3,000 fpm and vane lengths 36" and under.
  - b. Type 2:
    - 1) **Description:** Double wall type with 3-1/4" blade spacing, 4-1/2" radius, 24-gauge minimum, and SMACNA Type 1 runners. C-value below 0.27.
    - 2) **Usage:** No limits other than imposed by the manufacturer. Provide intermediate support for vanes over 48" long.
  - c. Type 3 (acoustical - where acoustical lagging is located or as noted on drawings):
    - 1) **Description:** Same as Type 2, except filled with fiberglass and with slotted or perforated inner curve. Minimum insertion loss of 9 dB at 250 Hz and 6 dB at 1 KHz.
    - 2) **Usage:** No limits other than imposed by the manufacturer. Provide intermediate support for vanes over 48" long.
  - d. Turning vanes shall operate quietly. Repair or replace vanes that rattle or flutter.
  - e. Runners must be installed at a 45° angle. Elbows with different size inlet and outlet must be radius type.
  - f. Omitting every other vane is prohibited.
4. Where smooth radius rectangular elbows are shown, they shall be constructed per SMACNA Figure 4-2. Type RE1 shall be constructed with a centerline duct radius R/W of 1.0. Where shown on drawings, Type RE3 elbows with 3 vanes shall be used with centerline duct radius R/W of 0.6 (SMACNA r/W=0.1). RE1 or RE3 elbows may be used where mitered elbows are shown if space permits. **Mitered elbows (with or without turning vanes) may not be substituted for radius elbows.** Do not make branch takeoffs within 4 duct diameters on the side of the duct downstream from the inside radius of radius elbows.
5. Rectangular branch and tee connections in ducts over 1" pressure class shall be 45° entry type per Figs. 4-5 and 4-6. Rectangular straight taps are not acceptable above 1" pressure class.

6. Bellmouth fittings shown on return duct inlets shall expand at a 60-degree total angle horizontally and vertically (space permitting) and have length of at least 25% of the smallest duct dimension.
7. Round taps off rectangular unlined ducts shall be flanged conical or bellmouth type (equal to Buckley Bellmouth or Sheet Metal Connectors E-Z Tap), or 45° rectangular with transition to round (equal to Sheet Metal Connectors Inc. High Efficiency Takeoff). Straight taps are acceptable if pressure class is 1" or less, round duct is 12" diameter or less, and the tap is not located between fans and TAB devices.
8. Duct offsets shall be constructed as shown on drawings. Additional offsets required in the field shall be formed of mitered elbows without turning vanes for offsets up to 30° maximum angle in accordance with SMACNA offset Type 2. Offsets of greater than 30° angle shall be formed of radius elbows with centerline radius R/W=1.0 or greater. SMACNA Type 1 offsets are not permitted.
9. All lined duct shall utilize dovetail joints where round or conical taps occur. The dovetail joints shall extend past the liner before being folded over.
10. Cushion heads are acceptable only downstream of TAB devices in ducts up to ± 2" pressure class and must be less than 6" in length.
11. Slide-on flanged transverse joint systems are acceptable provided they are a manufactured product that has been tested for conformance with Chapter 2 of the SMACNA HVAC Duct Construction Standards for sheet and joint deflection at the specified pressure class.
  - a. Apply sealant to all inside corners. Holes at corners are not acceptable.
  - b. Acceptable Manufacturers: Ductmate Industries - 25/35/45, Nexus, Mez, or WDCI. Other manufacturers must submit test data and fabrication standards and receive Architect/Engineer's approval before any fabrication begins.
12. Formed-on flanged transverse joint systems are acceptable provided they are a manufactured product that has been tested for conformance with Chapter 2 of the SMACNA HVAC Duct Construction Standards for sheet and joint deflection at the specified pressure class.
  - a. Apply sealant to all inside corners. Holes at corners are not acceptable.
  - b. Flanges shall be 24-gauge minimum (not 26 gauge).
  - c. Acceptable Manufacturers: Lockformer TDC, TDF, United McGill, or Sheet Metal Connectors. Other manufacturers must submit test data and fabrication standards and receive Architect/Engineer's approval before any fabrication begins.

## **2.6 GREASE EXHAUST DUCT FIELD FABRICATED**

- A. All ductwork shall be 16 gauge minimum, Type 304L stainless steel. Concealed ductwork may be 16 gauge black steel.
- B. All joints and fittings shall be continuously welded and liquid-tight.
- C. Install ducts with proper clearance to combustible and limited-combustible materials.

## **2.7 DISHWASHER EXHAUST DUCT**

- A. Ductwork shall be 16 gauge minimum Type 316L stainless steel.
- B. All joints and fittings shall be continuously welded and liquid-tight.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Locate ducts with space around equipment for normal operation and maintenance.
- B. Do not install ducts or other equipment above electrical switchboards or panelboards. This includes a dedicated space extending 25 feet from the floor to the structural ceiling with width and depth equal to the electrical equipment. Unless intended to serve these rooms, do not install any ductwork or equipment in electrical rooms, transformer rooms, electrical closets, telephone rooms or elevator machine rooms.
- C. Provide temporary closures of metal or taped polyethylene on open ducts to prevent dust from entering ductwork. Supply ductwork shall be free of construction debris, and shall comply with Level "B" of the SMACNA Duct Cleanliness for New Construction Guidelines.
- D. Repair all duct insulation and liner tears.
- E. Install all exterior ductwork per SMACNA Fig. 6-3. Where drawings do not indicate otherwise, ductwork seams and joints shall be sealed watertight and pitched to shed water.
- F. Support all duct systems in accordance with the SMACNA HVAC Duct Construction Standards: Metal and Flexible.
- G. Adhesives, sealants, tapes, vapor retarders, films, and other supplementary materials added to ducts, plenums, housing panels, silencers, etc. shall have flame spread/smoke developed ratings of under 25/50 per ASTM E84, NFPA 255, or UL 723.
- H. All duct support shall extend directly to building structure. Do not support ductwork from pipe hangers. Do not allow lighting or ceiling supports to be hung from ductwork or ductwork supports.
- I. Kitchen Grease and Dishwasher Ductwork:
  - 1. All kitchen grease and dishwasher ductwork shall be installed with a continuous slope and grease tight welds on all seams and joints.

### 3.2 DUCTWORK APPLICATION SCHEDULE

USAGE	MATERIAL	PRESSUR E CLASS	SEAL CLASS †	INSULATION
Outside Air Duct from Roof Hood to Motor Operated Damper	Galvanized Sheet Metal	-2"	A	2" thick Type B (R=8.0)
General Exhaust Duct	Galvanized Sheet Metal	-1"	A	None (R=3.6)
Grease Exhaust Duct	Refer to "Grease Exhaust Duct"	-2"	---	None
Dishwasher Exhaust Duct	Refer to "Dishwasher Exhaust Duct"	-1"	A	None (R=4.5)
† Seal Class is per SMACNA HVAC Air Duct Leakage Test Manual ± Type A insulation (Flexible Fiberglass Wrap) R-values noted are based on installed values (25% compression). Note 1: Apply aluminum based adhesive sealant tape at non-flanged joints on ducts serving dedicated outside air supply (DOAS) and exhaust system in addition to Class A sealant. Note 2: Apply aluminum based adhesive sealant tape on TAB boxes (all seams and joints of the box and duct connections) serving dedicated outside air supply (DOAS) system.				

### 3.3 DUCTWORK SEALING

#### A. General Requirements:

1. Openings, such as rotating shafts, shall be sealed with bushings or similar.
2. Pressure sensitive tape shall not be used as the primary sealant unless it has been certified to comply with UL-181A or UL-181B by an independent testing laboratory and the tape is used in accordance with that certification.
3. All connections shall be sealed including, but not limited to, taps, other branch connections, access doors, access panels, and duct connections to equipment. Sealing that would void product listings is not required. Spiral lock seams need not be sealed.
4. Mastic-based duct sealants shall be applied to joints and seams in minimum 3 inch wide by 20 mil thick bands using brush, putty knife, trowel, or spray, unless manufacturer's data sheet specifies other application methods or requirements.

B. For Seal Class A ducts, all transverse joints, longitudinal seams, and duct wall penetrations shall be sealed. Joints are inclusive of, but not limited to, girth joints, branch and sub-branch intersections, duct collar tap-ins, fitting subsections, louver and air terminal connections to ducts, access door and access panel frames and jambs, duct, plenum, and casing abutments to building structures.

C. Double-wall ductwork: Install insulation end fittings at all transitions from double to single-wall construction.

### 3.4 TESTING

- A. Duct - 2" WG or Less (positive or negative):
  - 1. Systems shall not leak more than shown in Table 4-1 of SMACNA HVAC Air Duct Leakage Test Manual for Seal Class A.
  - 2. Leak testing of these systems is not normally required for interior ductwork. However, leak tests will be required if, in the opinion of the Architect/Engineer, the leakage appears excessive. All exterior ductwork shall be tested. If duct has outside wrap, testing shall be done before it is applied.
  - 3. Leak test shall be at the Contractor's expense and shall require capping and sealing all openings.
  - 4. Seal ducts to bring the air leakage into compliance.
  - 5. Contractor shall notify the Architect/Engineer five business days prior to pressurizing ductwork for testing.
  
- B. Duct - 3" WG and Above (positive or negative):
  - 1. A minimum of 25% of interior ductwork and all exterior ductwork shall be tested. The Owner or designated representative shall select the sections to be tested. If duct has outside wrap, testing shall be done before it is applied.
  - 2. Leak test shall be at the Contractor's expense and shall require capping and sealing all openings.
  - 3. Seal ducts to bring the air leakage into compliance.
  - 4. Contractor shall notify the Architect/Engineer five business days prior to pressurizing ductwork for testing.
  
- C. Test procedure shall be as listed in the latest edition of the SMACNA HVAC Duct Leakage Manual, with the following additional requirements:
  - 1. Test pressure shall be the specified duct pressure class. Testing at reduced pressures and converting the results mathematically is not acceptable. This is required to test the structural integrity of the duct system.
  - 2. If any leak causes discernible noise at a distance of 3 feet, that leak shall be eliminated, regardless of whether that section of duct passed the leakage test.
  - 3. All joints shall be felt by hand, and all discernible leaks shall be sealed.
  - 4. Totaling leakage from several tested sections and comparing them to the allowable leakage for the entire system is not acceptable. Each section must pass the test individually.
  - 5. Contractor shall notify the Architect/Engineer five business days prior to pressurizing ductwork for testing. Failure to notify the Architect/Engineer of

pressure testing may require the contractor to repeat the duct pressure test after proper notification.

6. Upon completion of the pressure test, the contractor shall submit an air duct leakage test summary report as outlined in the SMACNA HVAC Duct Leakage Test Manual.
7. All access doors, taps to terminal air boxes, and other accessories and penetrations must be installed prior to testing. Including terminal air boxes in the test is not required.
8. The required leakage class for Seal Class A, both round and rectangular ducts, shall be 4.
9. Positive pressure leakage testing is acceptable for negative pressure ductwork.

D. Grease Exhaust Duct:

1. A light test shall be performed by passing a lamp having a power rating of not less than 100 watts through the entire section of ductwork to be tested. The lamp shall be open to emit light equally in all four directions.
2. Testing of the entire exhaust duct system including the hood-to-duct connection shall be performed. Ductwork shall be permitted to be tested in sections provided every joint is tested.
3. Leakage testing shall occur prior to use or concealment of the duct system. Ducts shall be considered concealed where installed in shafts or covered by insulation or wrap that prevents ductwork from being visibly inspected on all sides. The test shall be performed in the presence of the code official.

### **3.5 DUCTWORK PENETRATIONS**

- A. Seal all duct penetrations of walls that are not fire rated by caulking or packing with fiberglass. Install trim strip to cover vacant space and raw construction edges of all openings in finished rooms. Install escutcheon ring at all round duct openings in finished rooms. Trim strips and rings shall be same material and finish as exposed duct.

**END OF SECTION 233100**

## **SECTION 233423 - POWER VENTILATORS**

### **PART 1 - GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Roof Exhaust Fans.
- B. Rooftop Fan Curbs.

#### **1.2 QUALITY ASSURANCE**

- A. Performance Ratings: Conform to AMCA 210 and bear AMCA Certified Rating Seal.
- B. Sound Ratings: AMCA 301, tested to AMCA 300.
- C. Fabrication: Conform to AMCA 99.

#### **1.3 SUBMITTALS**

- A. Submit shop drawings per Section 230500. Include product data on wall and roof exhausters, and ceiling and cabinet fans.
- B. Provide multi-rpm fan curves with specified operating point clearly plotted.
- C. Submit manufacturer's installation instructions.
- D. Submit electrical power/controls wiring diagrams and product data indicating general assembly, components, safety controls, and service connections.

### **PART 2 - PRODUCTS**

#### **2.1 ROOFTOP EXHAUST FAN - BELT DRIVEN**

- A. Fan Wheel: Centrifugal type, aluminum hub and wheel with backward inclined blades, statically and dynamically balanced.
- B. Housing: Removable, spun aluminum dome or rectangular top, with square, one piece, aluminum base and curb cap with Venturi inlet cone.
- C. Fan Shaft: Turned, ground and polished steel; keyed to wheel hub.
- D. All steel parts galvanized or epoxy coated. Non-corrosive fasteners.
- E. V-belt drive with adjustable pitch drive sheave and adjustable motor mountings for belt tensioning.
- F. Motor mounted outside of air stream and ventilated with outside air. Motor not less than 1/3 HP.
- G. Aluminum or brass bird screen. Plastic mesh will not be allowed.
- H. Furnish factory mounted and wired disconnect switch: Non-fusible type with thermal overload protection mounted inside fan housing, factory wired through an aluminum conduit.

- I. Furnish normally closed, electric motorized damper. Provide step down transformer if required. Install and wire damper to open when fan runs.
- J. Dampers shall be aluminum with brass bushings, blade seals and blade tie rods. Leakage shall not exceed 4 cfm/sq.ft @1" SP.
- K. Mill aluminum finish.
- L. Permanently lubricated, permanently sealed, self-aligning ball bearings.
- M. Acceptable Manufacturers: Aerovent, Greenheck, Cook, Carnes, PennBarry, ACME, ILG, Jenco, Soler-Palau.

## **2.2 ROOFTOP FAN CURBS**

- A. Furnish and install prefabricated roof curbs for all rooftop fans.
- B. Size curb to match the curb cap of fan.
- C. Top of all curbs shall be at least 12" above the top of the roof. Increase curb height to allow for roof insulation.
- D. Unitized construction, continuous arc welded corner seams. Insulated with 1-1/2" thick, 3 lb. density rigid fiberglass board. Damper support angle. Pressure treated wood nailer.
- E. 18-gauge galvanized steel construction.
- F. Curb without cant.
- G. Acceptable Manufacturers: Same manufacturer as the fan, Pate, RPS or Thy.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Secure roof exhausters with cadmium plated lag screws to roof curb.
- C. If manufacturer has no recommendations, secure roof exhaust fans to curbs with 1/4" lag bolts on 8" maximum centers.
- D. MC shall install and wire factory provided damper to open when the fan runs if the manufacturer does not provide an option to pre-wire the damper.

**END OF SECTION 233423**

## **SECTION 233700 - AIR INLETS AND OUTLETS**

### **PART 1 - GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Roof Hoods.
- B. Roof Curbs.
- C. Goosenecks.

#### **1.2 QUALITY ASSURANCE**

- A. Test and rate performance of air inlets and outlets per ASHRAE 70.
- B. Test and rate performance of louvers per AMCA 500L-99.
- C. All air handling and distribution equipment mounted outdoors shall be designed to prevent rain intrusion into the airstream when tested at design airflow and with no airflow, using the rain test apparatus described in Section 58 of UL 1995.

#### **1.3 SUBMITTALS**

- A. Submit product data under provisions of Section 230500.
- B. Submit schedule of inlets and outlets indicating type, size, location, application, and noise level.
- C. Review requirements of inlets and outlets as to size, finish, and type of mounting prior to submitting product data and schedules of inlets and outlets.
- D. Submit manufacturer's installation instructions.

#### **1.4 REGULATORY REQUIREMENTS**

- A. Conform to ANSI/NFPA 90A.
- B. Conform to ASHRAE 90.1.

### **PART 2 - PRODUCTS**

#### **2.1 ROOF HOODS**

- A. Hoods shall be constructed of roll formed, interlocking aluminum panels. Vertical end panels are fully locked into hood.
- B. Top of curb to hood inlet shall be minimum of 5".
- C. Curb cap shall be of 14 gauge formed aluminum with mitered corners continuously heliarc-welded. Hood shall be of the same material and cross-braced for added strength.
- D. Hoods shall be furnished with aluminum bird screen.

- E. Hood and throat shall be reinforced with extruded aluminum angle and have a minimum snow load rating of 30 lbs. per square foot.
- F. Size, cfm, finish and pressure drop for hoods shall be as scheduled on the drawings.
- G. Inlet area shall be minimum 150% of throat area for intake hoods. Outlet area shall be minimum 125% of throat area for exhaust hoods and relief vents.
- H. Hoods shall be furnished with 12" high curb (above top of roof) and be of the size and type as shown on the drawings.
- I. Hood shall be furnished with motorized damper unless otherwise noted on the drawings.
- J. Acceptable Manufacturers: Ammerman, Carnes, Cook, Greenheck, ILG, Jenco Fan, PennBarry, Twin City Fan & Blower.

## **2.2 ROOF CURBS**

- A. Furnish and install, where shown on the drawings, prefabricated roof curbs for all rooftop hood openings.
- B. Curbs shall be sized to match curb cap of the hood. The top of all curbs shall be 12" above the top of the roof.
- C. Curbs shall be unitized construction, 14 gauge aluminum, with continuous arc welded corner seams, insulated with 1-1/2" thick, 3 lb. density rigid fiberglass board and damper support angle.
- D. Curb with built-in cant with step for roof insulation.
- E. Acceptable Manufacturers: Same manufacturer as the equipment it serves or Pate, RPS, or Thy.

## **2.3 GOOSENECKS**

- A. Fabricate in accordance with SMACNA Duct Construction Standards of minimum 18 gauge galvanized steel.
- B. Mount on minimum 12 inch high curb base.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. General Installation Requirements:
  - 1. Install items in accordance with manufacturers' instructions.
  - 2. Check location of inlets and outlets and make necessary adjustments in position to conform to architectural features, symmetry, and lighting arrangement.

B. Roof Hood:

1. If manufacturer has no recommendations, secure roof hoods to curbs with 1/4" lag bolts on 8" maximum centers.

C. Maintaining Duct Cleanliness:

1. When grilles, registers, and diffusers are installed, Contractor shall prevent construction dust, dirt, and debris from entering ductwork as required by Section 23 05 00.

**END OF SECTION 233700**

## **SECTION 260500 - BASIC ELECTRICAL REQUIREMENTS**

### **PART 1 - GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Requirements applicable to all Division 26 Sections. Also refer to Division 1 - General Requirements.
- B. All materials and installation methods shall conform to the applicable standards, guidelines and codes referenced herein and within each specification section.

#### **1.2 REFERENCES**

- A. NFPA 70 - National Electrical Code (NEC)

#### **1.3 SCOPE OF WORK**

- A. This Specification and the associated drawings govern furnishing, installing, testing and placing into satisfactory operation the Electrical Systems.
- B. The Contractor shall furnish and install all new materials as indicated on the drawings, and/or in these specifications, and all items required to make his portion of the Electrical Work a finished and working system.
- C. Description of Systems shall be as follows:
  - 1. Electrical power system to and including luminaires, equipment, motors, devices, etc.
  - 2. Wiring system for temperature control system as shown on the drawings.
  - 3. Lightning protection system.
  - 4. Wiring of equipment furnished by others.
  - 5. Removal work and/or relocation and reuse of existing systems and equipment.
- D. Work Not Included:
  - 1. Temperature control wiring for plumbing and HVAC equipment (unless otherwise indicated) will be by other Contractors.

#### **1.4 WORK SEQUENCE**

- A. All work that will produce excessive noise or interference with normal building operations, as determined by the Owner, shall be scheduled with the Owner. It may be necessary to schedule such work during unoccupied hours. The Owner reserves the right to determine when restricted construction hours are required.
- B. Schedule overtime hours for the following work:
- C. Itemize all work and list associated hours and pay scale for each item.

## 1.5 DIVISION OF WORK BETWEEN MECHANICAL, ELECTRICAL, AND CONTROL CONTRACTORS

- A. Division of work is the responsibility of the Prime Contractor. Any scope of work described at any location on the contract document shall be sufficient for including said requirement in the project. The Prime Contractor shall be solely responsible for determining the appropriate subcontractor for the described scope. In no case shall the project be assessed an additional cost for scope that is described on the contract documents on bid day. The following division of responsibility is a guideline based on typical industry practice.
- B. Definitions:
1. "Mechanical Contractors" refers to the Contractors listed in Division 23 of this Specification.
  2. Motor Power Wiring: The single phase or 3 phase wiring extending from the power source (transformer, panelboard, feeder circuits, etc.) through disconnect switches and motor controllers to, and including the connections to the terminals of the motor.
  3. Motor Control Wiring: The wiring associated with the remote operation of the magnetic coils of magnetic motor starters or relays, or the wiring that permits direct cycling of motors by means of devices in series with the motor power wiring. In the latter case, the devices are usually single phase, have "Manual-Off-Auto" provisions, and are usually connected into the motor power wiring through a manual motor starter.
  4. Control devices such as start-stop push buttons, thermostats, pressure switches, flow switches, relays, etc., generally represent the types of equipment associated with motor control wiring.
  5. Motor control wiring is single phase and usually 120 volts. In some instances, the voltage will be the same as the motor power wiring. When the motor power wiring exceeds 120 volts, a control transformer is usually used to give a control voltage of 120 volts.
  6. Temperature Control Wiring: The wiring associated with the operation of a motorized damper, solenoid valve or motorized valve, etc., either modulating or two-position, as opposed to wiring that directly powers or controls a motor used to drive equipment such as fans, pumps, etc. This wiring will be from a 120-volt source and may continue as 120 volt, or be reduced in voltage (24 volt), in which case a control transformer shall be furnished as part of the temperature control wiring.
  7. Control Motor: An electric device used to operate dampers, valves, etc. It may be two-position or modulating. Conventional characteristics of such a motor are 24 volts, 60 cycles, 1 phase, although other voltages may be encountered.
  8. Low Voltage Technology Wiring: The wiring associated with the technology systems, used for analog or digital signals between equipment.

C. General:

1. The purpose of these Specifications is to outline the Electrical and Mechanical Contractors' responsibilities related to electrical work required for items such as temperature controls, mechanical equipment, fans, chillers, compressors, etc. The exact wiring requirements for much of the equipment cannot be determined until the systems have been selected and submittals approved. Therefore, the electrical drawings show only known wiring related to such items. All wiring not shown on the electrical drawings, but required for mechanical systems, is the responsibility of the Mechanical Contractor.
2. Where the drawings require the Electrical Contractor to wire between equipment furnished by the Mechanical Contractor, such wiring shall terminate at terminals provided in the equipment. The Mechanical Contractor shall furnish complete wiring diagrams and supervision to the Electrical Contractor and designate the terminal numbers for correct wiring.
3. Control low (24V) and control line (120V) voltage wiring, conduit, and related switches and relays required for the automatic control and/or interlock of motors and equipment, including final connection, are to be furnished and installed under Division 23.
4. The Electrical Contractor shall establish electrical utility elevations prior to fabrication and installation. The Electrical Contractor shall coordinate utility elevations with other trades. When a conflict arises, priority shall be as follows:
  - a. Luminaires.
  - b. Gravity flow piping, including steam and condensate.
  - c. Electrical bus duct.
  - d. Sheet metal.
  - e. Cable trays, including access space.
  - f. Other piping.
  - g. Conduits and wireway.

D. Mechanical Contractor's Responsibility:

1. Assumes responsibility for internal wiring of all equipment furnished by the Mechanical Contractor.
2. Assumes all responsibility for miscellaneous items furnished by the Mechanical Contractor that require wiring but are not shown on the electrical drawings or specified in the Electrical Specification. If items such as relays, flow switches, or interlocks are required to make the mechanical system function correctly or are required by the manufacturer, they are the responsibility of the Mechanical Contractor.
3. Assumes all responsibility for Temperature Control wiring, if the Temperature Control Contractor is a Subcontractor to the Mechanical Contractor.
4. This Contractor is responsible for coordination of utilities with all other Contractors. If any field coordination conflicts are found, the Contractor shall coordinate with other Contractors to determine a viable layout.

- E. Temperature Control Contractor's or Subcontractor's Responsibility:
1. Wiring of all devices needed to make the Temperature Control System functional.
  2. Verifying any control wiring on the electrical drawings as being by the Electrical Contractor. All wiring required for the Control System, but not shown on the electrical drawings, is the responsibility of the Temperature Control Contractor or Subcontractor.
  3. Coordinating equipment locations (such as PE's, EP's, relays, transformers, etc.) with the Electrical Contractor, where wiring of the equipment is by the Electrical Contractor.
- F. Electrical Contractor's Responsibility:
1. Furnishes and installs all combination starters, manual starters and disconnect devices shown on the Electrical Drawings or indicated to be by the Electrical Contractor in the Mechanical Drawings or Specifications.
  2. Installs and wires all remote-control devices furnished by the Mechanical Contractor or Temperature Control Contractor when so noted on the Electrical Drawings.
  3. Furnishes and installs motor control and temperature control wiring, when noted on the drawings.
  4. Furnishes, installs, and connects all relays, etc., for automatic shutdown of certain mechanical equipment (supply fans, exhaust fans, etc.) upon actuation of the Fire Alarm System.
  5. This Contractor is responsible for coordination of utilities with all other Contractors. If any field coordination conflicts are found, the Contractor shall coordinate with other Contractors to determine a viable layout.

## **1.6 QUALITY ASSURANCE**

- A. Contractor's Responsibility Prior to Submitting Pricing/Bid Data:
1. The Contractor is responsible for constructing complete and operating systems. The Contractor acknowledges and understands that the Contract Documents are a two-dimensional representation of a three-dimensional object, subject to human interpretation. This representation may include imperfect data, interpreted codes, utility guides, three-dimensional conflicts, and required field coordination items. Such deficiencies can be corrected when identified prior to ordering material and starting installation. The Contractor agrees to carefully study and compare the individual Contract Documents and report at once in writing to the Architect/Engineer any deficiencies the Contractor may discover. The Contractor further agrees to require each subcontractor to likewise study the documents and report at once any deficiencies discovered.
  2. The Contractor shall resolve all reported deficiencies with the Architect/Engineer prior to awarding any subcontracts, ordering material, or starting any work with

the Contractor's own employees. Any work performed prior to receipt of instructions from the Architect/Engineer will be done at the Contractor's risk.

B. Qualifications:

1. Only products of reputable manufacturers as determined by the Architect/Engineer are acceptable.
2. All Contractors and subcontractors shall employ only workmen who are skilled in their trades. At all times, the number of apprentices at the job site shall be less than or equal to the number of journeymen at the job site.

C. Compliance with Codes, Laws, Ordinances:

1. Conform to all requirements of the State of Missouri Codes, Laws, Ordinances and other regulations having jurisdiction.
2. Conform to all published standards of State of Missouri.
3. If there is a discrepancy between the codes and regulations and these specifications, the Architect/Engineer shall determine the method or equipment used.
4. If the Contractor notes, at the time of bidding, any parts of the drawings or specifications that do not comply with the codes or regulations, he shall inform the Architect/Engineer in writing, requesting a clarification. If there is insufficient time for this procedure, he shall submit with his proposal a separate price to make the system comply with the codes and regulations.
5. All changes to the system made after the letting of the contract to comply with codes or the requirements of the Inspector, shall be made by the Contractor without cost to the Owner.
6. If there is a discrepancy between manufacturer's recommendations and these specifications, the manufacturer's recommendations shall govern.
7. If there are no local codes having jurisdiction, the current issue of the NEC shall be followed.

D. Permits, Fees, Taxes, Inspections:

1. Procure all applicable permits and licenses.
2. Abide by all laws, regulations, ordinances, and other rules of the State or Political Subdivision where the work is done, or as required by any duly constituted public authority.
3. Pay all charges for permits or licenses.
4. Pay all fees and taxes imposed by State, Municipal, and other regulatory bodies.
5. Pay all charges arising out of required inspections by an authorized body.

6. Pay all charges arising out of required contract document reviews associated with the project and as initiated by the Owner or authorized agency/consultant.
  7. Where applicable, all fixtures, equipment and materials shall be listed by Underwriter's Laboratories, Inc. or a nationally recognized testing organization.
  8. Pay all telephone company charges related to the service or change in service.
- E. Examination of Drawings:
1. The drawings for the electrical work are completely diagrammatic, intended to convey the scope of the work and to indicate the general arrangements and locations of equipment, outlets, etc., and the approximate sizes of equipment.
  2. Contractor shall determine the exact locations of equipment and rough-ins, and the exact routing of raceways to best fit the layout of the job. Conduit entry points for electrical equipment including, but not limited to, panelboards, switchboards, switchgear and unit substations, shall be determined by the Contractor unless noted in the contract documents.
  3. Scaling of the drawings will not be sufficient or accurate for determining these locations.
  4. Where job conditions require reasonable changes in arrangements and locations, such changes shall be made by the Contractor at no additional cost to the Owner.
  5. Because of the scale of the drawings, certain basic items, such as junction boxes, pull boxes, conduit fittings, etc., may not be shown, but where required by other sections of the specifications or required for proper installation of the work, such items shall be furnished and installed.
  6. If an item is either shown on the drawings or called for in the specifications, it shall be included in this contract.
  7. The Contractor shall determine quantities and quality of material and equipment required from the documents. Where discrepancies arise between drawings, schedules and/or specifications, the greater and better-quality number shall govern.
  8. Where used in electrical documents the word "furnish" shall mean supply for use, the word "install" shall mean connect up complete and ready for operation, and the word "provide" shall mean to supply for use and connect up complete and ready for operation.
  9. Any item listed as furnished shall also be installed unless otherwise noted.
  10. Any item listed as installed shall also be furnished unless otherwise noted.
- F. Electronic Media/Files:
1. Construction drawings for this project have been prepared utilizing Revit.

2. Contractors and Subcontractors may request electronic media files of the contract drawings and/or copies of the specifications. Specifications will be provided in PDF format.
3. Upon request for electronic media, the Contractor shall complete and return a signed "Electronic File Transmittal" form provided by IMEG.
4. If the information requested includes floor plans prepared by others, the Contractor will be responsible for obtaining approval from the appropriate Design Professional for use of that part of the document.
5. The electronic contract documents can be used for preparation of shop drawings and as-built drawings only. The information may not be used in whole or in part for any other project.
6. The drawings prepared by IMEG for bidding purposes may not be used directly for ductwork layout drawings or coordination drawings.
7. The use of these CAD documents by the Contractor does not relieve them from their responsibility for coordination of work with other trades and verification of space available for the installation.
8. The information is provided to expedite the project and assist the Contractor with no guarantee by IMEG as to the accuracy or correctness of the information provided. IMEG accepts no responsibility or liability for the Contractor's use of these documents.

G. Field Measurements:

1. Verify all pertinent dimensions at the job site before ordering any conduit, conductors, wireways, bus duct, fittings, etc.

## 1.7 SUBMITTALS

- A. Submittals shall be required for the following items, and for additional items where required elsewhere in the specifications or on the drawings.

1. Submittals list:

<b>Referenced Specification Section</b>	<b><u>Submittal Item</u></b>
260533	Conduit and Boxes

- B. General Submittal Procedures: In addition to the provisions of Division 1, the following are required:

1. Transmittal: Each transmittal shall include the following:
  - a. Date
  - b. Project title and number
  - c. Contractor's name and address

- d. Division of work (e.g., electrical, plumbing, heating, ventilating, etc.)
  - e. Description of items submitted and relevant specification number
  - f. Notations of deviations from the contract documents
  - g. Other pertinent data
2. Submittal Cover Sheet: Each submittal shall include a cover sheet containing:
- a. Date
  - b. Project title and number
  - c. Architect/Engineer
  - d. Contractor and subcontractors' names and addresses
  - e. Supplier and manufacturer's names and addresses
  - f. Division of work (e.g., electrical, plumbing, heating, ventilating, etc.)
  - g. Description of item submitted (using project nomenclature) and relevant specification number
  - h. Notations of deviations from the contract documents
  - i. Other pertinent data
  - j. Provide space for Contractor's review stamps
3. Composition:
- a. Submittals shall be submitted using specification sections and the project nomenclature for each item.
  - b. Individual submittal packages shall be prepared for items in each specification section. All items within a single specification section shall be packaged together where possible. An individual submittal may contain items from multiple specifications sections if the items are intimately linked (e.g., pumps and motors).
  - c. All sets shall contain an index of the items enclosed with a general topic description on the cover.
4. Content: Submittals shall include all fabrication, erection, layout, and setting drawings; manufacturers' standard drawings; schedules; descriptive literature, catalogs and brochures; performance and test data; wiring and control diagrams; dimensions; shipping and operating weights; shipping splits; service clearances; and all other drawings and descriptive data of materials of construction as may be required to show that the materials, equipment or systems and the location thereof conform to the requirements of the contract documents.
5. Contractor's Approval Stamp:
- a. The Contractor shall thoroughly review and approve all shop drawings before submitting them to the Architect/Engineer. The Contractor shall stamp, date and sign each submittal certifying it has been reviewed.
  - b. Unstamped submittals will be rejected.

- c. The Contractor's review shall include, but not be limited to, verification of the following:
    - 1) Only approved manufacturers are used.
    - 2) Addenda items have been incorporated.
    - 3) Catalog numbers and options match those specified.
    - 4) Performance data matches that specified.
    - 5) Electrical characteristics and loads match those specified.
    - 6) Equipment connection locations, sizes, capacities, etc. have been coordinated with other affected trades.
    - 7) Dimensions and service clearances are suitable for the intended location.
    - 8) Equipment dimensions are coordinated with support steel, housekeeping pads, openings, etc.
    - 9) Constructability issues are resolved (e.g., weights and dimensions are suitable for getting the item into the building and into place, sinks fit into countertops, etc.).
  - d. The Contractor shall review, stamp and approve all subcontractors' submittals as described above.
  - e. **The Contractor's approval stamp is required on all submittals. Approval will indicate the Contractor's review of all material and a complete understanding of exactly what is to be furnished. Contractor shall clearly mark all deviations from the contract documents on all submittals. If deviations are not marked by the Contractor, then the item shall be required to meet all drawing and specification requirements.**
6. Submittal Identification and Markings:
- a. The Contractor shall clearly mark each item with the same nomenclature applied on the drawings or in the specifications.
  - b. The Contractor shall clearly indicate the size, finish, material, etc.
  - c. Where more than one model is shown on a manufacturer's sheet, the Contractor shall clearly indicate exactly which item and which data is intended.
  - d. All marks and identifications on the submittals shall be unambiguous.
7. Schedule submittals to expedite the project. Coordinate submission of related items.
8. Identify variations from the contract documents and product or system limitations that may be detrimental to the successful performance of the completed work.
9. Reproduction of contract documents alone is not acceptable for submittals.
10. Incomplete submittals will be rejected without review. Partial submittals will only be reviewed with prior approval from the Architect/Engineer.

11. Submittals not required by the contract documents may be returned without review.
12. The Architect/Engineer's responsibility shall be to review one set of shop drawing submittals for each product. If the first submittal is incomplete or does not comply with the drawings and/or specifications, the Contractor shall be responsible to bear the cost for the Architect/Engineer to recheck and handle the additional shop drawing submittals.
13. Submittals shall be reviewed and approved by the Architect/Engineer **before** releasing any equipment for manufacture or shipment.
14. Contractor's responsibility for errors, omissions or deviation from the contract documents in submittals is not relieved by the Architect/Engineer's approval.

C. Electronic Submittal Procedures:

1. Distribution: Email submittals as attachments to all parties designated by the Architect/Engineer, unless a web-based submittal program is used.
2. Transmittals: Each submittal shall include an individual electronic letter of transmittal.
3. Format: Electronic submittals shall be in PDF format only. Scanned copies, in PDF format, of paper originals are acceptable. Submittals that are not legible will be rejected. Do not set any permission restrictions on files; protected, locked, or secured documents will be rejected.
4. File Names: Electronic submittal file names shall include the relevant specification section number followed by a description of the item submitted, as follows. Where possible, include the transmittal as the first page of the PDF instead of using multiple electronic files.
  - a. Submittal file name: 26XXXX.description.YYYYMMDD
  - b. Transmittal file name: 26XXXX.description.YYYYMMDD
5. File Size: Electronic file size shall be limited to a maximum of 4MB. Larger files shall be transmitted via a pre-approved method.

## 1.8 SCHEDULE OF VALUES

- A. The requirements herein are in addition to the provisions of Division 1.
- B. Format:
  1. Use AIA Document Continuation Sheets G703 or another similar form approved by the Owner and Architect/Engineer.
  2. Submit in Excel format.
  3. Support values given with substantiating data.

- C. Preparation:
  - 1. Itemize work required by each specification section and list all providers. All work provided by subcontractors and major suppliers shall be listed on the Schedule of Values. List each subcontractor and supplier by company name.
  - 2. Break down all costs into:
    - a. Material: Delivered cost of product with taxes paid.
    - b. Labor: Labor cost, excluding overhead and profit.
- D. Update Schedule of Values when:
  - 1. Indicated by Architect/Engineer.
  - 2. Change of subcontractor or supplier occurs.
  - 3. Change of product or equipment occurs.

#### 1.9 CHANGE ORDERS

- A. A detailed material and labor takeoff shall be prepared for each change order, along with labor rates and markup percentages. Change orders with inadequate breakdown will be rejected.
- B. Change order work shall not proceed until authorized.

#### 1.10 PRODUCT DELIVERY, STORAGE, HANDLING AND MAINTENANCE

- A. Exercise care in transporting and handling to avoid damage to materials. Store materials on the site to prevent damage.
- B. Keep all materials clean, dry and free from damaging environments.
- C. Coordinate the installation of heavy and large equipment with the General Contractor and/or Owner. If the Electrical Contractor does not have prior documented experience in rigging and lifting similar equipment, he/she shall contract with a qualified lifting and rigging service that has similar documented experience. Follow all equipment lifting and support guidelines for handling and moving.
- D. Contractor is responsible for moving equipment into the building and/or site. Contractor shall review site prior to bid for path locations and any required building modifications to allow movement of equipment. Contractor shall coordinate his/her work with other trades.

#### 1.11 WARRANTY

- A. Provide one-year warranty for all fixtures, equipment, materials, and workmanship.
- B. The warranty period for all work in this specification Division shall commence on the date of Substantial Completion or successful system performance whichever occurs later. The warranty may also commence if a whole or partial system or any separate piece of equipment or component is put into use for the benefit of any party other than the installing contractor with prior written authorization of the Owner. In this instance, the warranty period shall commence on the date when such whole system, partial system or separate

piece of equipment or component is placed in operation and accepted in writing by the Owner.

- C. Warranty requirements extend to correction, without cost to the Owner, of all work found to be defective or nonconforming to the contract documents. The Contractor shall bear the cost of correcting all damage due to defects or nonconformance with contract documents excluding repairs required as a result of improper maintenance or operation, or of normal wear as determined by the Architect/Engineer.

## **1.12 INSURANCE**

- A. This Contractor shall maintain insurance coverage as set forth in Division 1 of these specifications.

## **1.13 MATERIAL SUBSTITUTION**

- A. Where several manufacturers' names are given, the manufacturer for which a catalog number is given is the basis of design and establishes the quality required.
- B. Equivalent equipment manufactured by the other named manufacturers may be used. Contractor shall ensure that all items submitted by these other manufacturers meet all requirements of the drawings and specifications, and fit in the allocated space. The Architect/Engineer shall make the final determination of whether a product is equivalent.
- C. Any material, article or equipment of other unnamed manufacturers which will adequately perform the services and duties imposed by the design and is of a quality equal to or better than the material, article or equipment identified by the drawings and specifications may be used if approval is secured in writing from the Architect/Engineer via addendum. The Contractor assumes all costs incurred as a result of using the offered material, article or equipment, on his part or on the part of other Contractors whose work is affected.
- D. Voluntary add or deduct prices for alternate materials may be listed on the bid form. These items will not be used in determining the low bidder. This Contractor assumes all costs incurred as a result of using the offered material or equipment on his part or on the part of other Contractors whose work is affected.
- E. All material substitutions requested after the final addendum must be listed as voluntary changes on the bid form.

## **PART 2 - PRODUCTS**

### **2.1 GENERAL**

- A. All items of material having a similar function (e.g., safety switches, panelboards, switchboards, contactors, motor starters, dry type transformers) shall be of the same manufacturer unless specifically stated otherwise on drawings or elsewhere in specifications.

## **PART 3 - EXECUTION**

### **3.1 JOBSITE SAFETY**

- A. Neither the professional activities of the Architect/Engineer, nor the presence of the Architect/Engineer or his or her employees and subconsultants at a construction site, shall relieve the Contractor and any other entity of their obligations, duties and responsibilities including, but not limited to, construction means, methods, sequence, techniques or procedures necessary for performing, superintending or coordinating all portions of the work of construction in accordance with the contract documents and any health or safety precautions required by any regulatory agencies. The Architect/Engineer and his or her personnel have no authority to exercise any control over any construction contractor or other entity or their employees in connection with their work or any health or safety precautions. The Contractor is solely responsible for jobsite safety. The Architect/Engineer and the Architect/Engineer's consultants shall be indemnified and shall be made additional insureds under the Contractor's general liability insurance policy.

### **3.2 ARCHITECT/ENGINEER OBSERVATION OF WORK**

- A. The contractor shall provide seven (7) calendar days' notice to the Architect/Engineer prior to:
  - 1. Covering exterior walls, interior partitions and chases.
  - 2. Installing hard or suspended ceilings and soffits.
- B. The Architect/Engineer will review the installation and provide a written report noting deficiencies requiring correction. The contractor's schedule shall account for these reviews and show them as line items in the approved schedule.

### **3.3 PROJECT CLOSEOUT**

- A. The following paragraphs supplement the requirements of Division 1.
- B. Final Jobsite Observation:
  - 1. To prevent the Final Jobsite Observation from occurring too early, the Contractor shall review the completion status of the project and certify that the job is ready for the final jobsite observation.
  - 2. Attached to the end of this section is a typical list of items that represent the degree of job completeness expected prior to requesting a review. The Contractor shall sign the attached certification and return it to the Architect/Engineer so that the final observation can be scheduled.
  - 3. It is understood that if the Architect/Engineer finds the job not ready for the final observation and additional trips and observations are required to bring the project to completion, the cost of the additional time and expenses incurred by the Architect/Engineer will be deducted from the Contractor's final payment.
  - 4. Contractor shall notify Architect/Engineer 48 hours prior to installation of ceilings or lay-in ceiling tiles.

- C. The following must be submitted before Architect/Engineer recommends final payment:
  - 1. Operation and maintenance manuals with copies of approved shop drawings.
  - 2. Record documents including marked-up or reproducible drawings and specifications.
  - 3. A report documenting the instructions given to the Owner's representatives complete with the number of hours spent in the instruction. The report shall bear the signature of an authorized agent of this Contractor and shall be signed by the Owner's representatives.
- D. Circuit Directories:
  - 1. Provide custom typed circuit directory for each branch circuit panelboard. Label shall include equipment name or final approved room name, room number, and load type for each circuit (examples: SUMP SP-1 or ROOM 101 RECEIPT). Revise directory to reflect circuit changes required to balance phase loads. Printed copies of the bid document panel schedules are not acceptable as circuit directories.

### **3.4 RECORD DOCUMENTS**

- A. The following paragraphs supplement the requirements of Division 1.
- B. Maintain at the job site a separate and complete set of electrical drawings and specifications with all changes made to the systems clearly and permanently marked in complete detail.
- C. Mark drawings and specifications to indicate approved substitutions; Change Orders, and actual equipment and materials used. All Change Orders, RFI responses, Clarifications and other supplemental instructions shall be marked on the documents. Record documents that merely reference the existence of the above items are not acceptable. Should this Contractor fail to complete Record Documents as required by this contract, this Contractor shall reimburse Architect/Engineer for all costs to develop record documents that comply with this requirement. Reimbursement shall be made at the Architect/Engineer's hourly rates in effect at the time of work.
- D. Record changes daily and keep the marked drawings available for the Architect/Engineer's examination at any normal work time.
- E. Upon completing the job, and before final payment is made, give the marked-up drawings to the Architect/Engineer.

### **3.5 ADJUST AND CLEAN**

- A. Thoroughly clean all equipment and systems prior to the Owner's final acceptance of the project.
- B. Clean all foreign paint, grease, oil, dirt, labels, stickers, etc. from all equipment.
- C. Remove all rubbish, debris, etc., accumulated during construction from the premises.

### **3.6 SPECIAL REQUIREMENTS**

- A. Coordinate the installation of all equipment, controls, devices, etc., with other trades to maintain clear access area for servicing.
- B. Install all equipment to maximize access to parts needing service or maintenance. Review the final location, placement, and orientation of equipment with the Owner's representative prior to setting equipment.
- C. Installation of equipment or devices without regard to coordination of access requirements and confirmation with the Owner's representative will result in removal and reinstallation of the equipment at the Contractor's expense.

### **3.7 SYSTEM STARTING AND ADJUSTING**

- A. The electrical systems shall be complete and operating. System startup, testing, adjusting, and balancing to obtain satisfactory system performance is the responsibility of the Contractor. This includes all calibration and adjustment of electrical controls, balancing of loads, troubleshooting and verification of software, and final adjustments that may be needed.
- B. Complete all manufacturer-recommended startup procedures and checklists to verify proper equipment operation and does not pose a danger to personnel or property.
- C. All operating conditions and control sequences shall be tested during the start-up period. Testing all interlocks, safety shut-downs, controls, and alarms.
- D. The Contractor, subcontractors, and equipment suppliers shall have skilled technicians to ensure that all systems perform properly. If the Architect/Engineer is requested to visit the job site for trouble shooting, assisting in start-up, obtaining satisfactory equipment operation, resolving installation and/or workmanship problems, equipment substitution issues or unsatisfactory system performance, including call backs during the warranty period, through no fault of the design; the Contractor shall reimburse the Owner on a time and materials basis for services rendered at the Architect/Engineer's standard hourly rates in effect when the services are requested. The Contractor shall pay the Owner for services required that are product, installation or workmanship related. Payment is due within 30 days after services are rendered.

### **3.8 FIELD QUALITY CONTROL**

- A. General:
  - 1. Conduct all tests required during and after construction. Submit test results in NETA format, or equivalent form, that shows the test equipment used, calibration date, tester's name, ambient test conditions, humidity, conductor length, and results corrected to 40°C.
  - 2. Supply necessary instruments, meters, etc., for the tests. Supply competent technicians with training in the proper testing techniques.
  - 3. All cables and wires shall be tested for shorts and grounds following installation and connection to devices. Replace shorted or grounded wires and cables.

4. Any wiring device, electrical apparatus or luminaire, if grounded or shorted on any integral "live" part, shall have all defective parts or materials replaced.
  5. Test cable insulation of service and panel feeder conductors for proper insulation values. Tests shall include the cable, all splices, and all terminations. Each conductor shall be tested and shall test free of short circuits and grounds and have an insulation value not less than NEC Standards. Take readings between conductors, and between conductors and ground.
  6. If the results obtained in the tests are not satisfactory, make adjustments, replacements, and changes as needed. Then repeat the tests, and make additional tests, as the Architect/Engineer or authority having jurisdiction deems necessary.
- B. Other Equipment:
1. Give other equipment furnished and installed by the Contractor all standard tests normally made to assure that the equipment is electrically sound, all connections properly made, phase rotation correct, fuses and thermal elements suitable for protection against overloads, voltage complies with equipment nameplate rating, and full load amperes are within equipment rating.
- C. If any test results are not satisfactory, make adjustments, replacements and changes as needed and repeat the tests and make additional tests as the Architect/Engineer or authority having jurisdiction deem necessary.

**END OF SECTION 260500**

READINESS CERTIFICATION PRIOR TO FINAL JOBSITE OBSERVATION

To prevent the final job observation from occurring too early, we require that the Contractor review the completion status of the project and, by copy of this document, certify that the job is indeed ready for the final job observation. The following is a typical list of items that represent the degree of job completeness expected prior to your requesting a final job observation.

1. Electrical panels have typed circuit identification.
2. Report of instruction of Owner's representative has been submitted as per Section 26 05 00.
3. Fire alarm inspection and testing report has been submitted as per Sections 26 05 00.
4. Start-up reports from factory representative have been submitted as per Section 26 05 00.

Accepted by:

Prime Contractor \_\_\_\_\_

By \_\_\_\_\_ Date \_\_\_\_\_

Upon Contractor certification that the project is complete and ready for a final job observation, we require the Contractor to sign this agreement and return it to the Architect/Engineer so that the final observation can be scheduled.

It is understood that if the Architect/Engineer finds the job not ready for the final observation and that additional trips and observations are required to bring the project to completion, the costs incurred by the Architect/Engineers for additional time and expenses will be deducted from the Contractor's contract retainage prior to final payment at the completion of the job.

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## **SECTION 260505 - ELECTRICAL DEMOLITION FOR REMODELING**

### **PART 1 - GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Electrical demolition

### **PART 2 - PRODUCTS**

#### **2.1 MATERIALS AND EQUIPMENT**

- A. Materials and equipment for patching and extending work shall be as specified in individual Sections.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. THE DRAWINGS ARE INTENDED TO INDICATE THE SCOPE OF WORK REQUIRED AND DO NOT INDICATE EVERY BOX, CONDUIT, OR WIRE THAT MUST BE REMOVED. THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO SUBMITTING A BID AND VERIFY EXISTING CONDITIONS.
- B. Where walls, ceilings, structures, etc., are indicated as being removed on general or electrical drawings, the Contractor shall be responsible for the removal of all electrical equipment, devices, fixtures, raceways, wiring, systems, etc., from the removed area.
- C. Where ceilings, walls, structures, etc., are temporarily removed and replaced by others, this Contractor shall be responsible for the removal, storage, and replacement of equipment, devices, fixtures, raceways, wiring, systems, etc.
- D. Where mechanical or technology equipment is indicated as being removed on electrical, mechanical, or technology drawings, the Contractor shall be responsible for disconnecting the equipment and removing all starters, VFD, controllers, electrical equipment, raceways, wiring, etc. associated with the device.
- E. Verify that abandoned wiring and equipment serve only abandoned equipment or facilities. Extend conduit and wire to facilities and equipment that will remain in operation following demolition. Extension of conduit and wire to equipment shall be compatible with the surrounding area. Extended conduit and conductors to match existing size and material.
- F. Coordinate scope of work with all other Contractors and the Owner at the project site. Schedule removal of equipment and electrical service to avoid conflicts.
- G. Bid submittal shall mean the Contractor has visited the project site and has verified existing conditions and scope of work.

### **3.2 PREPARATION**

- A. The Contractor shall obtain approval from the Owner before turning off power to circuits, feeders, panels, etc. Coordinate all outages with Owner.
- B. Coordinate utility service outages with Utility Company.
- C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations. Assume all equipment and systems must remain operational unless specifically noted otherwise on drawings.
- D. Disconnect electrical systems in walls, floors, structures, and ceilings scheduled for removal.
- E. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Obtain permission from Owner at least 48 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area. Service changeover shall be completed on an overtime basis.
- F. Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switchovers and connections. Obtain permission from Owner at least 48 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area. Provide a watchman to make required premise observations during all outages, requirements as dictated by codes and Owner's insurance carrier.
- G. Existing Television System: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Obtain permission from the Owner at least 48 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area. System downtime shall occur on an overtime basis.

### **3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK**

- A. Demolish and extend existing electrical work under provisions of Division 1 of Specifications and this Section.
- B. Remove, relocate, and extend existing installations to accommodate new construction.
- C. Remove abandoned wiring and raceway to source of supply. Existing conduit in good condition may be reused in place by including an equipment ground conductor in reused conduit. Reused conduit and boxes shall have supports revised to meet current codes. Relocating conduit shall not be allowed.
- D. Remove exposed abandoned raceway, including abandoned raceway above accessible ceiling finishes. Cut raceway flush with walls and floors, and patch surfaces. Remove all associated clamps, hangers, supports, etc. associated with raceway removal.
- E. Disconnect and remove outlets and devices that are to be demolished. Remove conduit, supports, and conductors back to source. Devices' back box and conduit mounted in walls

that are to remain can be abandoned in place. Provide appropriate cover plate for all abandoned back boxes. Cover plates shall match existing plates used in the adjacent areas.

- F. Disconnect and remove abandoned panelboards and distribution equipment.
- G. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
- H. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories. Ballasts in light fixtures installed prior to 1980 shall be incinerated in EPA approved incinerator or disposed of in EPA certified containers and deposited in an EPA landfill certified for PCB disposal or recycled by permitted ballast recycler. Punctured or leaking ballasts must be disposed of according to Federal Regulations under the Toxic Substance Control Act. Provide Owner and Architect/Engineer with a Certificate of Destruction to verify proper disposal.
- I. Repair adjacent construction and finishes damaged during demolition and extension work. Patch openings to match existing surrounding finishes.
- J. Maintain access to existing electrical installations that remain active. Modify installation or provide junction boxes and access panel as appropriate.
- K. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified. Extended conduit and conductors to match existing size and material.
- L. HID and fluorescent lamps, determined by the Toxicity Characteristic Leachate procedure (TCLP), to be hazardous waste shall be disposed of in an EPA-permitted hazardous waste disposal facility or by a permitted lamp recycler.
- M. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- N. This Contractor is responsible for all costs incurred in repair, relocations, or replacement of any cables, conduits, or other services if damaged without proper investigation.

### **3.4 CLEANING AND REPAIR**

- A. Clean and repair existing materials and equipment that remain or are to be reused.
- B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.
- C. ELECTRICAL ITEMS (E.G., LIGHTING FIXTURES, RECEPTACLES, SWITCHES, CONDUIT, WIRE, ETC.) REMOVED AND NOT RELOCATED REMAIN THE PROPERTY OF THE OWNER. CONTRACTOR SHALL PLACE ITEMS RETAINED BY THE OWNER IN A LOCATION COORDINATED WITH THE OWNER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DISPOSAL OF MATERIAL THE OWNER DOES NOT WANT.

### **3.5 INSTALLATION**

- A. Install relocated materials and equipment under the provisions of Division 1 of Specifications.

**END OF SECTION 260505**

## **SECTION 260513 - WIRE AND CABLE**

### **PART 1 - GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Building wire
- B. Cabling for remote control, signal, and power limited circuits
- C. Metal-clad cable (MC)

#### **1.2 RELATED WORK**

- A. Section 260553 – Electrical Identification: Refer to electrical identification for color and identification labeling requirements.

#### **1.3 REFERENCES**

- A. NEMA WC 70 - Power Cables Rated 2,000V or Less for the Distribution of Electrical Energy
- B. NFPA 70 - National Electrical Code (NEC)
- C. UL 44 – Thermoset-Insulated Wires and Cables
- D. UL 83 – Thermoplastic-Insulated Wires and Cables

### **PART 2 - PRODUCTS**

#### **2.1 BUILDING WIRE**

- A. Feeders and Branch Circuits Larger Than 6 AWG: Copper, stranded conductor, 600-volt insulation, THHN/THWN or XHHW-2.
- B. Feeders and Branch Circuits 6 AWG and Smaller: Copper conductor, 600-volt insulation, THHN/THWN. 6 and 8 AWG, stranded conductor; smaller than 8 AWG, solid or stranded conductor, unless otherwise noted on the drawings.
- C. Control Circuits: Copper, stranded conductor 600-volt insulation, THHN/THWN.
- D. Aluminum conductors are not to be used for feeds to motor loads.
- E. Each 120 and 277-volt branch circuit shall have a dedicated neutral conductor. Neutral conductors shall be considered current-carrying conductors for wire derating.

#### **2.2 CABLING FOR REMOTE CONTROL, SIGNAL, AND POWER LIMITED CIRCUITS:**

- A. Wire for the following specialized systems shall be as designated on the drawings, or elsewhere in these specifications. If not designated on the drawings or specifications, the system manufacturer's recommendations shall be followed.
  - 1. Fire alarm
  - 2. Low voltage switching
  - 3. Building automation systems and control
  - 4. TV

- B. Control Cable for Class 1 Remote Control and Signal Circuits: Copper conductor, 600-volt insulation, rated 60°C, individual conductors twisted together, shielded, and covered with a PVC jacket.
- C. Control Cable for Class 2 or Class 3 Remote Control and Signal Circuits: Copper conductor, 300-volt insulation, rated 60°C, individual conductors twisted together, shielded, and covered with a PVC jacket; UL listed.
- D. Plenum Cable for Class 2 or Class 3 Remote Control and Signal Circuits: Copper conductor, 300-volt insulation, rated 60°C, individual conductors twisted together, shielded, and covered with a nonmetallic jacket; UL listed for use in air handling ducts, hollow spaces used as ducts, and plenums.

### 2.3 METAL-CLAD CABLE (MC)

- A. Conductors shall be copper, 600-volt insulation, THHN. Metal clad cable shall be constructed in strict accordance with Underwriters Laboratories, Inc. Standard for Metal-Clad Cables, UL 15694, exterior of metal interlocked armor.
- B. Minimum conductor size for branch circuit wiring shall be 12 AWG, with larger wires used where specified.
- C. Metal-clad cable shall **NOT** be used for circuits serving the Essential Electrical System.

## PART 3 - EXECUTION

### 3.1 WIRE AND CABLE INSTALLATION SCHEDULE

- A. Above Accessible Ceilings:
  - 1. Building wire shall be installed in raceway.
  - 2. Metal clad cable, Type MC, 1/2" size with minimum #12 conductors and ground, shall be allowed for flexible whips to individual luminaires **on non-essential circuits**. The flexible whips shall be between 18" to 60" in length per NEC 410.116(C).
- B. All Other Locations: Building wire in raceway.
- C. Above Grade: All conductors installed above grade shall be type "THHN".
- D. Low Voltage Cable (less than 100 volts): Low voltage cables in ducts, plenums, and other air handling spaces shall be plenum listed. Low voltage cables in non-accessible areas shall be installed in conduit. Low voltage cable may be installed without conduit in accessible areas using the following types of cable supports. Cable support types/systems shall comply with the warranty requirements of the low voltage cable manufacturer.
  - 1. J-hooks
  - 2. Bridle rings with saddle supports

### **3.2 CONTRACTOR CHANGES**

- A. The basis of design is copper conductors installed in raceway based on ambient temperature of 30°C, NEC Table 310.15(B)(16) (formerly 310.16 for NEC 2008 and earlier).
- B. The Contractor shall be responsible for derating and sizing conductors and conduits to equal or exceed the ampacity of the basis of design circuits, if he/she chooses to use methods or materials other than the basis of design.
- C. Record drawing shall include the calculations and sketches.

### **3.3 GENERAL WIRING METHODS**

- A. Use no wire smaller than 12 AWG for power and lighting circuits, and no smaller than 14 AWG for control wiring.
- B. Use no wire smaller than 18 AWG for low voltage control wiring (<100 volts).
- C. Use 10 AWG conductor for 20 ampere, 120-volt branch circuit home runs longer than 75 feet, and for 20 ampere, 277-volt branch circuit home runs longer than 200 feet.
- D. Use no wire smaller than 8 AWG for outdoor lighting circuits.
- E. The ampacity of multiple conductors in one conduit shall be derated per NEC 310. In no case shall more than 4 conductors be installed in one conduit to such loads as motors larger than 1/4 HP, panelboards, motor control centers, etc.
- F. Where installing parallel feeders, place an equal number of conductors for each phase of a circuit in same raceway or cable.
- G. Splice only in junction or outlet boxes.
- H. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- I. Make conductor lengths for parallel circuits equal.
- J. All conductors shall be continuous in conduit from last outlet to their termination.
- K. Terminate all spare conductors on terminal blocks, and label the spare conductors.
- L. Cables or wires shall not be laid out on the ground before pulling.
- M. Cables or wires shall not be dragged over earth or paving.
- N. Care shall be taken so as not to subject the cable or wire to high mechanical stresses that would cause damage to the wire and cable.
- O. At least six (6)-inch loops or ends shall be left at each outlet for installation connection of luminaires or other devices.
- P. All wires in outlet boxes not connected to fixtures or other devices shall be rolled up, spliced if continuity of circuit is required, and insulated.

### **3.4 WIRING INSTALLATION IN RACEWAYS**

- A. Pull all conductors into a raceway at the same time. Use UL listed wire pulling lubricant for pulling 4 AWG and larger wires.
- B. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.
- C. Pulling shall be continuous without unnecessary stops and starts with wire or cable only partially through raceway.
- D. Where reels of cable or wire are used, they shall be set up on jacks close to the point where the wire or cable enters the conduit or duct so that the cable or wire may be unreeled and run into the conduit or duct with a minimum of change in the direction of the bend.
- E. Conductors shall not be pulled through conduits until plastering or masonry work is completed and conduits are free from moisture. Care shall be taken so that long pulls of wire or pulls around several bends are not made where the wire may be permanently stretched and the insulation damaged.
- F. Only nylon rope shall be permitted to pull cables into conduit and ducts.
- G. Completely and thoroughly swab raceway system before installing conductors.

### **3.5 CABLE INSTALLATION**

- A. Provide protection for exposed cables where subject to damage.
- B. Use suitable cable fittings and connectors.
- C. Run all open cable parallel or perpendicular to walls, ceilings, and exposed structural members. Follow the routing as illustrated on the drawings as closely as possible. Cable routing on drawings scaled 1/4"=1'-0" or less shall be considered diagrammatical, unless noted otherwise. The correct routing, when shown diagrammatically, shall be chosen by the Contractor based on information in the contract documents; in accordance with the manufacturer's written instructions, applicable codes, the NECA's "Standard of Installation", recognized industry standards; and coordinated with other contractors.
- D. Open cable shall be supported by the appropriate size J-hooks or other means if called for on the drawings. Wire and cable from different systems shall not be installed in the same J-hook. J-hooks shall be sized with 20% spare capacity. J-hooks shall provide proper bend radius support for data cable and fiber cables.
- E. Open cable installed above suspended ceilings shall not rest on the suspended ceiling construction, nor utilize the ceiling support system for wire and cable support.
- F. J-hook supports shall be installed at a maximum of five-foot (5') intervals. All J-hooks shall be installed where completely accessible and not blocked by piping, ductwork, inaccessible ceilings, etc. J-hooks shall be independently rigidly attached to a structural element. J-hooks shall be installed to provide 2" horizontal separation and 6" vertical separation between systems.

- G. Open cable shall only be installed where specifically shown on the drawings, or permitted in these specifications.

### **3.6 WIRING CONNECTIONS AND TERMINATIONS**

- A. Splice and tap only in accessible junction boxes.
- B. Use solderless, tin-plated copper, compression terminals (lugs) applied with circumferential crimp for conductor terminations, 8 AWG and larger.
- C. Use solderless, tin-plated, compression terminals (lugs) applied with indenter crimp for copper conductor terminations, 10 AWG and smaller.
- D. Use solderless pressure connectors with insulating covers for copper wire splices and taps, 8 AWG and smaller. For 10 AWG and smaller, use insulated spring wire connectors with plastic caps.
- E. Use compression connectors applied with circumferential crimp for conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connectors with electrical tape to 150 percent of the insulation value of conductor.
- F. Thoroughly clean wires before installing lugs and connectors.
- G. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.
- H. Phase Sequence: All apparatus shall be connected to operate in the phase sequence A-B-C representing the time sequence in which the phase conductors so identified reach positive maximum voltage.
- I. As a general rule, applicable to switches, circuit breakers, starters, panelboards, switchgear and the like, the connections to phase conductors are intended thus:
  - 1. Facing the front and operating side of the equipment, the phase identification shall be:
    - a. Left to Right - A-B-C
    - b. Top to Bottom - A-B-C
- J. Connection revisions as required to achieve correct rotation of motors shall be made at the load terminals of the starters or disconnect switches.

### **3.7 MC CABLE INSTALLATION**

- A. Cable shall be supported by an approved means every 4.5' and within 12" of outlet boxes, junction boxes, cabinets, or fittings.
- B. Cable may be unsupported in the following conditions:
  - 1. Cable is no longer than 2' in length at terminals where flexibility is necessary.
  - 2. Cable is not more than 4.5' from the last point of support for connections within an accessible ceiling to light fixtures or equipment.

- C. Conductor ampacity shall be derated as required by the NEC where more than three current carrying conductors are used.
- D. Each 120 and 277-volt circuit shall have a dedicated neutral conductor. Neutral conductors shall be considered current-carrying conductors for cable derating.
- E. Cables shall be cut using a rotary cutter as recommended by the manufacturer to eliminate nicking and cutting of the conductors.
- F. Bending radius shall comply with the requirements listed in the NEC for the type and size of cable being installed, but shall not be less than 5-times the diameter of the cable in any case.
- G. At cable terminations, a fitting shall be provided to protect wires from abrasion, unless the design of the outlet boxes or fittings is such as to afford equivalent protection, and, in addition, an insulating bushing or its equivalent protection shall be provided between the conductors and the armor.

### **3.8 FIELD QUALITY CONTROL**

- A. Field inspection and testing will be performed under provisions of Division 1.
- B. Building Wire and Power Cable Testing: Perform an insulation-resistance test on each conductor with respect to ground and adjacent conductors. Test shall be made by means of a low-resistance ohmmeter, such as a “Megger”. The applied potential shall be 500 volts dc for 300 volt rated cable and 1000 volts dc for 600 volt rated cable. The test duration shall be one minute. Insulation resistance must be greater than 100 mega-ohm for 600 volt and 25 mega-ohm for 300 volt rated cables per NETA Acceptance Testing Standard. Verify uniform resistance of parallel conductors.
- C. Inspect wire and cable for physical damage and proper connection.
- D. Torque test conductor connections and terminations to manufacturer's recommended values.
- E. Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections.
- F. Protection of wire and cable from foreign materials:
  - 1. It is the Contractor’s responsibility to provide adequate physical protection to prevent foreign material application or contact with any wire or cable type. Foreign material is defined as any material that would negatively impact the validity of the manufacturer’s performance warranty. This includes, but is not limited to, overspray of paint (accidental or otherwise), drywall compound, or any other surface chemical, liquid, or compound that could come in contact with the cable, cable jacket, or cable termination components.

- G. Overspray of paint on any wire or cable will not be accepted. It shall be the Contractor's responsibility to replace any component containing overspray, in its entirety, at no additional cost to the project. Cleaning of the cables with harsh chemicals is not allowed.

**END OF SECTION 260513**

## **SECTION 260533 - CONDUIT AND BOXES**

### **PART 1 - GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Intermediate metallic conduit and fittings (IMC)
- B. Electrical metallic tubing and fittings (EMT)
- C. Flexible metallic conduit and fittings (FMC)
- D. Liquidtight flexible metallic conduit and fittings (LFMC)
- E. Wall and ceiling outlet boxes
- F. Electrical connection
- G. Pull and junction boxes

#### **1.2 RELATED WORK**

- A. Section 260553 – Electrical Identification: Refer to electrical identification for color and identification labeling requirements.

#### **1.3 REFERENCES**

- A. American National Standards Institute (ANSI):
  - 1. ANSI C80.3 - Electrical Metallic Tubing, Zinc-Coated and Fittings
  - 2. ANSI C80.4 - Fittings for Rigid Metal Conduit and Electrical Metallic Tubing
  - 3. ANSI C80.6 – Intermediate Metal Conduit, Zinc Coated
  - 4. ANSI/NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers and Box Supports
  - 5. ANSI/NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports
- B. Federal Specifications (FS):
  - 1. A–A–50553A – Fittings for Conduit, Metal, Rigid, (Thick-Wall and Thin-Wall (EMT) Type
  - 2. A–A–55810 – Specification for Flexible Metal Conduit
- C. NECA “Standards of Installation”
- D. National Electrical Manufacturers Association (NEMA):
  - 1. ANSI/NEMA FB 1 – Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable
  - 2. RN 1 – Polyvinyl chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit, Rigid Aluminum Conduit, and Intermediate Metal Conduit
  - 3. TC 2 – Electrical Polyvinyl Chloride (PVC) Conduit
  - 4. TC 9 – Fittings for PVC Plastic Utilities Duct for Underground Installation
- E. NFPA 70 – National Electrical Code (NEC)

- F. Underwriters Laboratories (UL): Applicable Listings
1. UL 1 – Flexible Metal Conduit
  2. UL 360 – Liquid Tight Flexible Steel Conduit
  3. UL514-B – Conduit Tubing and Cable Fittings
  4. UL797 – Electrical Metal Tubing
  5. UL1242 – Intermediate Metal Conduit
- G. Definitions:
1. Fittings: Conduit connection or coupling.
  2. Body: Enlarged fittings with opening allowing access to the conductors for pulling purposes only.
  3. Mechanical Spaces: Enclosed areas, usually kept separated from the general public, where the primary use is to house service equipment and to route services. These spaces generally have exposed structures, bare concrete and non-architecturally emphasized finishes.
  4. Finished Spaces: Enclosed areas where the primary use is to house personnel and the general public. These spaces generally have architecturally emphasized finishes, ceilings and/or floors.
  5. Concealed: Not visible by the general public. Often indicates a location either above the ceiling, in the walls, in or beneath the floor slab, in column coverings, or in the ceiling construction.
  6. Above Grade: Not directly in contact with the earth. For example, an interior wall located at an elevation below the finished grade shall be considered above grade but a wall retaining earth shall be considered below grade.
  7. Slab: Horizontal pour of concrete used for a floor or sub-floor.

## **PART 2 - PRODUCTS**

### **2.1 INTERMEDIATE METALLIC CONDUIT (IMC) AND FITTINGS**

- A. Minimum Size Galvanized Steel: 3/4 inch, unless otherwise noted.
- B. Acceptable Manufacturers: Allied, LTV, Steelduct, Wheatland Tube Co, O-Z Gedney, or approved equal.
- C. Fittings and Conduit Bodies:
1. End Bell Fittings: Malleable iron, hot dip galvanized, threaded flare type with provisions for mounting to form.
  2. Expansion Joints: Malleable iron and hot dip galvanized providing a minimum of 4 inches of movement. Fitting shall be watertight with an insulating bushing and a bonding jumper.

3. Expansion Joint for Concrete Encased Conduit: Neoprene sleeve with bronze end coupling, stainless steel bands and tinned copper braid bonding jumper. Fittings shall be watertight and concrete-tight.
4. Conduit End Bushings: Malleable iron type with molded-on high impact phenolic thermosetting insulation. Where required elsewhere in the contract documents, bushing shall be complete with ground conductor saddle and clamp. **High impact phenolic threaded type bushings are not acceptable.**
5. All other fittings and conduit bodies shall be of malleable iron construction and hot dip galvanized.

## 2.2 ELECTRICAL METALLIC TUBING (EMT) AND FITTINGS

- A. Minimum Size Electrical Metallic Tubing: 3/4 inch, unless otherwise noted.
- B. Acceptable Manufacturers of EMT Conduit: Allied, Calbond Calpipe, LTV, Steelduct, Wheatland Tube Co, or approved equal.
- C. Fittings and Conduit Bodies:
  1. 2" Diameter or Smaller: Compression type of steel designed for their specific application.
  2. 1/2" and 3/4" Conduit: Push-on connectors and couplers with locking ring and washer of zinc plated steel, listed for use in dry locations.
  3. Larger than 2": Compression type of steel designed for their specific application.
  4. Acceptable Manufacturers of EMT Conduit Fittings: Appleton Electric, O-Z/Gedney Co., Electroline, Raco, Bridgeport, Midwest, Regal, Thomas & Betts, Orbit Industries or approved equal.

## 2.3 FLEXIBLE METALLIC CONDUIT (FMC) AND FITTINGS

- A. Minimum Size Galvanized Steel: 3/4 inch, unless otherwise noted. Lighting branch circuit wiring to an individual luminaire may be a manufactured, UL listed 3/8" flexible metal conduit and fittings with #14 AWG THHN conductors and an insulated ground wire. Maximum length of 3/8" FMC shall be six (6) feet.
- B. Acceptable Manufacturers: American Flex, Alflex, Electri-Flex Co, or approved equal.
- C. Construction: Flexible steel, approved for conduit ground, zinc coated, threadless type formed from a continuous length of spirally wound, interlocked zinc coated strip steel. Provide a separate equipment grounding conductor when used for equipment where flexibility is required.
- D. Fittings and Conduit Bodies:
  1. Threadless hinged clamp type, galvanized zinc coated cadmium plated malleable cast iron.

2. Fittings and conduit bodies shall include plastic or cast metal inserts supplied by the manufacturer to protect conductors from sharp edges.
3. Acceptable Manufacturers: O-Z/Gedney Co., Thomas & Betts, Appleton Electric, Electroline, Bridgeport, Midwest, Regal, Orbit Industries, or approved equal.

## **2.4 LIQUIDTIGHT FLEXIBLE METALLIC CONDUIT (LFMC) AND FITTINGS**

- A. Acceptable Manufacturers: Anaconda Type UA, Electri-Flex Type LA, Alfex, Carlon (Lamson & Sessions), or approved equal.
- B. Construction: Flexible steel, approved for conduit ground, zinc coated, threadless type formed from a continuous length of spirally wound, interlocked zinc coated strip steel and an extruded PVC cover.
- C. Fittings and Conduit Bodies:
  1. Watertight, compression type, galvanized zinc coated cadmium plated malleable cast iron, UL listed.
  2. Fittings and conduit bodies shall include plastic or cast metal inserts supplied by the manufacturer to protect conductors from sharp edges.
  3. Acceptable Manufacturers: Appleton Electric, O-Z/Gedney Co., Electroline, Bridgeport, Thomas & Betts, Midwest, Regal, Carlon (Lamson & Sessions), Orbit Industries, or approved equal.

## **2.5 OUTLET BOXES**

- A. Sheet Metal Outlet Boxes: ANSI/NEMA OS 1; galvanized steel, minimum of 14 gauge, with 1/2-inch male fixture studs where required.
- B. Nonmetallic Outlet Boxes: ANSI/NEMA OS 2.
- C. Cast Boxes: NEMA FB1, Type FD, Aluminum, cast ferrous alloy, or stainless steel deep type, gasketed cover, threaded hubs.
- D. Outlet boxes for luminaires to be not less than 1-1/2" deep, deeper if required by the number of wires or construction. The box shall be coordinated with surface luminaires to conceal the box from view or provide a finished trim plate.
- E. Switch outlet boxes for local light control switches, dimmers and occupancy sensors shall be 4 inches square by 2-1/8 inches deep, with raised cover to fit flush with finish wall line. Multiple gang switch outlets shall consist of the required number of gang boxes appropriate to the quantity of switches comprising the gang. Where walls are plastered, provide a plaster raised cover. Where switch outlet boxes occur in exposed concrete block walls, boxes shall be installed in the block cavity with a raised square edge tile cover of sufficient depth to extend out to face of block or masonry boxes.
- F. Outlet boxes for telephone substations in walls and columns shall be 4 inches square and 2-1/8 inches deep with single gang raised cover to fit flush with finished wall line equipped with flush telephone plate.

- G. Wall or column receptacle outlet boxes shall be 4 inches square with raised cover to fit flush with finished wall line. Boxes in concrete block walls shall be installed the same as for switch boxes in block walls.

2.6 **[ECONN]: ELECTRICAL CONNECTION**

- A. Electrical connection to equipment and motors, sized per NEC. Coordinate requirements with contractor furnishing equipment or motor. Refer to specifications and general installation notes for terminations to motors.

2.7 **[JB]: PULL AND JUNCTION BOXES**

- A. Sheet Metal Boxes: ANSI/NEMA OS 1; galvanized steel.
- B. Sheet metal boxes larger than 12 inches in any dimension that contain terminations or components: Continuous hinged enclosure with 1/4 turn latch and white back panel for mounting terminal blocks and electrical components.
- C. Cast Metal Boxes for Outdoor and Wet Location Installations: NEMA 250; Type 4 and Type 6, flat-flanged, surface-mounted junction box, UL listed as raintight. Galvanized cast iron box and cover with ground flange, neoprene gasket, and stainless steel cover screws.
- D. Cast Metal Boxes for Underground Installations: NEMA 250; Type 4, inside flanged, recessed cover box for flush mounting, UL listed as raintight. Galvanized cast iron box and plain cover with neoprene gasket and stainless steel cover screws.
- E. Flanged type boxes shall be used where installed flush in wall.

**PART 3 - EXECUTION**

**3.1 CONDUIT INSTALLATION SCHEDULE AND SIZING**

- A. In the event the location of conduit installation represents conflicting installation requirements as specified in the following schedule, a clarification shall be obtained from the Architect/Engineer. If this Contractor is unable to obtain a clarification as outlined above, concealed rigid galvanized steel conduit installed per these specifications and the NEC shall be required.
- B. The following schedule shall be adhered to unless they constitute a violation of applicable codes or are noted otherwise on the drawings. The installation of RMC conduit will be permitted in place of all conduit specified in this schedule.

<b>Installation Type</b>	<b>IMC</b>	<b>EMT</b>
Feeders: Switchboards, distribution panels, panelboards, motor control centers, etc.	X	X
Branch Circuits: Lighting, receptacles, controls, etc.	X	X
Mechanical Equipment Feeders: Pumps, chillers, air handling units, etc.	X	X

<b>Installation Type</b>	<b>IMC</b>	<b>EMT</b>
Floor Mounted Equipment Feeders: Pumps, etc. (include no more than 6 feet of LFMC to pump)	X	X
Controls (lighting, power, building automation, etc.)	X	X
Finished Spaces / Concealed		X
Wet and Damp Locations: (conduit, boxes, fittings, installed and equipped to prevent water entry)	X	
Interior Locations: Concealed		X
Interior Locations: Exposed	X	X

C. Minimum Conduit Size (Unless Noted Otherwise):

1. Above Grade: 3/4 inch. (The use of 1/2 inch would be allowed for installation conduit to individual light switches, individual receptacles and individual fixture whips from junction box.)
2. Telecommunication Conduit: 1 inch.
3. Controls Conduit: 1/2 inch.

D. Conduit sizes shall change only at the entrance or exit to a junction box, unless specifically noted on the drawings.

### 3.2 CONDUIT ARRANGEMENT

A. In general, conduit shall be installed concealed in walls, in finished spaces and where possible or practical, or as noted otherwise. Conduit shall be installed parallel or perpendicular to walls, ceilings, and exposed structural members. In unfinished spaces, mechanical and utility areas, conduit may run either concealed or exposed as conditions dictate and as practical unless noted otherwise on drawings. Installation shall maintain headroom in exposed vicinities of pedestrian or vehicular traffic.

B. Exposed conduit on exterior walls or above roof will not be allowed without prior written approval of Architect/Engineer. A drawing of the proposed routing and a photo of the location shall be submitted 14 days prior to start of conduit rough-in. Routing shall be shown on coordination drawings.

C. Conduit arrangement in elevated slabs (restricted to applications specifically noted or shown on drawings):

1. Conduit size shall not exceed one-third of the structural slab thickness. Place conduit between the top and bottom reinforcing with a minimum of 3" concrete cover.
2. Parallel conduits shall be spaced at least 8 inches apart. Exception: Within 18 inches of commonly served floor boxes, junction boxes, or similar floor devices. Arrange conduits parallel or perpendicular to building lines and walls.

D. Conduit shall not share the same cell as structural reinforcement in masonry walls.

- E. Conduit runs shall be routed as shown on large scale drawings. Conduit routing on drawings scaled 1/4"=1'-0" or less shall be considered diagrammatic, unless noted otherwise. The correct routing, when shown diagrammatically shall be chosen by the Contractor based on information in the contract documents, in accordance with manufacturer's written instructions, applicable codes, the NECA's "Standard of Installation", in accordance with recognized industry standards, and coordinated with other contractors.
- F. Contractor shall adapt his work to the job conditions and make such changes as required and permitted by the Architect/Engineer, such as moving to clear beams and joists, adjusting at columns, avoiding interference with windows, etc., to permit the proper installation of other mechanical and/or electrical equipment.
- G. Contractor shall cooperate with all Contractors on the project. He shall obtain details of other Contractor's work to ensure fit and avoid conflict. Any expense due to the failure of This Contractor to do so shall be paid for in full by him. The other trades involved as directed by the Architect/Engineer shall perform the repair of work damaged as a result of neglect or error by This Contractor. The resultant costs shall be borne by This Contractor.

### **3.3 CONDUIT SUPPORT**

- A. Conduit runs installed above a suspended ceiling shall be properly supported. In no case shall conduit rest on the suspended ceiling construction, nor utilize ceiling support system for conduit support.
- B. Conduit shall not be supported from ductwork, water, sprinkler piping, or other non-structural members, unless approved by the Architect/Engineer. All supports shall be from structural slabs, walls, structural members, and bar joists, and coordinated with all other applicable contractors, unless noted otherwise.
- C. Conduit shall be held in place by the correct size of galvanized one-hole conduit clamps, two-hole conduit straps, patented support devices, clamp back conduit hangers, or by other means if called for on the drawings.
- D. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.
- E. Spring-steel conduit clips specifically designed for supporting single conduits or tubing may be used in lieu of malleable-iron hangers for 1-1/2" 1" and smaller raceways serving lighting and receptacle branch circuits above accessible ceilings and for securing raceways to slotted channel and angle supports.
- F. Group conduits in parallel runs where practical and use conduit racks or trapeze hangers constructed of steel channel, suspended with threaded solid rods or wall mounted from metal channels with conduit straps or clamps. Provide space in each rack or trapeze for 25% additional conduits.
- G. Do not exceed 25 lbs. per hanger and a minimum spacing of 2'-0" on center when attaching to metal roof decking (excludes concrete on metal deck). This 25 lbs. load and 2'-0" spacing include adjacent electrical and mechanical items hanging from deck. If the hanger restrictions cannot be achieved, supplemental framing off steel framing will need to be added.

- H. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.
- I. Supports for metallic conduit shall be no greater than 10 feet. A smaller interval may be used if necessitated by building construction, but in no event shall support spans exceed the NEC requirements. Conduit shall be securely fastened within 3 feet of each outlet box, junction box, device box, cabinet, or fitting.
- J. Supports of flexible conduit shall be within 12 inches of each outlet box, junction box, device box, cabinet, or fitting and at intervals not to exceed 4.5 feet.
- K. Supports for non-metallic conduit shall be at sufficiently close intervals to eliminate any sag in the conduit. The manufacturer's recommendations shall be followed, but in no event shall support spans exceed the NEC requirements.
- L. Where conduit is to be installed in poured concrete floors or walls, provide concrete-tight conduit inserts securely fastened to forms to prevent conduit misplacement.
- M. Finish:
  - 1. Prime coat exposed steel hangers and supports. Hangers and supports in crawl spaces, pipe shafts, and above suspended ceiling spaces are not considered exposed.
  - 2. Trim all ends of exposed field fabricated steel hangers, slotted channel and threaded rod to within 1" of support or fastener to eliminate potential injury to personnel unless shown otherwise on the drawings. Smooth ends and install elastomeric insulation with two coats of latex paint if exposed steel is within 6' -6" of finish floor and presents potential injury to personnel.

### **3.4 CONDUIT INSTALLATION**

- A. Conduit Connections:
  - 1. Shorter than standard conduit lengths shall be cut square using industry standards. The ends of all conduits cut shall be reamed or otherwise finished to remove all rough edges.
  - 2. Metallic conduit connections in slab on grade installation shall be sealed and one coat of rust inhibitor primer applied after the connection is made.
  - 3. Where conduits with tapered threads cannot be coupled with standard couplings, then approved split or Erickson couplings shall be used. Running threads will not be permitted.
  - 4. Install expansion/deflection joints where conduit crosses structure expansion/seismic joints.
- B. Conduit terminations for all low voltage wiring shall have nylon bushings installed on each end of every conduit run.

C. Conduit Bends:

1. Use a hydraulic one-shot conduit bender or factory elbows for bends in conduit 2" in size or larger. All steel conduit bending shall be done cold; no heating of steel conduit shall be permitted.
2. All bends of rigid polyvinyl chloride conduit (PVC) shall be made with the manufacturer's approved bending equipment. The use of spot heating devices will not be permitted (i.e. blow torches).
3. A run of conduit shall not contain more than the equivalent of four (4) quarter bends (360°), including those bends located immediately at the outlet or body.
4. Telecommunications conduits shall have no more than two (2) 90-degree bends between pull points and contain no continuous sections longer than 100 feet. Insert pull points or pull boxes for conduits exceeding 100 feet in length.
  - a. A third bend is acceptable if:
    - 1) The total run is not longer than (33) feet.
    - 2) The conduit size is increased to the next trade size.
5. Telecommunications pull boxes shall not be used in lieu of a bend. Align conduits that enter the pull box from opposite ends with each other. Pull box size shall be twelve (12) times the diameter of the largest conduit. Slip sleeves or gutters can be used in place of a pull box.
6. Telecommunications conduit bend radius shall be six (6) times the diameter for conduits under 2" and ten (10) times the diameter for conduits over 2".
7. Use conduit bodies to make sharp changes in direction (i.e. around beams).

D. Conduit Placement:

1. Conduit shall be mechanically continuous from source of current to all outlets. Conduit shall be electrically continuous from source of current to all outlets, unless a properly sized grounding conductor is routed within the conduit. All metallic conduits shall be bonded per the NEC.
2. Route exposed conduit and conduit above suspended ceilings (accessible or not) parallel/perpendicular to the building structural lines, and as close to building structure as possible. Wherever possible, route horizontal conduit runs above water and steam piping.
3. Route conduit through roof openings provided for piping and ductwork where possible. If not provided or routing through provided openings is not possible, route through roof jack with pitch pocket. Coordinate roof penetrations with other trades.
4. Conduits, raceway, and boxes shall not be installed in concealed locations in metal deck roofing or less than 1.5" below bottom of roof decking.

5. Avoid moisture traps where possible. Where unavoidable, provide a junction box with drain fitting at conduit low point.
6. All conduits through walls shall be grouted or sealed into openings. Where conduit penetrates firewalls and floors, seal with a UL listed sealant. Seal penetrations with intumescent caulk, putty, or sheet installed per manufacturer's recommendations. All materials used to seal penetrations of firewalls and floors shall be tested and certified as a system per ASTM E814 Standard for fire tests or through-penetration fire stops as manufactured by 3M or approved equal; refer to Section 26 05 03 for through penetration firestopping requirements.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL OPENINGS REQUIRED IN MASONRY OR EXTERIOR WALLS UNDER THIS DIVISION. A QUALIFIED MASON AT THE EXPENSE OF THIS CONTRACTOR SHALL REPAIR ALL OPENINGS TO MATCH EXISTING CONDITIONS.
8. Seal interior of conduit at exterior entries, air handling units, coolers/freezers, etc., and where the temperature differential can potentially be greater than 20°F, to prevent moisture penetration. Seal shall be placed where conduit enters warm space. Conduit seal fitting shall be a drain/seal, with sealing compound, equal to O-Z/Gedney type EYD.
9. Do not route conduits across each other in slabs on grade.
10. Contractor shall provide suitable mechanical protection around all conduits stubbed out from floors, walls or ceilings during construction to prevent bending or damaging of stubs due to carelessness with construction equipment.
11. Contractor shall provide a polypropylene pull cord with 2000 lbs. tensile strength in each empty conduit (indoor and outdoor), except in sleeves and nipples.
12. Telecommunications conduits that protrude through the structural floor shall be installed 1 to 3" above finished floor (AFF).
13. Telecommunications conduits that enter into Telecommunications rooms below the finished ceiling shall terminate a minimum of 4" below ceiling and as close to the wall as possible.
14. Telecommunications conduits that are below grade and enter into a building shall terminate a minimum of 4" above finished floor (AFF) and as close to the wall as possible.

### **3.5 CONDUIT TERMINATIONS**

- A. Where conduit bonding is indicated or required in the contract documents, the bushings shall be a grounding type sized for the conduit and ground bonding conductor as manufactured by O-Z/Gedney, Appleton, Thomas & Betts, Burndy, Regal, Orbit Industries or approved equal.
- B. Conduits with termination fittings shall be threaded for one (1) lock nut on the outside and one (1) lock nut and bushing on the inside of each box.

- C. Where conduits terminate in boxes with knockouts, they shall be secured to the boxes with lock nuts and provided with approved screw type tinned iron bushings or fittings with plastic inserts.
- D. Where conduits terminate in boxes, fittings, or bodies with threaded openings, they shall be tightly screwed against the shoulder portion of the threaded openings.
- E. Conduit terminations to all motors shall be made with flexible metallic conduit (FMC), unless noted otherwise. Final connections to roof exhaust fans, or other exterior motors and motors in damp or wet locations shall be made with liquidtight flexible metallic conduit (LFMC). Motors in hazardous areas, as defined in the NEC, shall be connected using flexible conduit rated for the environment. Flexible conduit shall not exceed 6' in length. Route equipment ground conductors from circuit ground to motor ground terminal through flexible conduit.
- F. All conduit ends shall be sealed with plastic immediately after installation to prevent the entrance of any foreign matter during construction. The seals shall be removed and the conduits blown clear of all foreign matter prior to any wires or pull cords being installed.

### 3.6 BOX INSTALLATION SCHEDULE

- A. Galvanized steel boxes may be used in:
  - 1. Concealed interior locations above ceilings and in hollow studded partitions.
  - 2. Exposed interior locations in mechanical rooms and in rooms without ceilings; higher than 8' above the highest platform level.
  - 3. Direct contact with concrete except slab on grade.
- B. Cast boxes shall be used in:
  - 1. Exterior locations.
  - 2. Exposed interior locations within 8' of the highest platform level.
  - 3. Wet locations.

### 3.7 COORDINATION OF BOX LOCATIONS

- A. Provide electrical boxes as shown on the drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance.
- B. Electrical box locations shown on the Contract Drawings are approximate, unless dimensioned. Verify location of floor boxes and outlets in offices and work areas prior to rough-in.
- C. Locate and install boxes to allow access. Avoid interferences with ductwork, piping, structure, equipment, etc. Where installation is inaccessible, provide access doors. Coordinate locations and sizes of required access doors with the Architect/Engineer and General Contractor.
- D. Locate and install to maintain headroom and to present a neat appearance.
- E. Coordinate locations with Heating Contractor to avoid baseboard radiation cabinets.

### 3.8 OUTLET BOX INSTALLATION

- A. Install sound insulation pads on all five sides of the back of all boxes in sound-rated wall assemblies. Sound-rated wall assemblies are defined as partition types carrying a Sound Transmission Class (STC) rating.
- B. The Contractor shall anchor switch and outlet box to wall construction so that it is flush with the finished masonry, paneling, drywall, plaster, etc. The Contractor shall check the boxes as the finish wall surface is being installed to assure that the box is flush. (Provide plaster rings as necessary.)
- C. Mount at heights shown or noted on the drawings or as generally accepted if not specifically noted.
- D. Locate boxes in masonry walls to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat openings for boxes.
- E. Provide knockout closures for unused openings.
- F. Support boxes independently of conduit.
- G. Use multiple-gang boxes where more than one device is mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.
- H. Install boxes in walls without damaging wall insulation.
- I. Coordinate mounting heights and locations of outlets mounted above counters, benches, backsplashes, and below baseboard radiation.
- J. Position outlets to locate luminaires as shown on reflected ceiling drawings.
- K. In inaccessible ceiling areas, position outlets and junction boxes within 6 inches of recessed luminaire, to be accessible through luminaire ceiling opening.
- L. Provide recessed outlet boxes in finished areas; secure boxes to interior wall and partition studs, accurately positioned to allow for surface finish thickness. Use stamped steel stud bridges for flush outlets in hollow stud wall, and adjustable steel channel fasteners for flush ceiling outlet boxes.
- M. Align wall-mounted outlet boxes for switches, thermostats, and similar devices.
- N. Provide cast outlet boxes in exterior locations and wet locations, and where exposed rigid or intermediate conduit is used.

### 3.9 PULL AND JUNCTION BOX INSTALLATION

- A. Locate pull boxes and junction boxes above accessible ceilings or in unfinished areas.
- B. Support pull and junction boxes independent of conduit.
- C. Install sound insulation pads on all five sides of the back of all boxes in sound-rated wall assemblies. Sound-rated wall assemblies are defined as partition types carrying a Sound Transmission Class (STC) rating.

### 3.10 EXPOSED BOX INSTALLATION

- A. Boxes shall be secured to the building structure with proper size screws, bolts, hanger rods, or structural steel elements.
- B. On brick, block and concrete walls or ceilings, exposed boxes shall be supported with no less than two (2) Ackerman-Johnson, Paine, Phillips, or approved equal screw anchors or expansion shields and round head machine screws. Cast boxes shall not be drilled.
- C. On steel structures, exposed boxes shall be supported to the steel member by drilling and tapping the member and fastening the boxes by means of round head machine screws.
- D. Boxes may be supported on steel members by APPROVED beam clamps if conduit is supported by beam clamps.
- E. Boxes shall be fastened to wood structures by means of a minimum of two (2) wood screws adequately large and long to properly support. (Quantity depends on size of box.)
- F. Wood, plastic, or fiber plugs shall not be used for fastenings.
- G. Explosive devices shall not be used unless specifically allowed.

**END OF SECTION 260533**

## **SECTION 260553 - ELECTRICAL IDENTIFICATION**

### **PART 1 - GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Adhesive labels, markings, nameplates, and signs
- B. Wire and cable markers
- C. Raceway, box, and wire identification
- D. Electrical equipment labeling

#### **1.2 REFERENCES**

- A. ANSI C2 – National Electrical Safety Code
- B. NFPA 70 – National Electrical Code (NEC)
- C. ANSI A13.1 – Standard for Pipe Identification
- D. ANSI Z535.4 – Standard for Product Safety Signs and Labels

### **PART 2 - PRODUCTS**

#### **2.1 ADHESIVE MARKINGS AND FIELD LABELS**

- A. Colored Adhesive Marking Tape for banding Raceways, Wires, and Cables: Self-adhesive vinyl tape not less than 3 mils thick by 1 inch (25mm) to 2 inches (50mm) in width.
- B. Pretensioned Flexible Wraparound Colored Plastic Sleeves for Cable Identification: flexible acrylic bands sized to suit the cable diameter and arranged to stay in place by pretensioned gripping action when coiled around the cable.
- C. Wire/Cable Designation Tape Markers: Vinyl or vinyl-cloth, self-adhesive, wraparound, cable/conductor markers with preprinted numbers and letter.
- D. Cable Ties: Fungus-inert, self-extinguishing, one-piece, self-locking nylon cable ties, 0.18-inch (5mm) minimum width, 50-lb minimum tensile strength, and suitable for a temperature range from minus 50°F to 350°F (10°C to 176°C). Provide ties in specified colors when used for color coding.
- E. Aluminum, Wraparound Marker Bands: 1-inch (25mm) width, 0.014 (5mm) inch thick aluminum bands with stamped or embossed legend and fitted with slots or ears for permanently securing around wire or cable jacket or around groups of conductors.
- F. Brass or aluminum Tags: 2" (50mm) by 2" (50mm) by .05-inch (2mm) metal tags with stamped legend, punched for fastener.
- G. Indoor/Outdoor Number and Letters: Outdoor grade vinyl label with acrylic adhesive designed for permanent application in severe indoor and outdoor environments.

## 2.2 PRODUCT COLORS

- A. Adhesive Markings and Field Labels:
  - 1. All Labels: Black letters on white face

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Lettering and Graphics: Coordinate names, abbreviations, colors, and other designations used in electrical identification work with corresponding designations specified or indicated. Install numbers, lettering, and colors as required by code.
- B. Install identification devices in accordance with manufacturer's written instruction and requirements of NEC.
- C. Sequence of Work: Where identification is to be applied to surfaces that require finish, install identification after completion of finish work. All mounting surfaces shall be cleaned and degreased prior to identification installation.
- D. Circuit Identification: Tag or label conductors as follows:
  - 1. Multiple Power or Lighting Circuits in Same Enclosure: Where multiple branch circuits are terminated or spliced in a box or enclosure, label each conductor with source and circuit number.
  - 2. Multiple Control Wiring and Communication/Signal Circuits in Same Enclosure: For control and communications/signal wiring, use wire/cable marking tape at terminations in wiring boxes, troughs, and control cabinets. Use consistent letter/number conductor designations throughout on wire/cable marking tape.
  - 3. Match identification markings with designations used in panelboards shop drawings, Contract Documents, and similar previously established identification schemes for the facility's electrical installations.
- E. Apply warning, caution and instruction signs as follows:
  - 1. Install warning, caution or instruction signs where required by NEC, where indicated, or where reasonably required to assure safe operation and maintenance of electrical systems and of the items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions or explanations are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.
  - 2. Emergency Operating Signs: Install, where required by NEC, where indicated, or where reasonably required to assure safe operation and maintenance of electrical systems and of the items to which they connect, engraved laminate signs with white legend on red background with minimum 3/8-inch (10mm) high lettering for emergency instructions on power transfer, load shedding, or other emergency operations.

- F. Apply circuit/control/item designation labels of engraved plastic laminate for pushbuttons, pilot lights, alarm/signal components, and similar items, except where labeling is specified elsewhere.
- G. Install labels parallel to equipment lines at locations as required and at locations for best convenience of viewing without interference with operation and maintenance of equipment.
- H. Install ARC FLASH WARNING signs on all power distribution equipment per Section 26 05 73.

### **3.2 LIGHTING CONTROL AND RECEPTACLE COVER PLATES**

- A. Product:
  - 1. Adhesive labels and field markings
- B. Identification material to be a clear, 3/8-inch (10mm) Kroy tape or Brother self-laminating vinyl label with black letters. Embossed Dymo-Tape labels are not acceptable. Permanently affix identification label to cover plates, centered above the receptacle openings.
- C. Provide identification on all switch and receptacle cover plates. Identification shall indicate source and circuit number serving the device (e.g. "C1A #24").

### **3.3 BOX LABELING**

- A. Products:
  - 1. Adhesive labels and field markings
- B. Identify Junction, Pull and Connection Boxes: Labeling shall be 3/8-inch (10mm) Kroy tape or letters/numbers.
- C. All junction, pull, and connection boxes shall be identified as follows:
  - 1. For power and lighting circuits, indicate system voltage and identity of contained circuits ("120V, 1LA1-3,5,7").
  - 2. For other wiring, indicate system type and description of wiring ("FIRE ALARM NAC #1").

### **3.4 CONDUCTOR COLOR CODING**

- A. Products:
  - 1. All wire and cables shall be color coded by the manufacturer.
- B. Color coding shall be applied at all panels, switches, junction boxes, pull boxes, vaults, manholes etc., where the wires and cables are visible and terminations are made. The same color coding shall be used throughout the entire electrical system, therefore maintaining proper phasing throughout the entire project.

- C. Colored cable ties shall be applied in groups of three ties of specified color to each conductor at each terminal or splice point starting 3 inches (76mm) from the termination and spaced at 3- inches (76mm) centers. Tighten to a snug fit, and cut off excess length.
- D. Where more than one nominal voltage system exists in a building or facility, each ungrounded conductor of a multi-wire branch circuit, where accessible, shall be identified by phase and system.
- E. Conductors shall be color coded as follows:
  - 1. 120/240 Volt, 3-Wire:
    - a. A-Phase – Black
    - b. B-Phase – Red
    - c. Neutral – White
    - d. Ground Bond – Green
  - 2. 208Y/120 Volt, 4-Wire:
    - a. A-Phase – Black
    - b. B-Phase – Red
    - c. C-Phase – Blue
    - d. Neutral – White
    - e. Ground Bond – Green
  - 3. 480Y/277 Volt, 4-Wire:
    - a. A-Phase – Brown
    - b. B-Phase – Orange
    - c. C-Phase – Yellow
    - d. Neutral – Gray
    - e. Ground Bond – Green
  - 4. Grounding Conductors:
    - a. Equipment grounding conductors, main/system/supply-side bonding jumpers: Green.
    - b. Isolated Equipment Ground Conductors: Green with colored distinctive yellow stripe along the entire length of the conductor. Isolated ground for feeders, use colored tape with alternating bands of green and yellow to provide a minimum of three bands of green and two bands of yellow.
  - 5. Cabling for Remote Control, Signal, and Power Limited Circuits:
    - a. Low Voltage Switching: Per manufacturer recommendations and code requirements.
    - b. Building Automation Systems and Control: Refer to the Temperature Control Contactor notes located on the mechanical cover sheet.
    - c. Electronic Control: Per manufacturer recommendations and code requirements.

### 3.5 CONTROL EQUIPMENT IDENTIFICATION

- A. Products:
  - 1. Nameplates and signs
- B. Provide identification on the front of all control equipment such as combination starters, starters, VFDs, contactors, motor control centers, etc.
- C. Identification shall be provided for all connections to equipment furnished by this Contractor, other contractors, or the Owner.
- D. Labeling shall include:
  - 1. Equipment type and contract documents designation of equipment being served.
  - 2. Location of equipment being served if it is not located within sight.
  - 3. Voltage and phase of circuit(s).
  - 4. Panel and circuit number(s) serving the equipment.
  - 5. Method of automatic control, if included ("AUTO CONTROL BY FCMS").
  - 6. Available fault current; refer to one-line diagram or panel schedule of panel serving equipment.
  - 7. Date of fault current study, refer to one-line diagram

<p>EXHAUST FAN EF-1 ("LOCATED ON ROOF") 480V, 3-PHASE FED FROM "1HA1-1" AUTO CONTROL BY FCMS 22,000 AMPS AVAILABLE FAULT CURRENT DATE OF STUDY: 1 JAN 2017</p>
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### 3.6 EQUIPMENT CONNECTION IDENTIFICATION

- A. Products:
  - 1. Nameplates and signs
- B. Provide identification for hard wired electrical connections to equipment such as disconnects switches, starters, etc. Plug and cord type connections do not require this specific label.
- C. Identification shall be provided for all connections to equipment furnished by this Contractor, other contractors, or the Owner.
- D. Labeling shall include:
  - 1. Equipment type and contract documents designation of equipment being served
  - 2. Location of equipment being served if it is not located within sight.
  - 3. Voltage and rating of the equipment.
  - 4. Panel and circuit numbers(s) serving the equipment
  - 5. Available fault current; refer to one-line diagram or panel schedule of panel serving equipment.

6. Date of fault current study; refer to one-line diagram

UNIT HEATER UH-1  
("LOCATED IN STORAGE ROOM 200")  
480V: 3-PHASE  
FED FROM "1HA1-1"  
22,000 AMPS AVAILABLE FAULT CURRENT  
DATE OF STUDY: 1 JAN 2017

**END OF SECTION 260553**



**LIMITED ASBESTOS AND LEAD SURVEY**  
Replace Roof Systems, Multiple Assets  
Farmington Correctional Center  
1012 West Columbia Street, Farmington, MO  
Project No. C1922-01  
April 16-17, 2019

# LIMITED ASBESTOS AND LEAD SURVEY

**Farmington Correctional Center**  
1012 West Columbia Street  
Farmington, MO

for

**L2e Solutions**  
1834 Kennett Place  
St. Louis, MO 63104

Survey Dates:  
April 16 and 17, 2019



## Introduction

John A. Jurgiel & Associates, Inc. conducted a limited asbestos and lead-based paint identification survey of the existing roofs and associated structures on seven buildings at the Farmington Correctional Center located at 1012 West Columbia Street in Farmington, Missouri. The seven buildings included the Medical Building #16, Food Service Building #17 A-side, Education Building #18, Library Building #19, Boot Camp Building #31, Chapel Building #32 B-side and Warehouse Building #33 B-side. This survey was conducted for the Schematic Design (SD) submittal phase for the Replace Roof Systems, Multiple Assets (State of Missouri Project No. C1916-01). The principal contact for this project was Elaine Lewis of L2e Solutions.

The limited asbestos and lead field survey was conducted by Kevin Obermiller and Rob Jurgiel, both Missouri-licensed Asbestos Inspectors, on April 16 and 17, 2019. The limited lead survey was conducted by Kevin Obermiller, a Missouri-licensed Lead Risk Assessor, on April 16 and 17, 2019.

This report summarizes the asbestos and lead-related issues identified with this project. The sampling results have been summarized in Tables 1 & 2, with the laboratory analytical report and sample chain of custody contained in Appendix A.

## Inspection Procedures

The limited inspection was conducted using the following procedures:

The limited asbestos survey was based on a review of the original building roof drawings and field inspections of the impacted areas. Asbestos bulk samples were collected of suspect building materials that were accessible and exposed. All sampling procedures were conducted using guidelines established by the EPA. Bulk samples were analyzed by Polarized Light Microscopy (PLM) with Dispersion Staining using EPA/600/R-93/116 methods at EMSL Analytical, Inc., a laboratory accredited by the American Industrial Hygiene Association (AIHA) and the National Voluntary Laboratory Accreditation Program (NVLAP). The samples were analyzed using the positive stop method, wherein, analysis of subsequent samples in a homogenous sample set is terminated if one of the samples in the set tests positive for asbestos. Materials are considered asbestos-containing (ACM) if one or more samples collected from the homogeneous area contains more than 1% asbestos. Typically, three samples were collected of each homogenous material. For small quantities or confirmation of previously assessed building materials, one or two samples were collected to confirm or verify previous assumptions.

The lead survey was conducted using a Heuresis Pb200i portable X-ray Fluorescence Spectrometer (XRF) direct-reading instrument by a Missouri-licensed Lead Inspector / Risk Assessor. A level of 1.0 milligram per square centimeter ( $\text{mg}/\text{cm}^2$ ), or greater, is considered lead-containing paint, in accordance with the US Department of Housing and Urban Development (HUD). It should be noted that the Occupational Safety and Health Administration (OSHA) does not recognize a threshold value for this testing method, due to the continued potential for lead exposure. In addition, actual lead exposure may vary significantly depending upon the specific task, procedure, and other work area conditions. Proper OSHA compliance is considered performance-based and includes evaluating potential worker exposures with air monitoring and biological exposure monitoring, if required.



## Limited Inspection Results

### Asbestos Results

Based on the field inspection, 24 suspect asbestos-containing materials were observed and sampled. The sampled materials included roofing systems and flashing, caulking, window glazing, gutter insulation, sealant and seam patching and decorative stone inserts. The suspect materials, which were similar in general appearance and age of construction, were grouped into homogeneous material sets and sampled. The actual metal and wood roofing structural components for each respective building was not considered suspect for asbestos and therefore not sampled. It should be noted that one verification sample of gutter seam patching was collected from Building #18. Due to the quantity of material observed, only one verification sample of the patching was collected. It should also be noted that not all existing dormers for the seven buildings were accessible to be inspected and sampled due to their height and distance from where a hydraulic lift could be located and the facility security requirements. More thorough inspections of these dormers are recommended before renovation and demolition activities commence. The sample descriptions, collection locations and laboratory results have been summarized in Table 1.

Only one material tested positive for asbestos, the window glazing debris (GD-1). This window glazing contained 3% Chrysotile asbestos. This material was found on the Building 17, Middle South Metal Roof, North area, near the adjacent window units where the glazing originated. This window glazing contained 3% Chrysotile. All impacted ACM within the project limits should be removed by a Missouri-licensed Asbestos Abatement Contractor in accordance with all federal, state and local regulations.

### Lead Results

Testing locations and XRF results are contained in Table 2. A total of 69 XRF measurements, including 8 measurements for QA/QC purposes, were collected from painted surfaces and/or suspect lead-containing materials throughout the project boundaries. As mentioned before, not all dormers were accessible to be inspected and sampled. More thorough inspections of these dormers are recommended before renovation and demolition activities commence. For this project, it should be assumed that all dormer units and associated building components contain lead-based paint. A total of 30 measurements from the inspection had results identifying lead-based paint or lead-containing materials, as summarized below:

- Building 33, white colored paint on Southeast Wood Roof Overhang Support, Overhang Trim, Overhang (Soffit), Soffit Frame (Measurements 5-8).
- Building 33, white colored paint on East Wood Overhang Support, Soffit, Overhang Trim, Overhang Frame (Measurements 11-14).
- Building 33, white colored paint on South Dormer Wood Window Frame, Window, Dormer Trim, Dormer Facia, Dormer Decorative Stone (Measurements 16-19, 21).
- Building 32, white colored paint on West Metal Gutter, Wood Roof Trim, Wood Decorative Trim, Wood Trim and Wood Block-shaped Trim (Measurements 22, 24, 27-29).
- Building 32, West Bump out Roof, white colored paint on West Metal Railing, Wood Trough Frame, Wood Trough, Wood Trough Frame Bottom (Measurements 31, 32, 34, 35).



## LIMITED ASBESTOS AND LEAD SURVEY

Replace Roof Systems, Multiple Assets  
Farmington Correctional Center  
1012 West Columbia Street, Farmington, MO  
Project No. C1922-01  
April 16-17, 2019

- Building 31, white colored paint on West Wood Overhang Support, Overhang Trim, Overhang molding and Overhang (Soffit) (Measurements 38-41).
- Building 18, white colored paint on South Wood Molding Trim, Wood Block Molding and Wood Curved Molding (Measurements 50-52).
- Building 17, gray colored Metal Plumbing Vent Pipe on West Roof (Measurement 56).

All identified lead-containing materials directly impacted by the renovation work should be removed inside a regulated area in accordance with all federal, state and local regulations. This lead abatement work should be coordinated with the asbestos abatement to minimize the number of containments or regulated areas required.

## Limitations

Jurgiel & Associates has attempted to observe the existing conditions of the aforementioned area utilizing generally accepted procedures. Because of the hidden nature of many building components (i.e., within mechanical chases, above permanent ceilings, behind walls, etc.) and the unknown renovation history of the building, it may be impossible to determine if all the suspect building materials have been located and subsequently tested. Destructive inspection and testing in some instances was not a viable option. We cannot, therefore, guarantee that all potential asbestos or lead containing materials have been located. For the same reasons, estimates of quantities and/or conditions are subject to readily apparent situations, and our findings reflect this situation.

Other asbestos or lead containing materials may exist in unsurveyed or inaccessible areas, such as behind walls, underneath ceramic tiles, above permanent ceilings, inside mechanical systems, inside electrical/transmission cabinets, etc. Any materials found during construction activities similar to the materials identified in this survey report should be assumed to be asbestos containing. All assumptions made during this inspection need to be verified prior to any renovations or demolition that may impact these materials. In addition, the condition of the material may change gradually or suddenly depending upon use, maintenance or accidental damage. The findings in this report were indicative of conditions on the date of this inspection and should not be relied upon to represent conditions at substantially later dates.

Although extremely rare, asbestos cement panels, commonly referred to as Transite, have been found in various locations not typically associated with this type of material, such as underlayment, window coverings, roofing shingles, etc. Every attempt has been made to locate any and all materials, however, these non-typical applications may have been overlooked or inaccessible for observation.

The information contained in this report was prepared based upon specific parameters and regulations in force at the time of this report. The information herein is only for the specific use of the Client and Jurgiel & Associates.

**TABLE 1**  
 Asbestos Bulk Sample Results (PLM)

Homogeneous Material ID	Material Description	Sample No.	Location	Asbestos Content
BMP-1	<b>Flashing Patch</b> Black color	BMP-1a	Building 17: Exterior, Middle South Flat Metal Roof Unit, East HVAC Unit	No Asbestos Detected
		BMP-1b	Building 17: Exterior, Middle South Flat Metal Roof Unit, East HVAC Unit	No Asbestos Detected
		BMP-1c	Building 17: Exterior, Middle South Flat Metal Roof Unit, East HVAC Unit	No Asbestos Detected
CD-1	<b>Window Caulk Debris</b> White and gray color	CD-1a	Building 17: Exterior, Middle South Flat Metal Roof, North Area by Windows	No Asbestos Detected
		CD-1b	Building 17: Exterior, Middle South Flat Metal Roof, North Area by Windows	No Asbestos Detected
		CD-1c	Building 17: Exterior, Middle South Flat Metal Roof, North Area by Windows	No Asbestos Detected
CK-1	<b>Seam Caulking</b> White and gray color	CK-1a	Building 17: Exterior, Middle South Flat Metal Roof Unit, North Area	No Asbestos Detected
		CK-1b	Building 17: Exterior, Middle South Flat Metal Roof Unit, North Area	No Asbestos Detected
		CK-1c	Building 17: Exterior, Middle South Flat Metal Roof Unit, North Area	No Asbestos Detected

**TABLE 1 (Continued)**  
 Asbestos Bulk Sample Results (PLM)

Homogeneous Material ID	Material Description	Sample No.	Location	Asbestos Content
DS-1	<b>Decorative Stone Inserts</b> White color	DS-1a	Building 33: Exterior South Façade Window Unit	No Asbestos Detected
		DS-1b	Building 33: Exterior South Façade Window Unit	No Asbestos Detected
		DS-1c	Building 33: Exterior South Façade Window Unit	No Asbestos Detected
GD-1	<b>Window Glazing Debris</b> White and gray color	GD-1a	Building 17, Exterior Middle South Flat Metal Roof Unit, North Area by Windows	<b>3% Chrysotile</b>
		GD-1b	Building 17, Exterior Middle South Flat Metal Roof Unit, North Area by Windows	Sample Not Analyzed
		GD-1c	Building 17, Exterior Middle South Flat Metal Roof Unit, North Area by Windows	Sample Not Analyzed
GI-1	<b>Gutter Insulation Matrix Patch</b> White color	GI-1a	Building 33: Exterior Roof Façade, West Middle	No Asbestos Detected
		GI-1b	Building 33: Exterior Roof Façade, West Middle	No Asbestos Detected
		GI-1c	Building 33: Exterior Roof Façade, West Middle	No Asbestos Detected



**TABLE 1 (Continued)**  
 Asbestos Bulk Sample Results (PLM)

Homogeneous Material ID	Material Description	Sample No.	Location	Asbestos Content
GS-1	<b>Gutter Seam Sealant</b> Gray color	GS-1a	Building 16: Exterior Roof System	No Asbestos Detected
		GS-1b	Building 16: Exterior Roof System	No Asbestos Detected
		GS-1c	Building 16: Exterior Roof System	No Asbestos Detected
GSP-1	<b>Gutter Seam Sealant Patch</b> (Verification Sample Only) Gray color	GSP-1a	Building 18: Exterior Roof System, SW Peak on Gutters	No Asbestos Detected
RC-1	<b>Roofing Caulk</b> Black color	RC-1a	Building 32: Exterior West Façade Bump out	No Asbestos Detected
		RC-1b	Building 32: Exterior West Façade Bump out	No Asbestos Detected
		RC-1c	Building 32: Exterior West Façade Bump out	No Asbestos Detected
RF-1	<b>Roof Flashing</b> Black color	RF-1a	Building 32: Exterior Roof, West Façade Bump out	No Asbestos Detected
		RF-1b	Building 32: Exterior Roof, West Façade Bump out	No Asbestos Detected
		RF-1c	Building 32: Exterior Roof, West Façade Bump out	No Asbestos Detected

**TABLE 1 (Continued)**  
 Asbestos Bulk Sample Results (PLM)

Homogeneous Material ID	Material Description	Sample No.	Location	Asbestos Content
RF-2	<b>Roof Flashing</b> Black color	RF-2a	Building 17: Exterior Roof, Middle, South Flat Metal Roof Unit, North	White Flashing: No Asbestos Detected Flashing: No Asbestos Detected
		RF-2b	Building 17: Exterior Roof, Middle, South Flat Metal Roof Unit, North	White Flashing: No Asbestos Detected Flashing: No Asbestos Detected
		RF-2c	Building 17: Exterior Roof, Middle, South Flat Metal Roof Unit, Middle	Black Flashing: No Asbestos Detected
RF-3	<b>Roof Flashing</b> Gray color	RF-3a	Building 17: Exterior Roof, Middle, South Flat Metal Roof Unit, North	No Asbestos Detected
		RF-3b	Building 17: Exterior Roof, Middle, South Flat Metal Roof Unit, North	Flashing: No Asbestos Detected
		RF-3c	Building 17: Exterior Roof, Middle, South Flat Metal Roof Unit, North	Black Flashing: No Asbestos Detected Gray Flashing: No Asbestos Detected
RRS-1	<b>Asphaltic Shingles</b> Black colored	RRS-1a	Building 17: Exterior, Middle South Flat Metal Roof, North Raised Roof Structure	No Asbestos Detected
		RRS-1b	Building 17: Exterior, Middle South Flat Metal Roof, North Raised Roof Structure	No Asbestos Detected
		RRS-1c	Building 17: Exterior, Middle South Flat Metal Roof, North Raised Roof Structure	Shingle: No Asbestos Detected Black Flashing: No Asbestos Detected

**TABLE 1 (Continued)**  
 Asbestos Bulk Sample Results (PLM)

Homogeneous Material ID	Material Description	Sample No.	Location	Asbestos Content	
RRS-2	<b>Asphaltic Shingles</b> Black colored	RRS-2a	Building 17: Exterior, Middle South Flat Metal Roof, Northwest Raised Roof Structure	Flashing:	No Asbestos Detected
				Shingle:	No Asbestos Detected
		RRS-2b	Building 17: Exterior, Middle South Flat Metal Roof, Northwest Raised Roof Structure	Flashing:	No Asbestos Detected
				Shingle:	No Asbestos Detected
		RRS-2c	Building 17: Exterior, Middle South Flat Metal Roof, Northwest Raised Roof Structure	Flashing:	No Asbestos Detected
				Shingle:	No Asbestos Detected
RS-1	<b>Roof Shingle Matrix</b> Black and gray colored	RS-1a	Building 33: Southeast Façade Exterior Roof	Shingle:	No Asbestos Detected
				Shingle:	No Asbestos Detected
		RS-1b	Building 33: Southeast Façade Exterior Roof	Shingle:	No Asbestos Detected
				Shingle:	No Asbestos Detected
		RS-1c	Building 33: East Façade, Middle	Shingle:	No Asbestos Detected
				Shingle:	No Asbestos Detected
RS-2	<b>Roof Shingle Matrix</b> Black and gray colored	RS-2a	Building 32: Exterior Roof, West Middle Facade	Shingle:	No Asbestos Detected
				Shingle:	No Asbestos Detected
		RS-2b	Building 32: Exterior Roof, West Middle Facade	Shingle:	No Asbestos Detected
				Shingle:	No Asbestos Detected
		RS-2c	Building 32: Exterior Roof, West Middle Facade	Shingle:	No Asbestos Detected
				Shingle:	No Asbestos Detected

**TABLE 1 (Continued)**  
 Asbestos Bulk Sample Results (PLM)

Homogeneous Material ID	Material Description	Sample No.	Location	Asbestos Content	
RS-3	<b>Roof Shingle Matrix</b> Black and gray colored	RS-3a	Building 31: Exterior Roof, West Facade	Shingle:	No Asbestos Detected
		RS-3b	Building 31: Exterior Roof, West Facade	Shingle:	No Asbestos Detected
		RS-3c	Building 31: Exterior Roof, West Facade	Shingle:	No Asbestos Detected
RS-4	<b>Roof Shingle Matrix</b> Black and gray colored	RS-4a	Building 19: Exterior Roof, Northwest Section	Shingle:	No Asbestos Detected
		RS-4b	Building 19: Exterior Roof, Northwest Section	Shingle:	No Asbestos Detected
		RS-4c	Building 19: Exterior Roof, Northwest Section	Shingle:	No Asbestos Detected
RS-5	<b>Roof Shingle Matrix</b> Black and gray colored	RS-5a	Building 18: Exterior Roof, Southwest Peak	Shingle:	No Asbestos Detected
		RS-5b	Building 18: Exterior Roof, Southwest Peak	Shingle:	No Asbestos Detected
		RS-5c	Building 18: Exterior Roof, Southwest Peak	Shingle:	No Asbestos Detected

**TABLE 1 (Continued)**  
 Asbestos Bulk Sample Results (PLM)

Homogeneous Material ID	Material Description	Sample No.	Location	Asbestos Content	
RS-6	<b>Roof Shingle Matrix</b> Black and gray colored	RS-6a	Building 17: Exterior Roof, Southwest Peak	Shingle:	No Asbestos Detected
		RS-6b	Building 17: Exterior Roof, Southwest Peak	Shingle:	No Asbestos Detected
		RS-6c	Building 17: Exterior Roof, Southwest Peak	Shingle:	No Asbestos Detected
RS-7	<b>Roof Shingle Matrix</b> Black and gray colored	RS-7a	Building 16: Exterior Roof, Southwest Peak	Shingle:	No Asbestos Detected
		RS-7b	Building 16: Exterior Roof, Southwest Peak	Shingle:	No Asbestos Detected
		RS-7c	Building 16: Exterior Roof, Southwest Peak	Shingle:	No Asbestos Detected

**TABLE 1 (Continued)**  
 Asbestos Bulk Sample Results (PLM)

Homogeneous Material ID	Material Description	Sample No.	Location	Asbestos Content
WC-1	<b>Exterior Window Caulk</b> White colored	WC-1a	Building 33: Exterior, South Roof Window Unit	No Asbestos Detected
		WC-1b	Building 33: Exterior, South Roof Window Unit	No Asbestos Detected
		WC-1c	Building 33: Exterior, South Roof Window Unit	No Asbestos Detected
WG-1	<b>Window Glazing</b> White colored	WG-1a	Building 33: South Façade, 3 <sup>rd</sup> Level Window	No Asbestos Detected
		WG-1b	Building 33: South Façade, 3 <sup>rd</sup> Level Window	No Asbestos Detected
		WG-1c	Building 33: South Façade, 3 <sup>rd</sup> Level Window	No Asbestos Detected
WG-2	<b>Window Glazing</b> White colored	WG-2a	Building 32: Exterior Roof, West Bump out Membrane Rubber Roof	No Asbestos Detected
		WG-2b	Building 32: Exterior Roof, West Bump out Membrane Rubber Roof	No Asbestos Detected
		WG-2c	Building 32: Exterior Roof, West Bump out Membrane Rubber Roof	No Asbestos Detected

**TABLE 2**  
 Lead (XRF) Results

NO	LOCATION	SIDE	SUBSTRATE	COLOR	RESULTS (mg/cm <sup>2</sup> )			
						+/-		
1	Calibration Standard 1.04 +/- 0.06	--	--	--	Positive	1	+/-	0.2
2	Calibration Standard 1.04 +/- 0.06	--	--	--	Positive	1	+/-	0.2
3	Exterior, Building 33 Roof System, Downspout	SE	Metal	White	Negative	0.1	+/-	0.3
4	Exterior, Building 33 Roof System, Downspout	SE	Metal	White	Negative	0	+/-	0.3
5	Exterior, Building 33 Roof System, Overhang Support	SE	Wood	White	Positive	31	+/-	0
6	Exterior, Building 33 Roof System, Overhang Trim	SE	Wood	White	Positive	4.8	+/-	0.3
7	Exterior, Building 33 Roof System, Overhang	SE	Wood	White	Positive	26.3	+/-	0.3
8	Exterior, Building 33 Roof System, Frame	SE	Wood	White	Positive	30	+/-	0
9	Exterior, Building 33 Roof System, Gutter	SE	Metal	White	Negative	0	+/-	0.3
10	Exterior, Building 33 Roof System, Downspout	E	Metal	White	Negative	0.1	+/-	0.3
11	Exterior, Building 33 Roof System, Overhang Support	E	Wood	White	Positive	37	+/-	0
12	Exterior, Building 33 Roof System, Soffit	E	Wood	White	Positive	12.2	+/-	0.3
13	Exterior, Building 33 Roof System, Trim	E	Wood	White	Positive	8.1	+/-	0.3
14	Exterior, Building 33 Roof System, Frame	E	Wood	White	Positive	31	+/-	0
15	Exterior, Building 33 Roof System, Gutter	E	Metal	White	Negative	0.1	+/-	0.3
16	Exterior, Building 33 Roof System, Window frame	S	Wood	White	Positive	6.6	+/-	0.3
17	Exterior, Building 33 Roof System, Window	S	Wood	White	Positive	32	+/-	0
18	Exterior, Building 33 Roof System, Trim	S	Wood	White	Positive	29.4	+/-	0.3
19	Exterior, Building 33 Roof System, Facia	S	Wood	White	Positive	2.6	+/-	0.3
20	Exterior, Building 33 Roof System, Decorative Plate	S	Stone	White	Negative	0.3	+/-	0.3
21	Exterior, Building 33 Roof System, Decorative Plate	S	Stone	White	Positive	1	+/-	0.2
22	Exterior, Building 32 Roof System, Gutter	W	Metal	White	Positive	28.5	+/-	0.3
23	Exterior, Building 32 Roof System, Gutter	W	Metal	White	Negative	0.6	+/-	0.3
24	Exterior, Building 32 Roof System, Trim	W	Wood	White	Positive	16.1	+/-	0.3
25	Exterior, Building 32 Roof System, Downspout	W	Metal	White	Negative	0.1	+/-	0.3
26	Exterior, Building 32 Roof System, Facia	W	Wood	White	Negative	0.9	+/-	0.2
27	Exterior, Building 32 Roof System, Decorative Trim	W	Wood	White	Positive	11.8	+/-	0.3
28	Exterior, Building 32 Roof System, Trim	W	Wood	White	Positive	18.7	+/-	0.3
29	Exterior, Building 32 Roof System, Trim	W	Wood	White	Positive	36	+/-	0
30	Exterior, Building 32 Roof System, Molding	W	Wood	White	Negative	0.2	+/-	0.3
31	Exterior, Building 32 West Bump out, Trim	W	Metal	White	Positive	5.4	+/-	0.3
32	Exterior, Building 32 West Bump out, Trough Frame	W	Wood	White	Positive	2.8	+/-	0.3
33	Exterior, Building 32 West Bump out, Trough Trim	W	Wood	White	Negative	0.6	+/-	0.3
34	Exterior, Building 32 West Bump out, Trough	W	Wood	White	Positive	38	+/-	0
35	Exterior, Building 32 West Bump out, Frame Bottom	W	Wood	White	Positive	6.1	+/-	0.3
36	Exterior, Building 31 Roof System, Gutter	W	Metal	White	Negative	0.1	+/-	0.3
37	Exterior, Building 31 Roof System, Downspout	W	Metal	White	Negative	0.2	+/-	0.3
38	Exterior, Building 31 Roof System, Overhang Support	W	Wood	White	Positive	37	+/-	0
39	Exterior, Building 31 Roof System, Overhang Trim	W	Wood	White	Positive	35	+/-	0
40	Exterior, Building 31 Roof System, Molding	W	Wood	White	Positive	31	+/-	0
41	Exterior, Building 31 Roof System, Overhang	W	Wood	White	Positive	33	+/-	0
42	Exterior, Building 19 Roof System, Gutter	W	Metal	White	Negative	0.1	+/-	0.3
43	Exterior, Building 19 Roof System, Trim	W	Wood	White	Negative	-0.1	+/-	0.3
44	Exterior, Building 19 Roof System, Facia	W	Wood	White	Negative	0.1	+/-	0.3
45	Exterior, Building 19 Roof System, Facia	W	Wood	White	Negative	0.2	+/-	0.3



**TABLE 2 (Continued)**  
 Lead (XRF) Results

NO	LOCATION	SIDE	SUBSTRATE	COLOR	RESULTS (mg/cm <sup>2</sup> )			
					Positive	+/-	0.2	
46	Calibration Standard 1.04 +/- 0.06	--	--	--	Positive	1	+/-	0.2
47	Calibration Standard 1.04 +/- 0.06	--	--	--	Positive	1.1	+/-	0.2
48	Calibration Standard <0.001	--	--	--	Negative	0	+/-	0.3
49	Exterior, Building 18 Roof System, Gutter	S	Metal	White	Negative	0.1	+/-	0.3
50	<b>Exterior, Building 18 Roof System, Molding Trim</b>	<b>S</b>	<b>Wood</b>	<b>White</b>	<b>Positive</b>	<b>9.9</b>	<b>+/-</b>	<b>0.3</b>
51	<b>Exterior, Building 18 Roof System, Block Molding</b>	<b>S</b>	<b>Wood</b>	<b>White</b>	<b>Positive</b>	<b>9.8</b>	<b>+/-</b>	<b>0.3</b>
52	<b>Exterior, Building 18 Roof System, Curve Molding</b>	<b>S</b>	<b>Wood</b>	<b>White</b>	<b>Positive</b>	<b>11.3</b>	<b>+/-</b>	<b>0.3</b>
53	Exterior, Building 18 Roof System, Downspout	S	Metal	White	Negative	0	+/-	0.3
54	Exterior, Building 17 Roof System, Gutter	W	Metal	White	Negative	0.1	+/-	0.3
55	Exterior, Building 17 Roof System, Downspout	W	Metal	White	Negative	0.1	+/-	0.3
56	<b>Exterior, Building 17 Roof System, Vent Pipe</b>	<b>W</b>	<b>Metal</b>	<b>White</b>	<b>Positive</b>	<b>62</b>	<b>+/-</b>	<b>0</b>
57	Exterior, Building 17 Roof System, Facia	W	Wood	White	Negative	-0.1	+/-	0.3
58	Exterior, Building 17 Roof System, Overhang	W	Wood	White	Negative	0	+/-	0.3
59	Exterior, Building 17 Roof System, Molding	W	Wood	White	Negative	0.1	+/-	0.3
60	Exterior, Building 17 Roof System, Frame	W	Wood	White	Negative	0.1	+/-	0.3
61	Exterior, Building 17 Roof System, Decorative Trim	W	Wood	White	Negative	0	+/-	0.3
62	Exterior, Building 17 Roof System, Bottom Frame	W	Wood	White	Negative	0	+/-	0.3
63	Exterior, Building 16 Roof System, Gutter	W	Metal	White	Negative	0.1	+/-	0.3
64	Exterior, Building 16 Roof System, Downspout	W	Metal	White	Negative	0.1	+/-	0.3
65	Exterior, Building 16 Roof System, Top Trim	W	Wood	White	Negative	-0.1	+/-	0.3
66	Exterior, Building 16 Roof System, Frame	W	Wood	White	Negative	-0.1	+/-	0.3
67	Calibration Standard 1.04 +/- 0.06	--	--	--	Positive	1	+/-	0.2
68	Calibration Standard 1.04 +/- 0.06	--	--	--	Positive	1	+/-	0.2
69	Calibration Standard <0.001	--	--	--	Negative	0	+/-	0.3



## APPENDIX A: LABORATORY ANALYTICAL REPORTS



# EMSL Analytical, Inc.

3029 S. Jefferson Saint Louis, MO 63118

Tel/Fax: (314) 577-0150 / (314) 776-3313

<http://www.EMSL.com> / [saintlouislab@emsl.com](mailto:saintlouislab@emsl.com)

EMSL Order: 391903837

Customer ID: JOHN49

Customer PO:

Project ID:

**Attention:** Kevin Obermiller  
John A. Jurgiel & Associates  
123 North Main Street  
Saint Charles, MO 63301

**Phone:** (314) 280-6036

**Fax:** (636) 757-3064

**Received Date:** 04/18/2019 9:05 AM

**Analysis Date:** 04/28/2019 - 04/29/2019

**Collected Date:**

**Project:** L2e Farmington Houses

## Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
RS-1a-Shingle <small>391903837-0001</small>	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	31% Glass	69% Non-fibrous (Other)	None Detected
RS-1a-Shingle <small>391903837-0001A</small>	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	32% Glass	68% Non-fibrous (Other)	None Detected
RS-1b-Shingle <small>391903837-0002</small>	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	32% Glass	68% Non-fibrous (Other)	None Detected
RS-1b-Shingle <small>391903837-0002A</small>	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	29% Glass	71% Non-fibrous (Other)	None Detected
RS-1c-Shingle <small>391903837-0003</small>	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	22% Glass	78% Non-fibrous (Other)	None Detected
RS-1c-Shingle <small>391903837-0003A</small>	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	18% Glass	82% Non-fibrous (Other)	None Detected
RS-2a-Shingle <small>391903837-0004</small>	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	29% Glass	71% Non-fibrous (Other)	None Detected
RS-2a-Shingle <small>391903837-0004A</small>	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	30% Glass	70% Non-fibrous (Other)	None Detected
RS-2b-Shingle <small>391903837-0005</small>	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	30% Glass	70% Non-fibrous (Other)	None Detected
RS-2b-Shingle <small>391903837-0005A</small>	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	31% Glass	69% Non-fibrous (Other)	None Detected
RS-2c-Shingle <small>391903837-0006</small>	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	20% Glass	80% Non-fibrous (Other)	None Detected
RS-2c-Shingle <small>391903837-0006A</small>	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	20% Glass	80% Non-fibrous (Other)	None Detected
RS-3a-Shingle <small>391903837-0007</small>	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	31% Glass	69% Non-fibrous (Other)	None Detected
RS-3a-Shingle <small>391903837-0007A</small>	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	32% Glass	68% Non-fibrous (Other)	None Detected
RS-3b-Shingle <small>391903837-0008</small>	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	32% Glass	68% Non-fibrous (Other)	None Detected
RS-3b-Shingle <small>391903837-0008A</small>	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	29% Glass	71% Non-fibrous (Other)	None Detected

Initial report from: 04/29/2019 14:57:59



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<http://www.EMSL.com> / [saintlouislab@emsl.com](mailto:saintlouislab@emsl.com)

**EMSL Order:** 391903837  
**Customer ID:** JOHN49  
**Customer PO:**  
**Project ID:**

## Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
RS-3c-Shingle 391903837-0009	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	18% Glass	82% Non-fibrous (Other)	None Detected
RS-3c-Shingle 391903837-0009A	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	20% Glass	80% Non-fibrous (Other)	None Detected
RS-4a-Shingle 391903837-0010	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	29% Glass	71% Non-fibrous (Other)	None Detected
RS-4a-Shingle 391903837-0010A	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	30% Glass	70% Non-fibrous (Other)	None Detected
RS-4b-Shingle 391903837-0011	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	30% Glass	70% Non-fibrous (Other)	None Detected
RS-4b-Shingle 391903837-0011A	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	31% Glass	69% Non-fibrous (Other)	None Detected
RS-4c-Shingle 391903837-0012	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	20% Glass	80% Non-fibrous (Other)	None Detected
RS-4c-Shingle 391903837-0012A	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	22% Glass	78% Non-fibrous (Other)	None Detected
RS-5a-Shingle 391903837-0013	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	31% Glass	69% Non-fibrous (Other)	None Detected
RS-5a-Shingle 391903837-0013A	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	32% Glass	68% Non-fibrous (Other)	None Detected
RS-5b-Shingle 391903837-0014	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	32% Glass	68% Non-fibrous (Other)	None Detected
RS-5b-Shingle 391903837-0014A	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	29% Glass	71% Non-fibrous (Other)	None Detected
RS-5c-Shingle 391903837-0015	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	22% Glass	78% Non-fibrous (Other)	None Detected
RS-5c-Shingle 391903837-0015A	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	20% Glass	80% Non-fibrous (Other)	None Detected
RS-6a-Shingle 391903837-0016	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	29% Glass	71% Non-fibrous (Other)	None Detected
RS-6a-Shingle 391903837-0016A	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	30% Glass	70% Non-fibrous (Other)	None Detected
RS-6a-Shingle 391903837-0016B	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	26% Cellulose	74% Non-fibrous (Other)	None Detected
RS-6b-Shingle 391903837-0017	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	30% Glass	70% Non-fibrous (Other)	None Detected
RS-6b-Shingle 391903837-0017A	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	31% Glass	69% Non-fibrous (Other)	None Detected

Initial report from: 04/29/2019 14:57:59



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EMSL Order: 391903837

Customer ID: JOHN49

Customer PO:

Project ID:

## Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
RS-6b-Shingle 391903837-0017B	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	27% Cellulose	73% Non-fibrous (Other)	None Detected
RS-6c-Shingle 391903837-0018	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	20% Glass	80% Non-fibrous (Other)	None Detected
RS-6c-Shingle 391903837-0018A	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	25% Glass	75% Non-fibrous (Other)	None Detected
RS-7a-Shingle 391903837-0019	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	31% Glass	69% Non-fibrous (Other)	None Detected
RS-7a-Shingle 391903837-0019A	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	32% Glass	68% Non-fibrous (Other)	None Detected
RS-7a-Shingle 391903837-0019B	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	28% Cellulose	72% Non-fibrous (Other)	None Detected
RS-7b-Shingle 391903837-0020	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	32% Glass	68% Non-fibrous (Other)	None Detected
RS-7b-Shingle 391903837-0020A	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	29% Glass	71% Non-fibrous (Other)	None Detected
RS-7b-Shingle 391903837-0020B	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	29% Cellulose	71% Non-fibrous (Other)	None Detected
RS-7c-Shingle 391903837-0021	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	22% Glass	78% Non-fibrous (Other)	None Detected
RS-7c-Shingle 391903837-0021A	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	20% Glass	80% Non-fibrous (Other)	None Detected
RS-7c-Shingle 391903837-0021B	Roof Shingle Matrix	Various Non-Fibrous Heterogeneous	20% Glass	80% Non-fibrous (Other)	None Detected
WG-1a 391903837-0022 <i>Inseparable coating layer included in analysis.</i>	Window Glazing	Various Non-Fibrous Heterogeneous		100% Non-fibrous (Other)	None Detected
WG-1b 391903837-0023 <i>Inseparable coating layer included in analysis.</i>	Window Glazing	Various Non-Fibrous Heterogeneous		100% Non-fibrous (Other)	None Detected
WG-1c 391903837-0024	Window Glazing	Various Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
WC-1a 391903837-0025 <i>Inseparable coating layer included in analysis.</i>	Window Caulk	Various Non-Fibrous Heterogeneous		100% Non-fibrous (Other)	None Detected
WC-1b 391903837-0026 <i>Inseparable coating layer included in analysis.</i>	Window Caulk	Various Non-Fibrous Heterogeneous		100% Non-fibrous (Other)	None Detected

Initial report from: 04/29/2019 14:57:59



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**EMSL Order:** 391903837  
**Customer ID:** JOHN49  
**Customer PO:**  
**Project ID:**

## Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
WC-1c <small>391903837-0027</small> <i>Inseparable coating layer included in analysis.</i>	Window Caulk	Various Non-Fibrous Heterogeneous		100% Non-fibrous (Other)	None Detected
DS-1a <small>391903837-0028</small>	Decorative Stone	Various Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
DS-1b <small>391903837-0029</small>	Decorative Stone	Various Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
DS-1c <small>391903837-0030</small>	Decorative Stone	Various Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
RF-1a <small>391903837-0031</small>	Roof Flashing	Various Non-Fibrous Homogeneous	3% Cellulose	97% Non-fibrous (Other)	None Detected
RF-1b <small>391903837-0032</small>	Roof Flashing	Various Non-Fibrous Homogeneous	4% Cellulose	96% Non-fibrous (Other)	None Detected
RF-1c <small>391903837-0033</small>	Roof Flashing	Black Non-Fibrous Homogeneous	5% Cellulose	95% Non-fibrous (Other)	None Detected
GI-1a-Insulation <small>391903837-0034</small> <i>Inseparable coating layer included in analysis.</i>	Gutter Insulation	Various Non-Fibrous Heterogeneous		100% Non-fibrous (Other)	None Detected
GI-1a-Insulation <small>391903837-0034A</small>	Gutter Insulation	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
GI-1b-Insulation <small>391903837-0035</small> <i>Inseparable coating layer included in analysis.</i>	Gutter Insulation	Various Non-Fibrous Heterogeneous		100% Non-fibrous (Other)	None Detected
GI-1b-Insulation <small>391903837-0035A</small>	Gutter Insulation	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
GI-1c-Insulation <small>391903837-0036</small>	Gutter Insulation	Various Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
GI-1c-Insulation <small>391903837-0036A</small>	Gutter Insulation	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
RC-1a-Caulk <small>391903837-0037</small>	Roof Caulk	Pink Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
RC-1a-Caulk <small>391903837-0037A</small>	Roof Caulk	Brown Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
RC-1b-Caulk <small>391903837-0038</small>	Roof Caulk	Pink Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
RC-1b-Caulk <small>391903837-0038A</small>	Roof Caulk	Brown Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
RC-1c <small>391903837-0039</small>	Roof Caulk	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

Initial report from: 04/29/2019 14:57:59



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EMSL Order: 391903837

Customer ID: JOHN49

Customer PO:

Project ID:

## Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
WG-2a <small>391903837-0040</small> <i>Inseparable coating layer included in analysis.</i>	Window Glazing	Various Non-Fibrous Heterogeneous		100% Non-fibrous (Other)	None Detected
WG-2b <small>391903837-0041</small> <i>Inseparable coating layer included in analysis.</i>	Window Glazing	Various Non-Fibrous Heterogeneous		100% Non-fibrous (Other)	None Detected
WG-2c <small>391903837-0042</small> <i>Inseparable coating layer included in analysis.</i>	Window Glazing	Various Non-Fibrous Heterogeneous		100% Non-fibrous (Other)	None Detected
GSP-1a-Patch <small>391903837-0043</small>	Gutter Seam Patch	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
GSP-1a-Patch <small>391903837-0043A</small>	Gutter Seam Patch	Brown Fibrous Homogeneous	100% Fibrous (Other)		None Detected
RF-2a-Flashing <small>391903837-0044</small>	Roof Flashing	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
RF-2a-Flashing <small>391903837-0044A</small>	Roof Flashing	Various Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
RF-2b-Flashing <small>391903837-0045</small>	Roof Flashing	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
RF-2b-Flashing <small>391903837-0045A</small>	Roof Flashing	Various Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
RF-2c <small>391903837-0046</small>	Roof Flashing	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
RF-3a <small>391903837-0047</small>	Roof Flashing	Various Non-Fibrous Homogeneous	5% Cellulose	95% Non-fibrous (Other)	None Detected
RF-3b <small>391903837-0048</small>	Roof Flashing	Various Non-Fibrous Homogeneous	6% Cellulose	94% Non-fibrous (Other)	None Detected
RF-3c-Flashing <small>391903837-0049</small>	Roof Flashing	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
RF-3c-Flashing <small>391903837-0049A</small>	Roof Flashing	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
GD-1a <small>391903837-0050</small>	Glazing Debris	Gray Non-Fibrous Homogeneous		97% Non-fibrous (Other)	3% Chrysotile
GD-1b <small>391903837-0051</small>	Glazing Debris				Positive Stop (Not Analyzed)
GD-1c <small>391903837-0052</small>	Glazing Debris				Positive Stop (Not Analyzed)
CK-1a <small>391903837-0053</small>	Caulk	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

Initial report from: 04/29/2019 14:57:59



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**EMSL Order:** 391903837  
**Customer ID:** JOHN49  
**Customer PO:**  
**Project ID:**

## Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
CK-1b <small>391903837-0054</small>	Caulk	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CK-1c <small>391903837-0055</small> <i>Inseparable coating layer included in analysis.</i>	Caulk	Gray Non-Fibrous Heterogeneous		100% Non-fibrous (Other)	None Detected
BMP-1a <small>391903837-0056</small>	Patch Flashing	Various Non-Fibrous Homogeneous	4% Synthetic	96% Non-fibrous (Other)	None Detected
BMP-1b <small>391903837-0057</small> <i>Other layers present analyzed with other samples in the order.</i>	Patch Flashing	Various Non-Fibrous Homogeneous	5% Synthetic	95% Non-fibrous (Other)	None Detected
BMP-1c <small>391903837-0058</small>	Patch Flashing	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
RRS-1a <small>391903837-0059</small>	Shingle Matrix	Various Non-Fibrous Heterogeneous	19% Synthetic	81% Non-fibrous (Other)	None Detected
RRS-1b <small>391903837-0060</small>	Shingle Matrix	Various Non-Fibrous Heterogeneous	16% Synthetic	84% Non-fibrous (Other)	None Detected
RRS-1c-Shingle <small>391903837-0061</small>	Shingle Matrix	Various Non-Fibrous Heterogeneous	25% Synthetic	75% Non-fibrous (Other)	None Detected
RRS-1c-Flashing <small>391903837-0061A</small>	Shingle Matrix	Black Non-Fibrous Homogeneous	5% Cellulose	95% Non-fibrous (Other)	None Detected
RRS-2a-Flashing <small>391903837-0062</small>	Shingle Matrix	Various Non-Fibrous Homogeneous	4% Cellulose	96% Non-fibrous (Other)	None Detected
RRS-2a-Shingle <small>391903837-0062A</small>	Shingle Matrix	Various Non-Fibrous Heterogeneous	17% Synthetic	83% Non-fibrous (Other)	None Detected
RRS-2b-Flashing <small>391903837-0063</small>	Shingle Matrix	Various Non-Fibrous Homogeneous	5% Cellulose	95% Non-fibrous (Other)	None Detected
RRS-2b-Shingle <small>391903837-0063A</small>	Shingle Matrix	Various Non-Fibrous Heterogeneous	18% Synthetic	82% Non-fibrous (Other)	None Detected
RRS-2c-Flashing <small>391903837-0064</small>	Shingle Matrix	Black Non-Fibrous Homogeneous	5% Cellulose	95% Non-fibrous (Other)	None Detected
RRS-2c-Shingle <small>391903837-0064A</small>	Shingle Matrix	Various Non-Fibrous Heterogeneous	20% Synthetic	80% Non-fibrous (Other)	None Detected
CD-1a <small>391903837-0065</small> <i>Inseparable coating layer included in analysis.</i>	Caulk Debris	Various Non-Fibrous Heterogeneous		100% Non-fibrous (Other)	None Detected
CD-1b <small>391903837-0066</small> <i>Inseparable coating layer included in analysis.</i>	Caulk Debris	Various Non-Fibrous Heterogeneous		100% Non-fibrous (Other)	None Detected

Initial report from: 04/29/2019 14:57:59



# EMSL Analytical, Inc.

3029 S. Jefferson Saint Louis, MO 63118

Tel/Fax: (314) 577-0150 / (314) 776-3313

<http://www.EMSL.com> / [saintlouislam@emsl.com](mailto:saintlouislam@emsl.com)

**EMSL Order:** 391903837  
**Customer ID:** JOHN49  
**Customer PO:**  
**Project ID:**

## Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
CD-1c	Caulk Debris	Various Non-Fibrous Heterogeneous		100% Non-fibrous (Other)	None Detected
<i>391903837-0067 Inseparable coating layer included in analysis.</i>					
GS-1a	Gutter Seam Sealant	Silver Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
<i>391903837-0068</i>					
GS-1b	Gutter Seam Sealant	Silver Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
<i>391903837-0069</i>					
GS-1c	Gutter Seam Sealant	Silver Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
<i>391903837-0070</i>					

Analyst(s) \_\_\_\_\_

Donald Schmidt (34)

Sue Ferrario (73)

Jeff Siria, Laboratory Manager  
or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. The above analyses were performed in general compliance with Appendix E to Subpart E of 40 CFR (previously EPA 600/M4-82-020 "Interim Method"), but augmented with procedures outlined in the 1993 ("final") version of the method. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. All samples received in acceptable condition unless otherwise noted. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. EMSL recommends gravimetric reduction for all non-friable organically bound materials prior to analysis. Estimation of uncertainty is available on request.

Samples analyzed by EMSL Analytical, Inc. Saint Louis, MO NVLAP Lab Code 200742-0

Initial report from: 04/29/2019 14:57:59

391903837



(Page 1)

**LABORATORY SUBMITTAL**  
**CHAIN OF CUSTODY**

Lab: EMSL  
 Project: L2e Farmington Houses  
 Sampled by: Kevin O.  
 Sample Media: Bulk samples

Turnaround Time: 5 day turnaround  
 Analyze to First Positive  
 Point Count samples with results between 1-5%, excluding floor tile samples.

NUMBER	SAMPLE ID	DESCRIPTION	ANALYSIS TYPE	VOLUME
1	RS-1a,b,c	Roof Shingles Matrix	PLM (EPA 600)	
2	-2a,b,c			
3	-3a,b,c			
4	-4a,b,c			
5	-5a,b,c			
6	-6a,b,c			
7	-7a,b,c			
8	WG-1a,b,c	Window glazing		
9	WC-1a,b,c	Window caulk		
10	DS-1a,b,c	Decorative stone		

Additional Comments: email results to office + Kevin O. as usual please

Chain of Custody	Date/Time	Date/Time
Relinquished by: <u>Kevin O'Connell</u>	<u>4/17/19 6pm</u>	
Received by: <u>[Signature]</u>	<u>4/18/19</u>	<u>9:50a LA</u>
Relinquished by:		
Received by:		<u>8102 SJS 5/6/19</u>



(Page 2)

**LABORATORY SUBMITTAL**  
**CHAIN OF CUSTODY**

Lab: EMSL  
 Project: L2e Farmington  
 Sampled by: Kevin O  
 Sample Media: Bulk samples

Turnaround Time: 5 day turnaround

Analyze to First Positive

Point Count samples with results between 1-5%, excluding floor tile samples.

NUMBER	SAMPLE ID	DESCRIPTION	ANALYSIS TYPE	VOLUME
1	RF-1a,b,c	Roof Flashing	PLM (EPA 600)	
2	GI-1a,b,c	Gutter Insulation		
3	RC-1a,b,c	Roofing Cank		
4	WG-2a,b,c	Window Glazing		
5	GSP-1a,b,c	Gutter Seam Patch		
6	RF-2a,b,c	Roof Flashing		
7	I-3a,b,c	I		
8	GD-1a,b,c	Glazing debris		
9	CK-1a,b,c	Cank		
10	BMP-1a,b,c	Patch Flashing		

Additional Comments: (see Page 1)

Chain of Custody	Date/Time	Date/Time
Relinquished by: <u>Kevin O'Connell</u>	<u>4/17/19 bpm</u>	
Received by:		
Relinquished by:		
Received by:		



(Page 3)

**LABORATORY SUBMITTAL**  
**CHAIN OF CUSTODY**

Lab: EMSL  
 Project: Farmington Houses  
 Sampled by: Kevin O.  
 Sample Media: Bulk samples

Turnaround Time: 5 day turnaround

- Analyze to First Positive
- Point Count samples with results between 1-5%, excluding floor tile samples.

NUMBER	SAMPLE ID	DESCRIPTION	ANALYSIS TYPE	VOLUME
1	RPS-1a,b,c	Shingle matrix	PLM (EPA 600)	
2	-2a,b,c			
3	CD-1a,b,c	Canlk debris		
4	GS-1a,b,c	Gutter seam sealant		
5				
6				
7				
8				
9				
10				

Additional Comments: (see page 1)

Chain of Custody	Date/Time	Date/Time
Relinquished by: <u>Kevin Ozerille</u>	<u>4/17/19 6pm</u>	
Received by:		
Relinquished by:		
Received by:		



## APPENDIX B: MO INSPECTOR LICENSE

CERTIFICATION NUMBER:

**7118020119MOIR3238**

THIS CERTIFIES

**Robert A Jurgiel**

HAS COMPLETED THE CERTIFICATION

REQUIREMENTS FOR

**Inspector**



APPROVED: **02/07/2019**

EXPIRES: **02/07/2020**

TRAINING DATE: **02/01/2019**

A handwritten signature in blue ink, appearing to read "Angela R. B. [unclear]".

Director of Air Pollution Control Program

CERTIFICATION NUMBER:  
**7118010419MOIR10098**

THIS CERTIFIES  
**Kevin Obermiller**  
HAS COMPLETED THE CERTIFICATION  
REQUIREMENTS FOR  
**Inspector**



APPROVED: **01/11/2019**  
EXPIRES: **01/11/2020**

TRAINING DATE: **01/04/2019**  
  
Director of Air Pollution Control Program



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The items and/or recommendations contained in this report reflect the site conditions as noted or discussed on the indicated day(s) of our visit/inspection. We do not represent or warrant that all potential hazards/conditions have been identified or evaluated or that your workplace(s) is safe or healthful or in compliance with applicable laws, regulations, codes or standards. We also assume no responsibility for any actions taken by you or others in response to our items and/or recommendations.