# PROJECT MANUAL

***Fire Sprinkler System Upgrade***

***Higginsville Habilitation Center***

***Higginsville, Missouri***

Designed By: Henderson Engineers
8345 Lenexa Drive, Suite 300
Lenexa, Kansas, 65101

Date Issued: December 6, 2024

Project No.: M2405-01

## STATE *of* MISSOURI

## OFFICE *of* ADMINISTRATION

Facilities Management, Design and Construction

## SECTION 000107 - PROFESSIONAL SEALS AND CERTIFICATIONS

**PROJECT NUMBER: M2405-01** "UPGRADE FIRE SPRINKLER SYSTEM – HIGGINSVILLE HABILITATION CENTER"

**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:**

### ARCHITECTURAL

The documents intended to be authenticated by my seal are limited to:

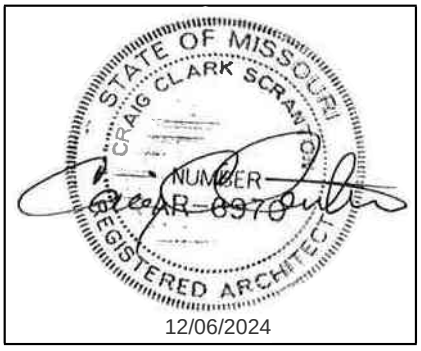
Specifications: Division 07 all Sections.

Drawings Sheets: A101, A102, A300.

I hereby disclaim any responsibility for all other plans, specifications, estimates, reports or other documents or instruments relating to or intended to be used for any part of the project.

By: _____

Craig Clark Scranton, AIA (Div. 02, 06, 07, 08, 09, 10)




12/06/2024

## SECTION 000107 - PROFESSIONAL SEALS AND CERTIFICATIONS

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### PLUMBING/MECHANICAL/ELECTRICAL

The documents intended to be authenticated by my seal are limited to:

Specifications: Division 21 all Sections.
Division 23 all Sections.
Division 26 all Sections.
Division 28 all Sections.

Drawings Sheets: FP-000, FP-101A, FP-102A, FP-102B, FP-103A, FP-103B, FP-104B, FP-105B, FP-500, FPD-104B, FPD-105B, M-000, M-102A, M-103A, M-400, E-000, E-101B, E-101C

I hereby disclaim any responsibility for all other plans, specifications, estimates, reports or other documents or instruments relating to or intended to be used for any part of the project.

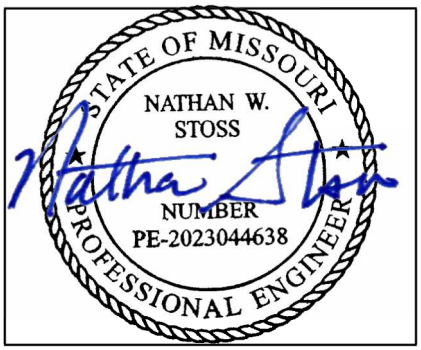
By: _____

Kelley P. Cramm, P.E. (Div. 23)


12/06/2024

By: _____

Nathan W. Stoss, P.E. (Div. 26)

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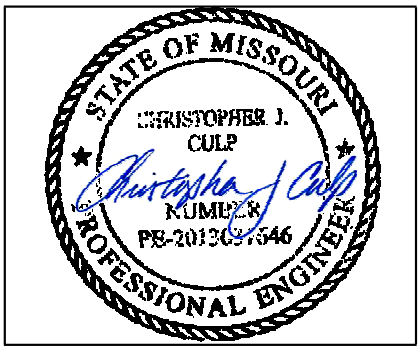
By: _____

Christopher J. Culp, P.E. (Div. 21 & Div. 28)




12/06/2024

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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:

| | TITLE | SHEET # | DATE | CAD # |
|---|---|---|---|---|
| 1. | Cover Sheet | G000 | 12/06/24 | G000 |
| 2. | Attic Floor Plan - Cottage B | A101 | 12/06/24 | A101 |
| 3. | Attic Floor Plan - Cottage C | A102 | 12/06/24 | A102 |
| 4. | Attic Insulation Details | A300 | 12/06/24 | A300 |
| 5. | Mechanical General Notes and Legend | M000 | 12/06/24 | M000 |
| 6. | HVAC Attic Plan – Cottage B | M102A | 12/06/24 | M102A |
| 7. | HVAC Attic Plan – Cottage C | M103A | 12/06/24 | M103A |
| 8. | Mechanical Schedules and and Details | M400 | 12/06/24 | M400 |
| 9. | Electrical Legend, Notes and Details | E000 | 12/06/24 | E000 |
| 10. | Electrical Plan - Overall - Cottage B | E101B | 12/06/24 | E101B |
| 11. | Electrical Plan - Overall - Cottage C | E101C | 12/06/24 | E101C |
| 12. | Fire Protection General Notes and Legend | FP000 | 12/06/24 | FP000 |
| 13. | Fire Protection Plan - Kitchen-Laundry | FP101A | 12/06/24 | FP101A |
| 14. | Fire Protection Plan - Cottage B | FP102A | 12/06/24 | FP102A |
| 15. | Fire Protection Plan Basement Cottage B | FP102B | 12/06/24 | FP102B |

| | | | | |
|---|---|---|---|---|
| 16. | Fire Protection Plan - Cottage C | FP103A | 12/06/24 | FP103A |
| 17. | Fire Protection Plan Basement Cottage C | FP103B | 12/06/24 | FP103B |
| 18. | Fire Protection Demolition Plan Basement - Cottage E | FPD104B | 12/06/24 | FPD104B |
| 19. | Fire Protection Plan Basement Cottage E | FP104B | 12/06/24 | FP104B |
| 20. | Fire Protection Demolition Plan Basement - Cottage F | FPD105B | 12/06/24 | FPD105B |
| 21. | Fire Protection Plan Basement Cottage F | FP105B | 12/06/24 | FP105B |
| 22. | Fire Protection Details | FP500 | 12/06/24 | FP500 |

**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. Fire Sprinkler System Upgrade
Higginsville Habilitation Center
Higginsville, Missouri
**Project No.: M2405-01**

**3.0 BIDS WILL BE RECEIVED:**

A. Until: 1:30 PM, August 7, 2025

B. **Only electronic bids sent to FMDCBids@oa.mo.gov shall be accepted: (See Instructions to Bidders for further detail)**

**4.0 DESCRIPTION:**

A. Scope: The project includes providing limited fire sprinkler upgrades throughout the Kitchen/Laundry building and Cottages B & C. Project scope includes adding sprinklers to specific areas to comply with current NFPA 13 standards. This project scope also includes testing all sprinkler systems to ensure the system and the piping are in good working condition and are compliant with NFPA. Project also includes adding closed cell spray foam insulation to the attic roof in Cottages B & C.

B. MBE/WBE/SDVE Goals: MBE 10%, WBE 10%, and SDVE 3%. **NOTE: Only MBE/WBE firms certified by the State of Missouri Office of Equal Opportunity 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.**

**5.0 PRE-BID MEETING:**

A. Place/Time**:** 10:00 AM, July 21, 2025, at Higginsville Habilitation Center, Administration Building; 100 W 1st Street Higginsville, MO 64037

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 $100.00 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: Henderson Engineers, Matt Swaback, (913) 742-5742, email: Matt.Swaback@hendersonengineers.com

B. Project Manager: Aaron Libbert, (816) 797-3442, email: Aaron.Libbert@oa.mo.gov

**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.

**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 must adhere to requirements in Section 013513 – Site Security and Health Requirements as applicable per Agency.

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 one (1) party may be limited in accordance with available supply.

B. For the convenience of contractors, subcontractors and suppliers, bidding documents are available on the Owner's website at 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 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 successful Bidder (contractor) to fulfill every detail of the requirements of the contract, nor accepted as a basis for any claims for extra compensation or time extension.

B. Under no circumstances will Bidders give their plans and specifications to other Bidders. It is highly encouraged, but not required, that all Bidders be on the official planholders list to receive project updates including but not limited to any addenda that are issued during the bidding process.

## 4.0 - INTERPRETATIONS

A. No Bidder shall be entitled to rely on oral or written representations from any person as to the meaning of the plans and specifications or the acceptability of alternate products, materials, form or type of construction.

B. Bidders shall make all requests for interpretations in writing and submit all requests to the Project Designer and Project Manager identified in Section 007300 – Supplementary Conditions with all necessary supporting documentation no less than five (5) working days before opening of bids. Responses to requests for interpretation will be issued via a written addendum and will be sent as promptly as is practicable to all official planholders and posted on the Owner's website. All such addenda shall become part of the bid and contract documents.

C. Bidders shall make all requests for an "Acceptable Substitution" on the Section 006325 Substitution Request Form. The request shall be emailed to the Project Designer and Project Manager identified in Section 007300 – Supplementary Conditions no less than five (5) working days before opening of bids. Responses to requests for substitutions will be issued via a written addendum and will be sent as promptly as is practicable to all official planholders and posted on the Owner's website. All such addenda shall become part of the bid and contract documents.

D. An "Acceptable Substitution" requested after the award of bid will only be approved if proven to the satisfaction of the Owner and the Designer 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 and all requests of this nature must be submitted in accordance with Article 3.1 of the General Conditions.

## 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 on the bid documents or the bid will be rejected for being non-responsive.

B. Depending on the specific project requirements, **the following is a GENERIC list** of all possible bid forms that may be due with bid submittals. Bidders must verify each specific project's requirements in Section 004113 to ensure they have provided all the required documentation with their submission.

**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 |
| 004545 | Anti-Discrimination Against Israel Act Certification form |

C. The Bidder shall submit its bid on the forms provided by the Owner in the same file format (PDF) with each space fully and properly completed, typewritten or legibly printed, including all amounts required for alternate bids, unit prices, cost accounting data, etc. The Owner will reject bids that are not on the Owner's forms or that do not contain all requested information. All forms can be found on the Owner's website at https://oa.mo.gov/facilities/bid-opportunities/bid-listing-electronic-plans and shall be submitted with your bid to FMDCBids@oa.mo.gov.

D. All bids shall be submitted without additional terms and conditions, modifications, or reservations. The completed forms should not include interlineations, alterations, or erasures. Bids not in compliance with the requirements of this paragraph will be rejected as non-responsive.

E. 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 in the bid documents in Section 004113. Failure of the Bidder to submit the duly authorized bid bond or 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 bid closing or if the Bidder, within ten (10) working days after notification of award, refuses or is unable to 1) execute the tendered contract, 2) provide an acceptable performance and payment bond, or 3) provide evidence of required insurance coverage.

F. The bid bond 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.

## 6.0 - SIGNING OF BIDS

A. 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. If the Bidder is an entity organized in a state other than Missouri, the Bidder must provide a Certificate of Authority to do business in the State of Missouri.

B. If the successful Bidder is doing business in the State of Missouri under a fictitious name, the Bidder 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.

C. A bid from an individual shall be signed as noted on the Bid Form.

D. 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.

E. A bid from a limited liability company (LLC) shall be signed by a manager or a managing member of the LLC.

F. A bid from a corporation shall have the correct corporate name thereon and the signature of an authorized officer of the corporation. Title of office held by the person signing for the corporation shall appear, along with typed name of said individual and the corporate license number shall be provided. In addition, for corporate proposals, the President or Vice-President listed per the current filing with the Missouri Secretary of State should sign as the Bidder. If the signatory is other than the corporate president or vice president, the bidder must provide satisfactory evidence that the signatory has the legal authority to bind the corporation.

## 7.0 - RECEIVING BID SUBMITTALS

A. It is the Bidder's sole responsibility to ensure receipt of the bid submittals by Owner on or before the date and time specified in the Invitation for Bid or as modified via written addenda. Bids received after the date and time specified will not be considered by the Owner.

B. All bids shall be received via email at FMDCBids@oa.mo.gov and bids received by the Owner through any other means, including hard copies, will not be considered, and will be discarded by the Owner unopened.

## 8.0 - MODIFICATION AND WITHDRAWAL OF BIDS

A. Bidder may withdraw a bid at any time prior to the 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. Bidder may modify a bid until the scheduled closing time by sending a revised bid to FMDCBids@oa.mo.gov with a note in the subject line and body of the email that it is a revised bid. All revised bids must be submitted to FMDCBids@oa.mo.gov, revised bids sent any other way will not be considered.

## 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 limited to, contracts for the furnishing and installation of furniture, equipment, machinery, appliances and other apparatuses.

C. The Owner will award a contract to the lowest, responsive, and responsible Bidder in accordance with Section 8.250, RSMo. No contract will be awarded to any Bidder who has had a contract with the Owner terminated within the preceding twelve months for material breach of contract or who has been suspended or debarred by the Owner.

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 lowest, responsive, responsible bidder.

E. No award shall be considered binding upon the Owner until the written contract has been properly executed and the following documentation has been provided: 1) performance and payment bond consistent with Article 6.1 of the General Conditions; 2) proof of the required insurance coverage; 3) an executed Section 004541 - Affidavit of Work Authorization form; and 4) documentation evidence enrollment and participation in a federal work authorization program.

F. Failure to execute and return the contract and associated documents within the prescribed period 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.

G. 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.

H. 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. 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.e-verify.gov/employers/enrolling-in-e-verify. The contractor shall be responsible for ensuring that all subcontractors and suppliers associated with this contract enroll in E-Verify.

I. The successful Bidder must be registered in MissouriBUYS powered by MOVERS at https://missouribuys.mo.gov/supplier-registration# as an approved vendor prior to being issued a contract.

## 10.0 - CONTRACT SECURITY

A. The successful Bidder shall furnish a performance/payment bond as set forth in General Conditions Article 6.1 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, manufacturer, or suppliers 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. 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 or if more than one subcontractor is listed for any category without designating the portion of work to be performed by each, 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, Juneteenth, 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 Bidder'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 – ANTI-DISCRIMINATION AGAINST ISRAEL ACT CERTIFICATION:**

A. If the Bidder meets the section 34.600, RSMo., definition of a "company" and the Bidder has ten or more employees, the Bidder must certify in writing that the Bidder is not currently engaged in a boycott of goods or services from the State of Israel and shall not engage in a boycott of goods or services from the State of Israel, if awarded a contract, for the duration of the contract. The Bidder is required to complete and submit the applicable portion of Section 004545 - Anti-Discrimination Against Israel Act Certification with its Bid Form. The applicable portion of the exhibit must be submitted prior to execution of a contract by the Owner and issuance of Notice to Proceed.

**15.0 - 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 nonresponsive, and its bid shall be rejected.

2. The Bidder should submit with its bid all 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 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 Prime Bidder that qualifies as an SDVE shall receive a three-percentage 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 will become 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.

C. 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.) 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 performing, managing and supervising the work or providing supplies or manufactured materials.

D. 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 Equal Opportunity or by the Federal U.S. Small Business Administration directory.

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/MWBCertifiedFirms/. The Bidder may determine the eligibility of a SDVE subcontractor or supplier by referring to the Office of Equal Opportunity online SDVE directory at https://oeo.mo.gov/sdve-certification-program/ or the Federal U.S. Small Business Administration directory https://veterans.certify.sba.gov/#search.

3. Additional information, clarifications, or other information regarding the MBE/WBE/SDVE listings in the directories may be obtained by contacting the Contract Specialist of record as shown in the Supplementary Conditions (Section 007300).

E. 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 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 granted a waiver and will be considered 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;

F. 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 in the 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 nonresponsive 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 the 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 in writing.

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
# Construction Contract

**THIS AGREEMENT** is 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.

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:** **Fire Sprinkler System Upgrade**
**Higginsville Habilitation Center**
**Higginsville, Missouri**

**Project Number:** **M2405-01**

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 **140 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 $700** 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: $

Accepted Alternates, if applicable to the Project and accepted by the Owner.

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

**UNIT PRICES:** The Owner accepts the following Unit Prices:

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.

**ARTICLE 5. PREVAILING WAGE RATE**

**MISSOURI PREVAILING WAGE LAW (Sections 290.210 to 290.340, RSMo)**: The Contractor shall pay not less than the specified hourly rate of wages, as set out in the wage order attached to and made part of the specifications for work under this contract, to all workers performing work under the contract, in accordance with sections 290.210 to 290.340, RSMo. The Contractor shall forfeit a penalty to the Owner of one hundred dollars per day (or portion of a day) for each worker that is paid less than the specified rates for any work done under the contract by the Contractor or by any subcontractor, in accordance with section 290.250, RSMo.

**DAVIS-BACON ACT:** If this Project is financed in whole or in part from Federal funds (as indicated in the Instructions to Bidders or other bid or contract documents for this Project), then this contract shall be subject to all applicable federal labor statutes, rules and regulations, including provisions of the Davis-Bacon Act, 40 U.S.C. §3141 et seq., and the "Federal Labor Standards Provisions," as further set forth in Section 007333 – Supplementary General Conditions for Federally Funded/Assisted Construction Projects, which is incorporated into the contract by reference. Where the Missouri Prevailing Wage Law and the Davis-Bacon Act require payment of different wages for work performed under this contract, the Contractor and all Subcontractors shall pay the greater of the wages required under either law, on a classification-by-classification basis.

**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**

The following documents are hereby incorporated into this contract by reference (all division/section numbers and titles are as utilized in the Project Manual published by the Owner for this Project):

1. Division 0 – Procurement and Contracting Information, including, but not limited to:
    a. Invitation for Bid (Section 001116)
    b. Instructions to Bidders (Section 002113)
    c. Supplementary Instructions to Bidders (if applicable) (Section 002213)
    d. The following documents as completed and executed by the Contractor and accepted by the Owner, if applicable:
        i. Bid Form (Section 004113)
        ii. Unit Prices (Section 004322)
        iii. Proposed Contractors Form (Section 004336)
        iv. MBE, WBE, SDVE Compliance Evaluation Form(s) (Section 004337)
        v. MBE, WBE, SDVE Eligibility Determination Form for Joint Ventures (Section 004338)
        vi. MBE, WBE, SDVE Good Faith Effort (GFE) Determination Form (Section 004339)
        vii. Missouri Service Disabled Veteran Business Form (Section 004340)
        viii. Affidavit of Work Authorization (Section 004541)
        ix. Affidavit for Affirmative Action (Section 005414), if applicable
    e. Performance and Payment Bond, completed and executed by the Contractor and surety (Section 006113)
    f. General Conditions (Section 007213)
    g. Supplementary Conditions (Section 007300)
    h. Supplementary General Conditions for Federally Funded/Assisted Construction Projects (Section 007333), if applicable
    i. Wage Rate(s) (Section 007346)
2. Division 1 – General Requirements
3. All Drawings identified in the Project Manual
4. All Technical Specifications included in the Project Manual
5. Addenda, if applicable

**ARTICLE 8 – CERTIFICATION**

By signing this contract, the Contractor hereby re-certifies compliance with all legal requirements set forth in Section 6.0, Bidder's Certifications of the Bid Form.

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

**APPROVED:**

_____
Brian Yansen, Director
Division of Facilities Management,
Design and Construction

_____
Contractor's Authorized Signature

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*

**Bond No._____**

**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 | |
|---|---|---|
| LOCATION | | DATE INSTALLED |

**SIGNIFICANT VARIATIONS FROM SPECIFIED PRODUCT**

**REASON FOR SUBSTITUTION**

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

☐ YES ☐ NO

IF YES, EXPLAIN

**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:

☐ Substitution is accepted.

☐ Substitution is accepted with the following comments:

☐ Substitution is not accepted.

| ARCHITECT/ENGINEER | DATE |
|---|---|
| | |

STATE OF MISSOURI
OFFICE OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION

# FINAL RECEIPT OF PAYMENT AND RELEASE

PROJECT NUMBER

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

ORIGINAL: FILE/Closeout Documents

STATE OF MISSOURI
OFFICE OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT,
DESIGN AND CONSTRUCTION

| PAY APP NO. | PROJECT NUMBER |
|---|---|
| CHECK IF FINAL ☐**FINAL** | DATE |

## MBE/WBE/SDVE PROGRESS REPORT

Remit with **ALL** Progress and Final Payments

(Please check appropriate box) ☐CONSULTANT ☐CONSTRUCTION

| PROJECT TITLE | |
|---|---|
| PROJECT LOCATION | |
| FIRM | |
| ORIGINAL CONTRACT SUM (Same as Line Item 1. on Form A of Application for Payment) **$** | TOTAL CONTRACT SUM TO DATE (Same as Line Item 3. on Form A of Application for Payment) **$** |

THE TOTAL MBE/WBE/SDVE PARTICIPATION DOLLAR AMOUNT OF THIS PROJECT AS INDICATED IN THE ORIGINAL CONTRACT: **$**

| SELECT MBE, WBE, SDVE | ORIGINAL CONTRACT PARTICIPATION AMOUNT | PARTICIPATION AMOUNT PAID-TO-DATE (includes approved contract changes) | CONSULTANT/SUBCONSULTANT OR CONTRACTOR/SUBCONTRACTOR/SUPPLIER COMPANY NAME |
|---|---|---|---|
| ☐ MBE ☐ WBE ☐ SDVE | $ | $ | |
| ☐ MBE ☐ WBE ☐ SDVE | $ | $ | |
| ☐ MBE ☐ WBE ☐ SDVE | $ | $ | |
| ☐ MBE ☐ WBE ☐ SDVE | $ | $ | |
| ☐ MBE ☐ WBE ☐ SDVE | $ | $ | |
| ☐ MBE ☐ WBE ☐ SDVE | $ | $ | |

*Revised 06/2023*

## INSTRUCTIONS FOR MBE/WBE/SDVE PROGRESS REPORT

**CONTRACTOR OR CONSULTANT TO FILL OUT AND REMIT WITH EACH PAY APPLICATION:**

The MBE/WBE/SDVE Progress Report for the project is issued with the contract comprising values reported in the consultant's Proposal or on the successful contractor's Section 004337 Compliance Evaluation Forms.

At Initial Pay Application fill in the following:

1. Pay App No. Start with 1.
2. Fill in the Project Number and Date.
3. Enter Project Title, Project Location, and Firm.
4. Fill in the "Original Contract Sum" and "Total Contract Sum To Date" (Reference applicable Line Items on Form A of Application for Payment).
5. Indicate the Total Participation Dollar Amount from the Original Contract.
6. Select MBE, WBE, or SDVE for each Consultant/Subconsultant or Contractor/Subcontractor/Supplier.
7. Enter the "Total Amount of Subcontract", "$ Amount (Paid-To-Date)", and Company Name.

For all subsequent Pay Applications fill in the following:

1. Pay App No.
2. If Final Pay App, check box.
3. Fill in the Project Number and Date.
4. Enter Project Title, Project Location, and Firm
5. At each Pay App fill in the "Original Contract Sum" and "Total Contract Sum To Date" (reference applicable Line Items on Form A of Application for Payment).
6. Indicate the Total Participation Dollar Amount from the Original Contract.
7. Select MBE, WBE, or SDVE for each Consultant/Subconsultant or Contractor/Subcontractor/Supplier
8. Enter the "Total Amount of Subcontract", "$ Amount (Paid-To-Date)", and Company Name.

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

FILE: Closeout Documents

# GENERAL CONDITIONS

# INDEX

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

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. Acting by and through the Office of Administration, Division of Facilities Management, Design and Construction.
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"**: All supervision, labor, materials, tools, supplies, equipment, and any incidental operations and/or activities required by or reasonably inferable from the Contract Documents necessary to construct the Project and to produce the results intended by the Contract Documents 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, Juneteenth, 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 ensure 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 under this clause to any labor union with which they have bargaining or other agreements.

B. 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**

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**

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

The Contractor shall register and utilize the Owner's eBuilder digital project management system for submission of documents described in the following sections. This includes but is not limited to submittals as required by designer, payment applications, Request for Information (RFI), construction change orders, Request for Proposals (RFP), Designer Supplemental Instructions (DSI), etc.

## 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 place 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 ensure 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 subject to the following limits: (a) the percentage mark-up for the Contractor shall be limited to the Contractor’s fee: (b) fifteen percent (15%) maximum for Work directly performed by employees of a subcontractor, or sub-subcontractor; (c) five percent (5%) maximum for the Work performed or passed through to the Owner by the Contractor; (d) five percent (5%) maximum subcontractor’s mark-up for

Work performed by a sub-subcontractor and passed through to the Owner by the subcontractor and Contractor; and (e) in no case shall the total overhead and profit paid by the Owner on any Contract Changes exceed twenty-five percent (25%) 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 Contractor's payment and performance bonding, builder's risk insurance, and general liability insurance to their cost of work. The above listed bonding and insurance cost shall not exceed two percent (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(s) 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 the same as those for additive Contract Changes provided above.

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 <u>without</u> 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.

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 contact 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

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:
Matt Swaback
Henderson Engineers
8345 Lenexa Drive, Suite 300
Lenexa, Kansas, 65101
Telephone: (913) 742-5742
Email: Matt.Swaback@hendersonengineers.com

Construction Representative:
John Gentges
Division of Facilities Management, Design and Construction
301 West High Street, Room 730
Jefferson City, MO 65101
Telephone: (573) 526-5768
Email: John.Gentges@oa.mo.gov

Project Manager:
Aaron Libbert
Division of Facilities Management, Design and Construction
301 West High Street, Room 730
Jefferson City, Missouri 65101
Telephone: (816) 797-3442
Email: Aaron.Libbert@oa.mo.gov

Contract Specialist:
April Howser
Division of Facilities Management, Design and Construction
301 West High Street, Room 730
Jefferson City, Missouri 65101
Telephone: 573-751-0053
Email: April.Howser@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 3 complete sets of drawings and specifications at no charge.

B. The Owner will furnish the Contractor with approximately 3 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 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. 31

Section 054
**LAFAYETTE 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
Todd Smith, Director
Division of Labor Standards

Filed With Secretary of State: **March 8, 2024**

Last Date Objections May Be Filed: **April 8, 2024**

**Prepared by Missouri Department of Labor and Industrial Relations**

| OCCUPATIONAL TITLE | **Prevailing Hourly Rate |
|---|---|
| Asbestos Worker | $71.09 |
| Boilermaker | $24.42* |
| Bricklayer-Stone Mason | $24.42* |
| Carpenter | $24.42* |
| Lather | |
| Linoleum Layer | |
| Millwright | |
| Pile Driver | |
| Cement Mason | $24.42* |
| Plasterer | |
| Communication Technician | $24.42* |
| Electrician (Inside Wireman) | $70.94 |
| Electrician Outside Lineman | $24.42* |
| Lineman Operator | |
| Lineman - Tree Trimmer | |
| Groundman | |
| Groundman - Tree Trimmer | |
| Elevator Constructor | $24.42* |
| Glazier | $24.42* |
| Ironworker | $24.42* |
| Laborer | $50.32 |
| General Laborer | |
| First Semi-Skilled | |
| Second Semi-Skilled | |
| Mason | $24.42* |
| Marble Mason | |
| Marble Finisher | |
| Terrazzo Worker | |
| Terrazzo Finisher | |
| Tile Setter | |
| Tile Finisher | |
| Operating Engineer | $63.18 |
| Group I | |
| Group II | |
| Group III | |
| Group III-A | |
| Group IV | |
| Group V | |
| Painter | $57.42 |
| Plumber | $78.45 |
| Pipe Fitter | |
| Roofer | $60.30 |
| Sheet Metal Worker | $71.41 |
| Sprinkler Fitter | $24.42* |
| Truck Driver | $24.42* |
| Truck Control Service Driver | |
| Group I | |
| Group II | |
| Group III | |
| Group IV | |

*The Division of Labor Standards received fewer than 1,000 reportable hours for this occupational title. The public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center.
**The Prevailing Hourly Rate includes any applicable fringe benefit amounts for each occupational title as defined in RSMo Section 290.210.

Heavy Construction Rates for
LAFAYETTE County

Section 054

| OCCUPATIONAL TITLE | **Prevailing Hourly Rate |
|---|---|
| Carpenter | $24.42* |
| Millwright | |
| Pile Driver | |
| Electrician (Outside Lineman) | $24.42* |
| Lineman Operator | |
| Lineman - Tree Trimmer | |
| Groundman | |
| Groundman - Tree Trimmer | |
| Laborer | $45.88 |
| General Laborer | |
| Skilled Laborer | |
| Operating Engineer | $58.74 |
| Group I | |
| Group II | |
| Group III | |
| Group IV | |
| Truck Driver | $24.42* |
| 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 fewer than 1,000 reportable hours for this occupational title. Public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center.

**The Prevailing Hourly Rate includes any applicable fringe benefit amounts for each occupational title.

# OVERTIME
# and
# HOLIDAYS

## OVERTIME

For all work performed on a Sunday or a holiday, not less than twice (2x) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work.

For all overtime work performed, not less than one and one-half (1½) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work or contractual obligation. For purposes of this subdivision, **"overtime work"** shall include work that exceeds ten hours in one day and work in excess of forty hours in one calendar week; and

A thirty-minute lunch period on each calendar day shall be allowed for each worker on a public works project, provided that such time shall not be considered as time worked.

## HOLIDAYS

January first;
The last Monday in May;
July fourth;
The first Monday in September;
November eleventh;
The fourth Thursday in November; and
December twenty-fifth;

If any holiday falls on a Sunday, the following Monday shall be considered a holiday.

# SECTION 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 upgrading the fire sprinkler system.

1. Project Location: Higginsville Habilitation Center, 100 W. 1st Street, Higginsville, MO 64037.

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 December 6, 2024 were prepared for the Project by Henderson Engineers, 8345 Lenexa Drive, Suite 300, Lenexa KS 66214.

C. The Work consists of upgrading the fire sprinkler system.

1. The Work includes:

a. The Kitchen/Laundry building and Cottage's B & C on the campus of the Higginsville Habilitation Center have their original fire sprinkler systems and need limited sprinkler upgrades. The Kitchen/Laundry building was constructed in 1955 and contains a wet system and a dry system. The dry system serves the exterior spaces, and the wet system serves the interior spaces. Both Cottage buildings were constructed in 1956 and contain a single wet sprinkler system.

b. Provide limited fire sprinkler upgrades throughout the three buildings. Project scope includes adding sprinklers to specific areas to comply with current NFPA 13 standards. This project scope also includes testing all sprinkler systems to ensure the system and the piping are in good working condition and are compliant with NFPA. Project also includes adding closed cell spray foam insulation to the attic roof in Cottages B and C.

D. The Work will be constructed under a single prime contract.

### 1.3 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.

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..

## 1.4 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.

## PART 2 - PRODUCTS (Not Applicable)

## PART 3 - EXECUTION

## 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. This Section includes administrative and procedural requirements governing allowances.

1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.

B. Types of allowances include the following:

1. Lump-sum allowances.
2. Weather allowances.

C. Related Sections include the following:

1. Division 1 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders for allowances.
2. Division 1 Section "Unit Prices" for procedures for using unit prices.

### 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 Change Order time extension will be executed for "bad weather" days, as defined above, encountered during the remainder of the Project.

**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 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 1, Section 012100 "Allowances" for procedural requirements for handling and processing Allowances.
2. Division 1, Section 012200 "Unit Prices" for administrative requirements for using Unit Prices.
3. Division 1, Section 013115 “Project Management Communications” for administrative requirements for communications.
4. Division 0, Section 007213, Article 3.1 "Acceptable Substitutions" for administrative procedures for handling Requests for Substitutions made after Contract award.
5. Division 0, Section 007213, Article 4.0 "Changes in the Work" for Change Order 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 Contactor 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 Change Order 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 Change Order Detailed Breakdown form. Subcontractors may use the appropriate Change Order 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 CHANGE ORDER PROCEDURES

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

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION (Not Used)

## 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. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

## 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 Change Orders

    e. Purchases

    f. Deliveries

    g. Submittals

    h. Review of mockups

    i. Possible conflicts

    j. Compatibility problems

    k. Time schedules

    l. Weather limitations

    m. Manufacturer's written 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 013115 - PROJECT MANAGEMENT COMMUNICATIONS

## 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.

B. Division 1, Section 013300 - Submittals

C. Division 1, Section 012600 – Contract Modification Procedures

### 1.2 SUMMARY

A. Project Management Communications: The Contractor shall use the Internet web based project management communications tool, E-Builder® ASP software, and protocols included in that software during this project. The use of project management communications as herein described does not replace or change any contractual responsibilities of the participants.
   1. Project management communications is available through E-Builder® as provided by "e-Builder®" in the form and manner required by the Owner.
   2. The project communications database is on-line and fully functional. User registration, electronic and computer equipment, and Internet connections are the responsibility of each project participant. The sharing of user accounts is prohibited

B. Support: E-Builder® will provide on-going support through on-line help files.

C. Copyrights and Ownership: Nothing in this specification or the subsequent communications supersedes the parties' obligations and rights for copyright or document ownership as established by the Contract Documents. The use of CAD files, processes or design information distributed in this system is intended only for the project specified herein.

D. Purpose: The intent of using E-Builder® is to improve project work efforts by promoting timely initial communications and responses. Secondly, to reduce the number of paper documents while providing improved record keeping by creation of electronic document files

E. Authorized Users: Access to the web site will be by individuals who are authorized users.
   1. Individuals shall complete the E-Builder New Company/User Request Form located at the following web site: https://oa.mo.gov/facilities/vendor-links/contractor-forms.

Completed forms shall be emailed to the following email address: OA.FMDCE-BuilderSupport@oa.mo.gov.

2. Authorized users will be contacted directly and assigned a temporary user password.
3. Individuals shall be responsible for the proper use of their passwords and access to data as agents of the company in which they are employed.

F. Administrative Users: Administrative users have access and control of user licenses and all posted items. DO NOT POST PRIVATE OR YOUR COMPANY CONFIDENTIAL ITEMS IN THE DATABASE! Improper or abusive language toward any party or repeated posting of items intended to deceive or disrupt the work of the project will not be tolerated and will result in deletion of the offensive items and revocation of user license at the sole discretion of the Administrative User(s).

G. Communications: The use of fax, email and courier communication for this project is discouraged in favor of using E-Builder® to send messages. Communication functions are as follows:
   1. Document Integrity and Revisions:
      a. Documents, comments, drawings and other records posted to the system shall remain for the project record. The authorship time and date shall be recorded for each document submitted to the system. Submitting a new document or record with a unique ID, authorship, and time stamp shall be the method used to make modifications or corrections.
      b. The system shall make it easy to identify revised or superseded documents and their predecessors.
      c. Server or Client side software enhancements during the life of the project shall not alter or restrict the content of data published by the system. System upgrades shall not affect access to older documents or software.
   2. Document Security:
      a. The system shall provide a method for communication of documents. Documents shall allow security group assignment to respect the contractual parties communication except for Administrative Users. DO NOT POST PRIVATE OR YOUR COMPANY CONFIDENTIAL ITEMS IN THE DATABASE!
   3. Document Integration:
      a. Documents of various types shall be logically related to one another and discoverable. For example, requests for information, daily field reports, supplemental sketches and photographs shall be capable of reference as related records.
   4. Reporting:
      a. The system shall be capable of generating reports for work in progress, and logs for each document type. Summary reports generated by the system shall be available for team members.
   5. Notifications and Distribution:
      a. Document distribution to project members shall be accomplished both within the extranet system and via email as appropriate. Project document distribution to parties outside of the project communication system shall be

accomplished by secure email of outgoing documents and attachments, readable by a standard email client.

6. Required Document Types:
    a. RFI, Request for Information.
    b. Submittals, including record numbering by drawing and specification section.
    c. Transmittals, including record of documents and materials delivered in hard copy.
    d. Meeting Minutes.
    e. Application for Payments (Draft or Pencil).
    f. Review Comments.
    g. Field Reports.
    h. Construction Photographs.
    i. Drawings.
    j. Supplemental Sketches.
    k. Schedules.
    l. Specifications.
    m. Request for Proposals
    n. Designer's Supplemental Instructions
    o. Punch Lists

H. Record Keeping: Except for paper documents, which require original signatures and large format documents (greater than 8½ x 11 inches), all other 8½ x 11 inches documents shall be submitted by transmission in electronic form to the E-Builder® web site by licensed users.
    a. The Owner and his representatives, the Designer and his consultants, and the Contractor and his Sub Contractors and suppliers at every tier shall respond to documents received in electronic form on the web site, and consider them as if received in paper document form.
    b. The Owner and his representatives, the Designer and his consultants, and the Contractor and his Sub Contractors and suppliers at every tier reserves the right to and shall reply or respond by transmissions in electronic form on the web site to documents actually received in paper document form.
    c. The Owner and his representatives, the Designer and his consultants, and the Contractor and his Sub Contractors and suppliers at every tier reserves the right to and shall copy any paper document into electronic form and make same available on the web site.

I. Minimum Equipment and Internet Connection: In addition to other requirements specified in this Section, the Owner and his representatives, the Construction Manager and his representatives, the Architect and his consultants, and the Contractor and his sub-contractors and suppliers at every tier required to have a user license(s) shall be responsible for the following:

1. Providing suitable computer systems for each licensed user at the users normal work location[1] with high-speed Internet access, i.e. DSL, local cable company's Internet connection, or T1 connection.
2. Each of the above referenced computer systems shall have the following minimum system[2] and software requirements:
    a. Desktop configuration (Laptop configurations are similar and should be equal to or exceed desktop system.)
        1) Operating System: Windows XP or newer
        2) Internet Browser: Internet Explorer 6.01SP2+ (Recommend IE7.0+)
        3) Minimum Recommend Connection Speed: 256K or above
        4) Processor Speed: 1 Gigahertz and above
        5) RAM: 512 mb
        6) Operating system and software shall be properly licensed.
        7) Internet Explorer version 7 (current version is a free distribution for download). This specification is not intended to restrict the host server or client computers provided that industry standard HTTP clients may access the published content.
        8) Adobe Acrobat Reader (current version is a free distribution for download).
        9) Users should have the standard Microsoft Office Suite (current version must be purchased) or the equivalent.

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

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

END OF SECTION 013115

[1] The normal work location is the place where the user is assigned for more than one-half of his time working on this project.
[2] The minimum system herein will not be sufficient for many tasks and may not be able to process all documents and files stored in the E-Builder® Documents area.

# SECTION 013200 – SCHEDULE – BAR CHART

## 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.

1. The Schedule of Values must have the following line items included with the value of the item as indicated below:

a. O&M's (Owner's Manual)

1) $1,000,000.00 (One million) and under – 2% of the total contract amount

2) Over $1,000,000.00 (One million) – 1% of the total contract amount

b. Close Out Documents

1) $1,000,000.00 (One million) and under – 2% of the total contract amount

2) Over $1,000,000.00 (One million) – 1% of the total contract amount

c. General Conditions

1) No more than 10%

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

D. Area Separations: Provide a separate time bar to identify each major area of construction for each major portion of the Work. For the purposes of this Article, a "major area" is a story of construction, a separate building, or a similar significant construction element.

1. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
    a. Structural completion.
    b. Permanent space enclosure
    c. Completion of mechanical installation
    d. Completion of the electrical portion of the Work
    e. Substantial Completion

## 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. Post copies in the Project meeting room and temporary field office.
2. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned 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 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.

B. Division 1, Section 013115 "Project Management Communications" for administrative requirements for communications.

### 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 digital photographs. The Construction Administrator shall determine the quantity and naming convention at the preconstruction meeting.
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.

| SPEC SECTION | TITLE | CATEGORY |
|---|---|---|
| 013200 | Schedules | Construction Schedule |
| 013200 | Schedules | Schedule of Values |
| 013200 | Schedules | List of Subcontractors |
| 013200 | Schedules | Major Material Suppliers |
| 072100 | Thermal Insulation | Product Data |
| 210010 | General Fire Suppression Requirements | Warranty |
| 210500 | Common Work Results for Fire Suppression | Product Data |
| 210515 | Basic Fire Suppression Piping Materials and Methods | Product Data |
| 210553 | Identification for Fire Suppression Piping and Equipment | Product Data |
| 211313 | Water Based Fire Suppression Systems | Shop Drawings |
| 230500 | Common Work Results for HVAC | Product Data |
| 230529 | Hangers and Supports for HVAC Piping and Equipment | Product Data |

| | | |
|---|---|---|
| 230553 | Identification for HVAC Piping and Equipment | Product Data |
| 230700 | HVAC Insulation | Product Data |
| 230913 | Instrumentation & Control Devices for HVAC | Product Data |
| 230913 | Instrumentation & Control Devices for HVAC | Shop Drawings |
| 230913 | Instrumentation & Control Devices for HVAC | Operation / Maintenance Manual |
| 230913 | Instrumentation & Control Devices for HVAC | Warranty |
| 233300 | Air Duct Accessories | Product Data |
| 233413 | Axial HVAC Fans | Product Data |
| 233413 | Axial HVAC Fans | Operation / Maintenance Manual |
| 233713 | Diffusers, Registers and Grilles | Product Data |
| 233713 | Diffusers, Registers and Grilles | Operation / Maintenance Manual |
| 260500 | Common Work Results for Electrical | Product Data |
| 260502 | Equipment Wiring Systems | Product Data |
| 260502 | Equipment Wiring Systems | Shop Drawings |
| 260519 | Low-Voltage Elec Power Cond and Cables | Product Data |
| 260519 | Low-Voltage Elec Power Cond and Cables | Test Report |
| 260519 | Low-Voltage Elec Power Cond and Cables | As-Builts |
| 260519 | Low-Voltage Elec Power Cond and Cables | Operation / Maintenance Manual |
| 260526 | Grounding and Bonding for Electrical Systems | Product Data |
| 260526 | Grounding and Bonding for Electrical Systems | Test Report |
| 260526 | Grounding and Bonding for Electrical Systems | As-Builts |
| 260529 | Hangers and Supports for Electrical Systems | Product Data |
| 260533 | Raceway and Boxes for Electrical Systems | Shop Drawings |
| 260533 | Raceway and Boxes for Electrical Systems | As-Builts |
| 260553 | Identification for Electrical Systems | Product Data |
| 284600 | Fire Detection and Alarm | Certification |
| 284600 | Fire Detection and Alarm | Test Report |
| 284600 | Fire Detection and Alarm | Shop Drawings |
| 284600 | Fire Detection and Alarm | Product Data |
| 284600 | Fire Detection and Alarm | Operation / Maintenance Manual |
| 284600 | Fire Detection and Alarm | Warranty |

**END OF SECTION 013300**

# SECTION 013513.19 – SITE SECURITY AND HEALTH REQUIREMENTS (DMH)

## 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 general Institution rules.

B. This Section includes requirements for infection control in environments that Clients are housed in, dine in, or participate in program activities in or adjacent to the Scope of Work area:

1. The Contractor shall have the applicable measures specified below in-place any time demolition or construction activities occur in occupied or non-occupied project work areas.

2. The Contractor shall complete all specified cleaning procedures and receive clearance from the Construction Representative prior to removing any barriers and other precautionary measures – even for areas that the Clients do not occupy during construction.

### 1.3 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.

## PART 2 - PRODUCTS (Not Applicable)

## PART 3 - EXECUTION

### 3.1 GENERAL RULES OF THE INSTITUTION

A. All workers and supervisors employed by the Contractor or any Subcontractors shall be made aware that the buildings and grounds are part of a Department of Mental Health facility and that:

1. The Residents or Patients are to be treated with dignity.

2. Construction activities shall not interfere with normal facility operation, except as otherwise arranged with and approved by the Facility Authorities.

3. Access to the Facility, Residents, and Staff by Emergency Responders shall not be compromised at any time.

4. Fire exits, alarm systems, and sprinkler systems shall remain fully operational at all times unless written approval is received from the Construction Representative

and the appropriate Facility Representative at least (24) hours in advance. The Contractor shall submit a written time schedule for any proposed shutdowns.

5. Smoking is not permitted in State-operated buildings. Smoking on grounds shall be in accordance with local Facility regulations and only as approved by Facility Management.

6. Intoxicating beverages or narcotics shall not be brought upon the premises nor shall Contractor's personnel be under the influence of these substances while on the premises.

7. Explosives or firearms and other weapons shall not be allowed onsite.

8. Keys shall not be left in unattended vehicles. Vehicles shall be locked when not in use.

9. The Residents shall not be photographed. Maintaining confidentiality of the Residents shall be required.

B. Because of the persistent risk that Residents or Patients may cause harm to themselves or others, extreme caution and special care must be taken in the interest of safety.

1. Materials, tools, and construction apparatus including ropes, ladders, and flammable liquids shall not be left unattended during working hours and shall be securely stored during non-working hours. Secure storage includes lockable cabinets, rooms, trailers, and rigid fenced areas. The location and use of exterior storage areas shall be approved by the Construction Representative and Facility Management prior to their use.

2. An inventory of tools, equipment, and materials intended to be left unsecured must be submitted to and approved by the Construction Representative in advance.

3. Any missing tools, equipment, or material must be immediately reported to the Construction Representative and Facility Management. Unattended or unsecured tools, equipment, or material that poses a potential risk may be confiscated by Facility Staff and returned after completion of the appropriate request documents by the Contractor.

4. Access to construction areas must be controlled at all times. Appropriate barriers must be erected to secure trenches, pits, wiring, etc.

5. Material Safety Data Sheets, or their equivalent, shall be provided to the Construction Representative for all hazardous materials to be brought onsite at least a day before their delivery.

6. Construction debris and trash must be securely stored in approved containers or removed from the site at least daily.

C. If the safety of Residents or Staff is jeopardized because Safety Guidelines are not properly observed, the Facility Representative will notify the Construction Representative, who may stop the Work until the situation is resolved. In such case, the Work will resume only after the unsafe conditions have been corrected and the Contractor is notified by the Construction Representative to resume the Work.

## 3.2 ACCESS TO THE SITE

A. The Contractor shall coordinate with the Facility and Construction Representative to establish a schedule for working hours. Normal working hours for this Facility are 7:30AM to 4:00PM Monday through Friday. Working hour changes or overtime are to be requested and approved (48) hours in advance. The need for emergency overtime shall be reported to the Construction Representative as soon as it is evident that overtime is needed.

B. The Contractor shall provide the name and phone number of the individual who is in charge onsite and who can be contacted in case of an emergency. This individual must maintain a current list of names and addresses of all project construction personnel and to furnish this list to the Construction Representative or Facility Representative upon request.

C. All construction personnel shall be identified to the Facility Representative and, when the Facility Representative feels it is necessary, they will be issued identification cards.

## 3.3 HEALTH AND TRAFFIC CONTROLS

A. Take all reasonable and necessary measures to reduce air and water pollution by any material or equipment used during construction. Keep volatile wastes in approved covered containers. Do not dispose of volatile wastes or oils in storm or sanitary drains.

B. Keep project area in a neat, clean, orderly, and safe condition at all times. Immediately remove all waste materials. Do not allow trash or rubbish to accumulate. Provide approved onsite containers for collection of trash and rubbish and dispose of it at frequent intervals during progression of the Work.

C. No burning will be permitted on the grounds.

D. Conduct all construction-related activities and management of debris to ensure minimum interference with roadways, streets, walks, utilities, and adjacent facilities.

E. Do not obstruct streets, driveways, walks, or use facilities without permission from the Facility Representative.

F. No driver shall exceed the Facility speed limit of 5mph.

## 3.4 SPECIFICATION OF REQUIRED INFECTION CONTROL PRECAUTIONS BY CLASS

Class I is for inspection and non-invasive type activities. These include, but are not limited to, the removal of ceiling tiles for visual inspection (1) tile per 50SqFt, painting without sanding, wall covering, electrical trim work, minor plumbing, and activities which do not generate dust or require cutting of walls or access to ceilings other than for visual inspection.

OR

Class II is for work that generates minimal to a high level of dust, requires demolition, or removal of any fixed building components or assemblies. Work of this type includes, but is not limited to, installation of telephone and computer cabling, access to chase spaces, cutting of walls or ceiling where dust migration can be controlled, sanding of walls for painting or wall covering, removal of

floor coverings, ceiling tiles and casework, new wall construction, minor duct work, electrical or plumbing work above ceilings, and any activity that cannot be completed within a single work shift.

OR

Class III is for major demolition and construction projects. Work includes, but is not limited to, activities which require consecutive work shifts, heavy demolition, the removal of a complete cabling system, and new construction.

The Facility Contact or the DMH Capital Improvements Administrator will help you determine which Class applies to the particular project:

A. Class I: Contractor shall perform the following precautionary measures during the project:

1. Execute work by methods to minimize raising dust from construction operations.
2. Immediately replace a ceiling tile displaced for visual inspection.

B. Class I: Contractor shall perform the following measures upon completion of the project:

1. No work is required.

OR

A. Class II: Contractor shall perform the following precautionary measures during the project:

1. Provide active means to prevent airborne dust from dispersing into the atmosphere.
2. Water mist work surfaces to control dust while cutting.
3. Seal unused doors with duct tape.
4. Block off and seal air vents.
5. Place dust mat at entrance and exit of work area.
6. Remove or isolate HVAC system in areas where work is being performed.

B. Class II: Contractor shall perform the following measures upon completion of the project:

1. Wipe work surfaces with disinfectant.
2. Contain construction waste before transport in tightly covered containers.
3. Wet mop and/or vacuum with HEPA filtered vacuum before leaving work area.
4. Remove isolation of HVAC system in areas where work was performed.

OR

A. Class III: Contractor shall perform the following precautionary measures during the project:

1. Remove or isolate HVAC system in area where work is being done to prevent contamination of duct system including block off and seal air vents.
2. Complete all critical barriers, i.e., drywall, plywood, and plastic to seal area from non-work area or implement control cube method (use cart with plastic covering

and sealed connection to worksite with HEPA vacuum for vacuuming prior to exit) before construction begins.

3. Maintain negative air pressure within worksite utilizing HEPA equipped air filtration units.

4. Place dust mat at entrance and exit of work area.

5. Contain construction waste before transport in tightly covered containers.

6. Cover transport receptacles or carts. Tape covering unless solid lid.

B. Class III: Contractor shall perform the following measures upon completion of the project:

1. Do not remove barriers from work area until completed project is inspected by the Construction Representative and a Representative of the Facility's Safety and Inspection Control Section.

2. Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction.

3. Vacuum work area with HEPA filtered vacuums.

4. Wet mop area with disinfectant.

5. Remove isolation of HVAC system in areas where work is being performed.

## 3.5 SECURITY CLEARANCES AND RESTRICTIONS

### A. FMDC CONTRACTOR BACKGROUND AND ID BADGE PROCESS

1. All employees of an OA/FDMC contractor (or subcontractor performing work under an OA/FMDC contract) are required to submit a fingerprint check through the Missouri State Highway Patrol (MSHP) and the FBI enabling OA/FMDC to obtain state and national criminal background checks on the employees, unless stated otherwise in the Contractor's contract.

2. FMDC reserves the right to prohibit any employee of the Contractor from performing work in or on the premises of any facility owned, operated, or utilized by the State of Missouri for any reason.

3. The Contractor shall ensure all of its employees submit fingerprints to the Missouri State Highway Patrol and pay for the cost of such background checks. The Contractor shall submit to FMDC via email to FMDCSecurity@oa.mo.gov a list of the names of the Contractor's employees who will be fingerprinted and a signed OA/FMDC Authorization for Release of Information Confidentiality Oath for each employee. All employees of the Contractor approved by FMDC to work at a State facility must obtain a contractor ID badge from FMDC prior to beginning work on-site, unless the Director of FMDC, at the Director's discretion, waives the requirement for a contractor ID badge. The Contractor and its employees must comply with the process for background checks and contractor ID badges found on FMDC's website at: https://oa.mo.gov/facilities/facilities-operations/security-information/fmdc-contractor-background-and-id-badge

4. Fingerprints and Authorization for Release of Information Confidentiality Oath form are valid for one (1) year and must be renewed annually. Changing or adding locations

may result in additional required documentation. Certain employees may be required to be fingerprinted more frequently. OA/FMDC reserves the right to request additional background checks at any time for any reason.

5. The Contractor shall notify FMDC via email to FMDCSecurity@oa.mo.gov within 48 hours of anyone severing employment with their company.

**END OF SECTION 013513.19**

# 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. Telephone service
6. Sanitary facilities, including drinking water
7. Storm and sanitary sewer

C. Support facilities include, but are not limited to, the following:

1. Field offices and storage sheds
2. Temporary roads and paving
3. Dewatering facilities and drains
4. Temporary enclosures
5. Hoists and temporary elevator use
6. Temporary project identification signs and bulletin boards
7. Waste disposal services
8. Rodent and pest control
9. Construction aids and miscellaneous services and facilities

D. Security and protection facilities include, but are not limited to, to following:

1. Temporary fire protection
2. Barricades, warning signs, and lights
3. Sidewalk bridge or enclosure fence for the site
4. Environmental protection

## 1.3 SUBMITTALS

A. Temporary Utilities: Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.

B. Implementation and Termination Schedule: Within (15) days of the date established for commencement of the Work, submit a schedule indicating implementation and termination of each temporary utility.

## 1.4 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".

C. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

## 1.5 PROJECT CONDITIONS

A. Temporary Utilities: Prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of permanent service.

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

B. Lumber and Plywood: Comply with requirements in Division 6 Section "Rough Carpentry".

1. For signs and directory boards, provide exterior-type, Grade B-B high-density concrete form overlay plywood of sized and thicknesses indicated.

2. For fences and vision barriers, provide minimum 3/9" (9.5mm) thick exterior plywood.

3. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8" (16mm) thick exterior plywood.

C. Paint: Comply with requirements of Division 9 Section "Painting".

1. For sign panels and applying graphics, provide exterior-grade alkyd gloss enamel over exterior primer.

D. Water: Provide potable water approved by local health authorities.

E. Open-Mesh Fencing: Provide 0.120" (3mm) thick, galvanized 2" (50mm) chainlink fabric fencing 6' (2m) high with galvanized steel pipe posts, 1½" (38mm) ID for line posts and 2½" (64mm) ID for corner posts.

### 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" (19mm), heavy-duty, abrasion-resistant, flexible rubber hoses 100' (30m) 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. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered-glass enclosures where exposed to breakage. Provide exterior fixture where exposed to moisture.

F. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM, or another recognized trade association related to the type of fuel being consumed.

G. Temporary Toilet Units: Provide self-contained, single-occupant toilet units of the chemical, aerated re-circulation, or combustion type. Provide units properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.

H. Fire Extinguishers: Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, 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.

B. Provide each Facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

### 3.2 TEMPORARY UTILITY INSTALLATION

A. General: Engage the appropriate local utility company to install temporary service or connect to existing service. Where company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with company recommendations.

1. Arrange with company and existing users for a time when service can be interrupted, if necessary, to make connections for temporary services.

2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.

3. Obtain easements to bring temporary utilities to the site where the Owner's easements cannot be used for that purpose.

4. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Designer. Neither the Owner nor Designer will accept cost or use charges as a basis of claims for Change Order.

B. 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.

C. 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.

D. Temporary Lighting: When overhead floor or roof deck has been installed, provide temporary lighting with local switching.

1. Install and operate temporary lighting that will fulfill security and protection requirements without operating the entire system. Provide temporary lighting that will provide adequate illumination for construction operations and traffic conditions.

E. Temporary 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.

F. Temporary Toilets: Install self-contained toilet units. Use of pit-type privies will not be permitted. Comply with regulations and health codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.

1. Shield toilets to ensure privacy.

2. Provide separate facilities for male and female personnel.

3. Provide toilet tissue materials for each facility.

G. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up for a health and sanitary condition. Dispose of drainage properly. Supply cleaning compounds appropriate for each condition.

1. Provide paper towels or similar disposable materials for each facility.

2. Provide covered waste containers for used material.

3. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.

H. Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of storm water from heavy rains.

## 3.3 SUPPORT FACILITIES INSTALLATION

A. General: Locate field offices, storage sheds, and other temporary construction and support facilities for easy access.

1. Maintain support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.

B. Field Offices: Provide insulated, weathertight temporary offices of sufficient size to accommodate required office personnel at the Project site. Keep the office clean and orderly for use for small progress meetings. Furnish and equip office as follows:

1. Furnish with a desk and chairs, a 4-drawer file cabinet, plan table, plan rack, and a 6-shelf bookcase.

2. Equip with a water cooler and private toilet complete with water closet, lavatory, and medicine cabinet unit with a mirror.

C. Storage Facilities: The Owner will provide storage onsite as designated by the Facility Representative or the Construction Representative. Areas for use by the Contractor for storage will be identified at the Pre-Bid Meeting.

D. Construction Parking: Parking at the site will be provided in the areas designated at the Pre-Construction Meeting.

E. Temporary Lifts 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.

F. Project Identification and Temporary Signs: Prepare project identification and other signs of size indicated. Install signs where indicated to inform the public and persons seeking entrance to the Project. Support on posts or framing of preservative-treated wood or steel. Do not permit installation of unauthorized signs.

1. Project Identification Signs: Engage an experienced sign painter to apply graphics. Comply with details indicated.

2. Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors.

G. Temporary Exterior Lighting: Install exterior yard and sign lights so signs are visible when Work is being performed.

H. 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. Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer, as requested by the Designer.

B. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of the types needed to protect against reasonable predictable and controllable fire losses. Comply with NFPA 10 “Standard for Portable Fire Extinguishers” and NFPA 241 “Standard for Safeguarding Construction, Alterations, and Demolition Operations”.

1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one (1) extinguisher on each floor at or near each usable stairwell.

2. Store combustible materials in containers in fire-safe locations.

3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for fighting fires. Prohibit smoking in hazardous fire-exposure areas.

4. Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of fire ignition.

C. Permanent Fire Protection: At the earliest feasible date in each area of the Project complete installation of the permanent fire-protection facility including connected services and place into operation and use. Instruct key personnel on use of facilities.

D. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting including flashing red or amber lights.

E. Enclosure Fence: Before excavation begins, install an enclosure fence with lockable entrance gates. Locate where indicated, or enclose the entire site or the portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs, and other animals from easily entering the site, except by the entrance gates.

1. Provide open-mesh, chainlink fencing with posts set in a compacted mixture of gravel and earth.

2. Provide plywood fence, 8’ (2.5m) high, framed with (4) 2”x4” (50mm x 100mm) rails, and preservative-treated wood posts spaced not more than 8’ (2.5m) apart.

F. Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

1. Storage: Where materials and equipment must be stored and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.

G. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted or that other undesirable effects might result. Avoid use of tools and equipment

that produce harmful noise. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons or firms near the site.

## 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.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

2. Protection: Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

C. Termination and Removal: Unless the Designer requests that it be maintained longer, remove each temporary facility when the need has ended, when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are the Contractor's property. The Owner reserves the right to take possession of project identification signs.

2. At Substantial Completion, clean and renovate permanent facilities used during the construction period including, but not limited to, the following:

a. Replace air filters and clean inside of ductwork and housing.

b. Replace significantly worn parts and parts subject to unusual operating conditions.

c. Replace lamps burned out or noticeably dimmed by hours of use.

**END OF SECTION 015000**

# 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 impending 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. At least twice each month, and more often if necessary, 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. Weekly, inspect all arrangements of materials stored onsite. Re-stack, tidy, or otherwise service all material arrangements.

3. Maintain the site in a neat and orderly condition at all times.

C. Structures

1. Daily, inspect the structures and pick up all scrap, debris, and waste material. Remove all such items to the place designated for their storage.

2. Weekly, sweep all interior spaces clean. "Clean" for the purposes of this paragraph, shall be interpreted as meaning free from dust and other material capable of being removed by use of reasonable effort and handheld broom.

3. In preparation for installation of succeeding materials, clean the structures or pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using all equipment and materials required to achieve the required cleanliness.

4. Following the installation of finish floor materials, clean the finish floor daily while work is being performed in the space in which finish materials have been installed. "Clean" for the purposes of this subparagraph, shall be interpreted as meaning free from all foreign material which, in the opinion of the Construction Representative, may be injurious to the finish of the finish floor material.

## 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. Clean the Project Site, yard and grounds, in areas disturbed by construction activities including landscape development areas, of rubbish, waste material, litter, and foreign substances.

2. Sweep paved areas broom clean. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.

3. Remove petrochemical spills, stains, and other foreign deposits.

4. Remove tools, construction equipment, machinery, and surplus material from the site.

5. Remove snow and ice to provide safe access to the building.

6. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

7. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.

8. Broom clean concrete floors in unoccupied spaces.

9. Vacuum clean carpet and similar soft surfaces removing debris and excess nap. Shampoo, if required.

10. Clean transparent material, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-

obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.

11. Remove labels that are not permanent labels.

12. 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.

13. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

14. Clean plumbing fixtures to a sanitary condition free of stains, including stains resulting from water exposure.

15. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

16. Clean ducts, blowers, and coils if units were operated without filters during construction

17. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs and defective and noisy starters in fluorescent and mercury vapor fixtures.

18. 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 017900 - DEMONSTRATION AND TRAINING

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.
3. Demonstration and training video recordings.

### 1.3 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

B. Attendance Record: For each training module, submit list of participants and length of instruction time.

C. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

### 1.4 CLOSEOUT SUBMITTALS

A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.

1. Identification: On each copy, provide an applied label with the following information:

a. Name of Project.
b. Name and address of videographer.
c. Name of Architect.
d. Name of Construction Manager.
e. Name of Contractor.
f. Date of video recording.

2. Transcript: Prepared in PDF electronic format. Include a cover sheet with same label information as the corresponding video recording and a table of contents with links to corresponding training components. Include name of Project and date of video recording on each page.

3. At completion of training, submit complete training manual(s) for Owner's use in PDF electronic file format on compact disc.

## 1.5 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative experienced in operation and maintenance procedures and training.

C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Coordination". Review methods and procedures related to demonstration and training including, but not limited to, the following:

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

## 1.6 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

# PART 2 - PRODUCTS

## 2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

a. System, subsystem, and equipment descriptions.
b. Performance and design criteria if Contractor is delegated design responsibility.
c. Operating standards.
d. Regulatory requirements.
e. Equipment function.
f. Operating characteristics.
g. Limiting conditions.
h. Performance curves.

2. Documentation: Review the following items in detail:

a. Emergency manuals.
b. Operations manuals.
c. Maintenance manuals.
d. Project record documents.
e. Identification systems.
f. Warranties and bonds.
g. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

a. Instructions on meaning of warnings, trouble indications, and error messages.
b. Instructions on stopping.
c. Shutdown instructions for each type of emergency.
d. Operating instructions for conditions outside of normal operating limits.
e. Sequences for electric or electronic systems.
f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:

a. Startup procedures.
b. Equipment or system break-in procedures.
c. Routine and normal operating instructions.
d. Regulation and control procedures.
e. Control sequences.
f. Safety procedures.
g. Instructions on stopping.
h. Normal shutdown instructions.
i. Operating procedures for emergencies.
j. Operating procedures for system, subsystem, or equipment failure.
k. Seasonal and weekend operating instructions.
l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.

5. Adjustments: Include the following:

a. Alignments.
b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

    a. Diagnostic instructions.
    b. Test and inspection procedures.

7. Maintenance: Include the following:

    a. Inspection procedures.
    b. Types of cleaning agents to be used and methods of cleaning.
    c. List of cleaning agents and methods of cleaning detrimental to product.
    d. Procedures for routine cleaning
    e. Procedures for preventive maintenance.
    f. Procedures for routine maintenance.
    g. Instruction on use of special tools.

8. Repairs: Include the following:

    a. Diagnosis instructions.
    b. Repair instructions.
    c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
    d. Instructions for identifying parts and components.
    e. Review of spare parts needed for operation and maintenance.

## PART 3 - EXECUTION

### 3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 007213 "General Conditions".

B. Set up instructional equipment at instruction location.

### 3.2 INSTRUCTION

A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
2. Owner will furnish an instructor to describe Owner's operational philosophy.
3. Owner will furnish Contractor with names and positions of participants.

B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner with at least seven days' advance notice.

C. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

D. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

## 3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

1. At beginning of each training module, record each chart containing learning objective and lesson outline.

B. Video: Provide minimum 640 x 480 video resolution converted to format file type acceptable to Owner, on electronic media.

1. Electronic Media: Read-only format compact disc acceptable to Owner, with commercial-grade graphic label.
2. File Hierarchy: Organize folder structure and file locations according to project manual table of contents. Provide complete screen-based menu.
3. File Names: Utilize file names based upon name of equipment generally described in video segment, as identified in Project specifications.
4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the Equipment Demonstration and Training DVD that describes the following for each Contractor involved on the Project, arranged according to Project table of contents:

    a. Name of Contractor/Installer.
    b. Business address.
    c. Business phone number.
    d. Point of contact.
    e. E-mail address.

C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.

1. Film training session(s) in segments not to exceed 15 minutes.

    a. Produce segments to present a single significant piece of equipment per segment.
    b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
    c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.

D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.

1. Furnish additional portable lighting as required.

E. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.

F. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.

G. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

**END OF SECTION 017900**

## SECTION 07 21 00 - THERMAL INSULATION

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Spray-applied cellulosic insulation.
2. Thermal barriers

### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

### 1.3 QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

## PART 2 - PRODUCTS

### 2.1 SPRAY POLYURETHANE FOAM INSULATION

A. Closed-Cell Polyurethane Foam Insulation: ASTM C 1029, Type II, with maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84; with HFO blowing agent.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. BASF Corportiaon; Walltjte.
    b. Carlisle Construction Materials; Carlisle Spray Foam Insulation; SealTite Pro HFO.
    c. Huntsman Building Solutions; Heatlok HFO Pro.
    d. Henry Company; Permax 2.0 HFO

2. Minimum density of 2.0 lb/cu. ft., thermal resistivity of 6.2 deg F x h x sq. ft./Btu x in. at 75 deg F (43 K x m/W at 24 deg C).
3. Vapor Permeance: Maximum 1.0 perm/1 inch ASTM E 96/E 96M, Desiccant Method.

### 2.2 THERMAL BARRIERS

A. Thermal Barrier: NFPA 275, Temperature Transmission Fire Test and Integrity Fire Test.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. GCP Applied Technologies; Monokote; Z-3306.
    b. International Cellulose Corporation; Ure-K.

2. Color: Manufacturer’s standard color.

## PART 3 - EXECUTION

### 3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation or that interfere with insulation attachment.

### 3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

### 3.3 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions.

B. Spray-Applied Insulation: Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.

C. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

    1. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

### 3.4 INSTALLATION OF THERMAL BARRIERS

A. Install thermal barrier according to manufacturer’s written recommendations with thickness to meet required fire rating.

B. Cure insulation with continuous natural or mechanical ventilation.

C. Remove and dispose of over-spray.

## 3.5 PROTECTION

A. Protect installed insulation thermal barriers from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

**END OF SECTION 07 21 00**

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# SECTION 210010 – GENERAL FIRE SUPPRESSION REQUIRMENTS

## PART 1 - GENERAL REQUIREMENTS

### 1.1 DESCRIPTION OF WORK

A. This Division requires the furnishing and installing of complete functioning systems, and each element thereof, as specified or indicated on the Drawings and Specifications or reasonably inferred; including every article, device or accessory (whether or not specifically called for by item) reasonably necessary to facilitate each system's functioning as indicated by the design and the equipment specified. Elements of the work include materials, labor, supervision, supplies, equipment, transportation, and utilities.

B. Division 21 of the Specifications and Drawings numbered with prefixes FP generally describe these systems, but the scope of the Fire Suppression work includes all such work indicated in the Contract Documents: Instructions to Bidders; Proposal Form; General Conditions; Supplementary General Conditions; Architectural, Structural, Fire Suppression, Mechanical, Plumbing, Fire Alarm and Electrical Drawings and Specifications; and Addenda.

C. The Drawings have been prepared diagrammatically intended to convey the scope of work, indicating the intended general location and arrangement of the equipment, piping, etc. without showing all the exact details as to elevations, offsets, pipe routing, and other installation requirements. The Contractor shall use the Drawings as a guide when laying out the work and shall verify that materials and equipment will fit into the designated spaces, and which, when installed per manufacturers requirements, will ensure a complete, coordinated, satisfactory and properly operating system.

D. Related Sections: The following sections contain requirements that relate to this Section:

1. Division 21 Section 210500 "Common Work Results for Fire Suppression," for materials and methods for wall and floor penetrations.
2. Division 21 Section 210515 "Basic Fire Suppression Piping Material and Methods," for general piping and fitting materials and methods.
3. Division 21 Section 210553 “Identification for Fire Suppression Piping and Equipment” for labeling and identification of installed fire suppression equipment.
4. Division 21 Section 211313 "Water-Based Fire Suppression Systems" for fire suppression sprinkler systems inside the building.

### 1.2 QUALITY ASSURANCE

A. All work under this division shall be executed in a thorough professional manner by competent and experienced workmen licensed to perform the Work specified.

B. All work shall be installed in strict conformance with manufacturer’s requirements and recommendations. Equipment and materials shall be installed in a neat and professional manner and shall be aligned, leveled, and adjusted for satisfactory operation.

C. Material and equipment shall be new, shall be of the best quality and design, shall be current model of the manufacturer, shall be free from defects and imperfections and shall

have markings or a nameplate identifying the manufacturer and providing sufficient reference to establish quality, size and capacity. Material and equipment of the same type shall be made by the same manufacturer whenever practicable.

D. Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

F. Threaded joints shall conform to ASME B1.20.1, Pipe Threads, General Purpose and the Pipe Fitters Handbook.

G. Regulatory Requirements: Comply with all standards listed in Section 1.2 and all applicable local requirements.

H. All electrical equipment provided and the wiring and installation of electrical equipment shall be in accordance with the requirements of this Section, Division 26.

I. Through and Membrane Penetration Firestopping Systems Installer Qualifications: A firm experienced in installing penetration firestopping systems similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its penetration firestopping system products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

## 1.3 CODES, REFERENCES AND STANDARDS

A. Execute Work in accordance with the National Fire Protection Association Standards and all Local, State, and National codes, ordinances and regulations in force governing the particular class of Work involved. Obtain timely inspections by the constituted authorities, and upon final completion of the Work obtain and deliver to the Owner executed final certificates of acceptance from the Authority Having Jurisdiction.

B. Any conflict between these Specifications and accompanying Drawings and the applicable Local, State and Federal codes, ordinances and regulations shall be reported to the Architect in sufficient time, prior to the submission of Bids, to prepare the Supplementary Drawings and Specification Addenda required to resolve the conflict.

C. The governing codes are minimum requirements. Where these Drawings and Specifications exceed the code requirements, these Drawings and Specification shall prevail.

D. All material, manufacturing methods, handling, dimensions, method or installation and test procedure shall conform to but not be limited to the following industry standards and codes.

1. NFPA (National Fire Protection Association) 13, “Installation of Sprinkler Systems”, 2016 Edition.

2. Underwriters Laboratories, “Fire Protection Equipment Directory”, Latest Edition.

3. International Building Code (IBC), 2018 Edition with local amendments.

4. International Fire Code (IFC), 2018 Edition with local amendments.

E. Contractor shall comply with rules and regulations of public utilities and municipal departments affected by connections of services.

F. All Fire Suppression work shall be performed in compliance with applicable safety regulations, including OSHA regulations. Safety lights, guards, shoring and warning signs required for the performance of the Fire Suppression work shall be provided by the Contractor.

## 1.4 DEFINITIONS

A. General:

1. Furnish: The term “furnish” is used to mean “supply and deliver to the project site, ready for unloading, unpacking, assembly, installation and similar operations.”

2. Install: The term “install” is used to describe operations at the project site including the actual “unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.”

3. Provide: The term “provide” means “to furnish and install, complete and ready for the intended use.” When 'furnish', 'install', 'perform', or 'provide' is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.

4. Furnished by Owner or Furnished by Others: The item will be furnished by the Owner or Others. It is to be installed and connected under the requirements of this Division, complete and ready for operation, including items incidental to the Work, including services necessary for proper installation and operation. The installation shall be included under the guarantee required by this Division.

5. Engineer: Where referenced in this Division, “Engineer” is the Engineer of Record and the Design Professional for the Work under this Division, and is a Consultant to, and an authorized representative of, the Architect, as defined in the General and/or Supplementary Conditions. When used in this Division, it means increased involvement by, and obligations to, the Engineer, in addition to involvement by, and obligations to, the “Architect”.

6. AHJ: The local code and/or inspection agency (Authority) Having Jurisdiction over the Work.

7. NRTL: Nationally Recognized Testing Laboratory, as defined and listed by OSHA in 29 CFR 1910.7 (e.g., UL, ETL, CSA, etc.), and acceptable to the Authority having Jurisdiction (AHJ) over this project. Nationally Recognized Testing Laboratories and standards listed are used only to represent the characteristics required and are not intended to restrict the use of other listed Manufacturers and models that meet the specified criteria.

8. Substitution: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor. Substitutions include Value Engineering proposals.

a. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.

b. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

9. Value Engineering: A systematic method to improve the "value" of goods and services by using an examination of function. Value, as defined, is the ratio of function to cost. Value can therefore be increased by either improving the function or reducing the cost. The goal of VE is to achieve the desired function at the lowest overall cost consistent with required performance.

B. The terms "approved equal", "equivalent", or "equal" are used synonymously and shall mean "accepted by or acceptable to the Engineer as equivalent to the item or manufacturer specified". The term "approved" shall mean labeled, listed, or both, by an NRTL, and acceptable to the AHJ over this project.

C. Pipe sizes used in this Specification are Nominal Pipe Size (NPS).

D. Other definitions for fire protection systems are listed in NFPA Standards 13,.

E. Working Plans, also referred to as Fire Protection Drawings as used in this Section means those documents (including drawings and calculations) prepared pursuant to the requirements contained in NFPA 13 for obtaining approval of the Authority Having Jurisdiction.

F. The following definitions apply to excavation operations:

1. Additional Excavation: Where excavation has reached required subgrade elevations, if unsuitable bearing materials are encountered, continue excavation until suitable bearing materials are reached. The Contract Sum may be adjusted by an appropriate Contract Modification.

2. Sub-base: as used in this Section refers to the compacted soil layer used in pavement systems between the subgrade and the pavement base course material.

3. Subgrade: as used in this Section refers to the compacted soil immediately below the slab or pavement system.

4. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction from the Architect.

## 1.5 COORDINATION

A. The Contractor shall visit the site and ascertain the conditions to be encountered while installing the Work under this Division, verify all dimensions and locations before purchasing equipment or commencing work, and make due provision for same in the bid. Failure to comply with this requirement shall not be considered justification for omission, alteration, incorrect or faulty installation of Work under this Division or for additional compensation for Work covered by this Division.

B. The Contractor shall refer to Drawings of the other disciplines and to relevant equipment drawings and shop drawings to determine the extent of clear spaces. The Contractor shall make offsets required to clear equipment, beams and other structural members; and to facilitate concealing piping in the manner anticipated in the design.

C. The Contractor shall maintain a foreman on the jobsite at all times to coordinate his work with other contractors and subcontractors so that various components of the Fire Suppression systems will be installed at the proper time, will fit the available space, and will allow proper service access to the equipment. Carry on the work in such a manner that the work of the other contractors and trades will not be handicapped, hindered, or delayed at any time.

D. Work of this Division shall progress according to the "Construction Schedule" as established by the Prime Contractor and his subcontractors and as approved by the Architect/Engineer. Cooperate in establishing these schedules and perform the Work under this Division, in a timely manner in conformance with the construction schedule so as to ensure successful achievement of schedule dates.

E. The contractor shall coordinate work in this section with all related trades. Work and/or equipment provided in other sections and related to the fire protection system shall include, but not be limited to:

1. Sprinkler monitoring equipment (water flow switches, valve tampers, etc) shall be provided by the fire sprinkler installer, but wired and connected by Division 28.

F. System shall be complete and operational with power and control wiring provided to meet the design intent shown on the drawings and described within the specification sections.

## 1.6 MEASUREMENTS AND LAYOUTS

A. The drawings are schematic in nature, but show the various components of the systems approximately to scale and attempt to indicate how they are to be integrated with other parts of the building. Figured dimensions shall be taken in preference to scale dimensions. Determine exact locations by job measurements, by checking the requirements of other trades, and by reviewing the Contract Documents. The Contractor will be held responsible for errors which could have been avoided by proper checking and inspection.

## 1.7 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to the requirements of individual Sections. Additionally, prepare coordination drawings as required scope of installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one trade.

1. Information shall be project specific and drawn accurately to a scale large enough to resolve conflicts. Do not base coordination drawings on standard dimensional data.

2. Prepare floorplans, sections, elevations, and details as needed to adequately describe relationship of various systems and components.

3. Clearly indicate functional and spatial relationships of components of all systems specified in the Contract Documents, including but not limited to: architectural, structural, civil, mechanical, electrical, fire protection, and specialty systems.

4. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.

5. Show location and size of access doors required for access to concealed equipment, fittings, controls, terminations, and cabling.

6. Indicate required installation sequence to minimize conflicts between entities.

7. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Contract Administrator indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

8. The details of the coordination are the responsibility of the Contractor and, where indicated on the Drawings, minor adjustments in raceway routing, device placement, device type, or equipment arrangement are not to be considered changes to the Contract.

B. Equipment Room Coordination Drawings: In accordance with the submittal procedures outlined within these Specifications, provide dimensioned layouts of electrical equipment locations within electrical rooms/closets, mechanical rooms, generator rooms, and fire pump rooms with equipment drawn to scale and identified therein.

1. Clearly identify all required working clearances and access provisions required for installation and maintenance.

2. Equipment layouts should be arranged accounting for considerations for required door openings and the clearances required by the equipment manufacturer.

3. Indicate path to allow for the future removal of each large piece of equipment (up to and including generators and unit sub-station transformers) without removal of non-related equipment or architectural elements.

4. Include work provided by others routed through the equipment rooms.

C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:

1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.

2. BIM File Incorporation: Develop and incorporate coordination drawing files into Building Information Model established for Project.

   a. Perform three-dimensional component conflict analysis as part of preparation of coordination drawings. Resolve component conflicts prior to submittal. Indicate where conflict resolution requires modification of design requirements by Contract Administrator.

3. Where the Engineer’s digital data files are provided to the Contractor for use in preparing coordination digital data files, the Engineer makes no representations as to the accuracy or completeness of digital data files as they relate to the Drawings or Specifications.

4. Submit coordination drawings in accordance with the submittal procedures outlined within these Specifications.

## 1.8 SUBMITTALS

A. Refer to Division 01 and General Conditions for submittal requirements in addition to requirements specified herein.

B. Refer to Division 01 for acceptance of electronic submittals. If not specified by Division 01, provide electronic submittals. If Division 01 requires paper submittals, provide the quantity of submittals required, but no fewer than seven (7) sets.

C. For electronic submittals, Contractor shall submit the documents in accordance with this Section and the procedures specified in Division 01. Contractor shall notify the Contract Administrator and Engineer that the submittals have been posted. If electronic submittal procedures are not defined in Division 01, Contractor shall include the website, username and password information needed to access the submittals. For submittals sent by e-mail, Contractor shall copy the Contract Administrator's and Engineer's designated representatives. Contractor shall allow for the Engineer Review Time as specified. Contractor shall submit only the documents required to purchase the materials and/or equipment in the submittal.

D. Engineer Review Time: Transmit submittals as early as required to support the project schedule. Allow two weeks for Engineer review time or time specified in the Engineer's Agreement with the Client, plus to/from mailing time via the Contract Administrator, plus a duplication of this time for resubmittal if required. Transmit submittals as soon as possible after Notice to Proceed and before Mechanical construction starts.

E. Submittals and shop drawings shall not contain the firm name, logo, seal, or signature of the Engineer. They shall not be copies of the work product of the Engineer. If the Contractor desires to use elements of such product, the license agreement for transfer of information obtained from the Engineer must be used.

F. Assemble and submit for review manufacturer product literature for material and equipment to be furnished and/or installed under this Division. Literature shall include shop drawings, manufacturer product data, performance sheets, samples, and other submittals required by this Division as noted in each individual Section. General product catalog data not specifically noted to be part of the specified product will be rejected and returned without review.

G. Separate submittals according to individual specification sections. Only resubmit those sections requested for resubmittal.

H. Provide submittals in sufficient detail so as to demonstrate compliance with these Contract Documents and the design concept. Highlight, mark, list or indicate the materials, performance criteria and accessories that are being proposed. Illegible submittals will be rejected and returned without review.

I. Refer to individual Sections for additional submittal requirements.

J. Before transmitting submittals and material lists, verify that the equipment submitted is mutually compatible with and suitable for the intended use. Verify that the equipment will fit the available space and maintain manufacturer recommended service clearances. If the size of equipment furnished makes necessary any change in location, or configuration, submit a shop drawing showing the proposed layout.

K. Submittals shall contain the following information:

1. The project name.
2. The applicable specification section and paragraph.
3. Equipment identification acronym as used on the drawings.
4. The submittal date.
5. The Contractor's stamp, which shall certify that the stamped drawings have been checked by the Contractor, comply with the Drawings and Specifications, and have been coordinated with other trades.
6. Submittals not so identified will be returned to the Contractor without action.

L. The checking and subsequent acceptance by the Engineer and/or Contract Administrator of submittals shall not relieve responsibility from the Contractor for (1) deviations from Drawings and Specifications; (2) errors in dimensions, details, sizes of equipment, or quantities; (3) omissions of components or fittings; and (4) not coordinating items with actual building conditions and adjacent work. Contractor shall request and secure written acceptance from the Engineer and Contract Administrator prior to implementing any deviation.

M. Provide shop drawings prepared in accordance with referenced standards identified as "Working Plans", including hydraulic calculations where applicable. Shop drawings shall be developed by minimum NICET Level III technician. Submit copies of the certification for the designer with submittal. Shop drawings consisting of the following shall be furnished at a minimum. Refer to NFPA 13 for additional requirements.

1. Scaled site plan indicating underground piping with sizes and hydrants utilized for flow test in relation to the building.
2. Layout drawings of complete fire sprinkler system indicating relationship to all other trades. This shall include all equipment, piping and a reflected ceiling plan indicating sprinkler locations.
3. Complete details and sections as required to clearly define and clarify the design indicated.
4. Shop drawings shall be to a standard scale and not less than 3/32" = 1’-0".
5. Shop drawings shall be produced using computer-aided design. Hand drawn documents will not be reviewed or approved.
6. Hydraulic calculations shall be based on a water flow test conducted at the site within twelve (12) months of the submittal of plans for approval. The contractor shall be responsible for obtaining the flow test if existing data is not provided in contract documents. Flow test information shall be documented on shop drawings with an accompanying site plan to scale. Contractor shall verify with AHJ any

minimum safety factor requirements. Demand shall not be less than 5 psibelow the supply at the demand point.

a. Hydrant testing shall be in accordance with NFPA 13 and 291 requirements.

7. Available fire-hydrant flow test records indicate the following conditions:

a. Date: 08/12/2024

b. Time: na

c. Performed by: Jayhawk Fire Sprinkler

d. Location of Residual Fire Hydrant: SW Corner Cottage B

e. Location of Flow Fire Hydrant: Admin Building

f. Static Pressure at Residual Fire Hydrant: 50 psig.

g. Measured Flow at Flow Fire Hydrant: 291 gpm.

h. Residual Pressure at Residual Fire Hydrant: 3 psig.

N. Contractor shall prepare installation drawings (working shop drawings) based upon this design. Requests for deviations from the approved design shall be submitted in writing to the Engineer of Record for approval. Shop drawings showing deviations from the design without prior approval will not be approved.

O. Provide Test Reports and Certificates including:

1. "Contractor's Material & Test Certificate for Aboveground Piping"

2. "Contractor's Material & Test Certificate for Underground Piping" as described in NFPA

a. Underground piping test certificate shall be obtained prior to connection of the aboveground system.

P. Provide welders' qualification certificates.

Q. BIM Incorporation: Develop and incorporate Shop Drawing files into BIM established for Project.

## 1.9 ELECTRONIC DRAWING FILES

A. Contractor may request an electronic version of the contract drawing set in AutoCAD format from the Engineer for a fee of $250. Contact the Architect for written authorization. Contact the Engineer for the release agreement form and specify the shipping method and drawing format. Allow up to ten (10) working days for electronic file delivery after authorization and release agreements are completed and delivered to the Engineer.

## 1.10 SUBSTITUTIONS

A. Refer to Division 1 and General Conditions for substitutions in addition to requirements specified herein.

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

C. The base bid shall include only the products from manufacturers specifically named in the drawings and specifications.

## 1.11 OPERATION AND MAINTENANCE MANUALS

A. Refer to Division 1 and General Conditions for Operation and Maintenance Manuals in addition to requirements specified herein.

## 1.12 SPARE PARTS

A. Provide to the Owner the spare parts specified in the individual sections in Division 21 specifications.

## 1.13 RECORD DRAWINGS

A. Refer to Division 01 and General Conditions for Record Drawings in addition to requirements specified herein.

## 1.14 PAINTING

A. Exposed ferrous surfaces, including pipe, pipe hangers, equipment stands and supports shall be painted by the Fire Suppression Contractor using materials and methods as specified under Division 9 of the Specifications; colors shall be as selected by the Architect.

B. Factory finishes, shop priming and special finishes are specified in the individual equipment specification sections.

C. Where factory finishes are provided and no additional field painting is specified, marred or damaged surfaces shall be touched up or refinished so as to leave a smooth, uniform finish.

## 1.15 DELIVERY, STORAGE AND HANDLING

A. Refer to Division 1 and General Conditions for Delivery, Storage and Handling in addition to requirements specified herein.

## 1.16 GUARANTEES AND WARRANTIES

A. Refer to Division 1 and General Conditions for Guarantees and Warranties in addition to requirements specified herein.

B. Furnish service and maintenance of fire protection system for one year from date of substantial completion.

C. Each system and element thereof shall be warranted against defects due to faulty workmanship, design or material for a period of 12 months from date of Substantial Completion, unless specific items are noted to carry a longer warranty in the Construction Documents or manufacturer's standard warranty. The Contractor shall remedy defects

occurring within a period of one year from the date of Substantial Completion or as stated in the General Conditions.

D. The following additional items shall be guaranteed:

1. Piping shall be free from obstructions, holes or breaks of any nature.

2. Proper sloping of pipe to drain in each piping system per NFPA 13.

E. The above guarantees shall include labor (including travel expenses), troubleshooting and material; and repairs or replacements shall be made without additional cost to the Owner.

F. The remedial work shall be performed promptly, upon written notice from the Architect or Owner.

G. At the time of Substantial Completion, deliver to the Owner warranties with terms extending beyond the one year guarantee period, each warranty instrument being addressed and stating the commencement date and term.

## 1.17 PROJECT CONDITIONS

A. Conditions Affecting Work In Existing Buildings:

1. The Drawings describe the general nature of remodeling to the existing building. However, the Contractor shall visit the site prior to submitting their bid to determine the nature and extent of work involved.

2. Work in the existing building shall be scheduled with the Owner.

3. Certain demolition work must be performed prior to the remodeling. The Fire Suppression Contractor shall perform the demolition which involves Fire Suppression and Fire Suppression systems, equipment, piping, equipment supports or foundations and materials.

4. Fire Suppression Contractor shall remove articles which are not required for the new work. Unless otherwise indicated, each item removed by the Fire Suppression Contractor during this demolition shall be removed by the Fire Suppression Contractor from the premises and disposed of in accordance with applicable federal, state and local regulations.

5. Fire Suppression Contractor shall relocate and reconnect Fire Suppression equipment that must be relocated in order to accomplish the remodeling shown in the Drawings or indicated in the Specifications. Where Fire Suppression equipment or materials are removed, the Fire Suppression Contractor shall cap unused piping beyond the floor line or wall line to facilitate restoration of finish.

6. General Contractor shall install finish material.

7. Obtain permission from the Architect for channeling of floors or walls not specifically noted on the Drawings.

8. Protect adjacent materials indicated to remain. Install and maintain dust and noise barriers to keep dirt, dust, and noise from being transmitted to adjacent areas. Remove protection and barriers after demolition operations are complete.

9. Locate, identify, and protect Fire Suppression services passing through demolition area and serving other areas outside the demolition limits. Maintain services to

areas outside demolition limits. When services must be interrupted, install temporary services for affected areas.

B. Environmental Conditions: Apply joint sealers under temperature and humidity conditions within the limits permitted by the joint sealer manufacturer. Do not apply joint sealers to wet substrates.

## PART 2 - PRODUCTS AND MATERIALS

### 2.1 GENERAL

A. Electrical Contractors shall provide all motors, starters, disconnects, wire, conduit, etc. as specified in the Construction Documents. If, however, the Fire Suppression Contractor furnishes a piece of equipment requiring a different motor, starter, disconnect, wire size, etc. than what is shown and/or intended on the Construction Documents, the Fire Suppression Contractor shall coordinate the requirements with any other Contractor and shall be responsible for any additional cost incurred by any other Contractor that is associated with installing the different equipment and related accessories for proper working condition.

B. Refer to Division 26, "Common Work Results for Electrical" for specification of motor connections.

C. All fire protection equipment shall be UL listed for its intended use and in conformance with the applicable NFPA codes.

D. System Pressures: All system components shall be listed for the actual designed system pressures.

1. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.

### 2.2 SOIL MATERIALS

A. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, or natural or crushed sand.

B. Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, with 100 percent passing a 1-1/2-inch sieve, and not more than 5 percent passing a No. 4 sieve.

C. Backfill and Fill Materials: Materials complying with ASTM D2487 soil classification groups GW, GP, GM, SM, SW, and SP; free of clay, rock, or gravel larger than 2 inches in any dimension; debris; waste; frozen materials; and vegetable and other deleterious matter.

## PART 3 - EXECUTION

### 3.1 GENERAL

A. The Contractor shall install, and test all new equipment identified in this contract and revise existing equipment as noted.

B. Installation shall be in accordance with NFPA requirements and the Contractor shall have employed or enlist the design services of at least one minimum NICET Level II certified technician.

C. Installer: Company specializing in the products indicated in this section with minimum three years documented experience. Shall be bondable and licensed contractor and employ full-time factory-trained and certified installers and technicians. Installers shall provide with the fire sprinkler submittal proof of factory training for each installer.

D. The Contractor shall provide all required equipment, sprinklers and piping for a complete and operational fire protection system. All components shall be installed in accordance with the guidelines of these specifications and documents as well as the NFPA codes and standards listed in these specifications.

E. The General Contractor is the central authority governing the total responsibility of all trade contractors. Therefore, deviations and clarifications of this schedule are permitted provided the General Contractor assumes responsibility to coordinate the trade contractors different than as indicated herein. If deviations or clarifications to this schedule are implemented, submit a record copy to the Engineer.

## 3.2 PERMITS

A. Secure and pay for permits required in connection with the installation of the Fire Suppression Work. Arrange with the various utility companies for the installation and connection of required utilities for this facility and pay charges associated therewith including connection charges and inspection fees, except where these services or fees are designated to be provided by others.

## 3.3 PREPARATION

A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Section.

B. Report test results promptly and in writing.

## 3.4 EXISTING UTILITIES

A. Schedule and coordinate with the Utility Company, Owner and with the Engineer connection to, or relocation of, or discontinuation of normal utility services from existing utility lines. Premium time required for any such work shall be included in the bid.

B. Existing utilities damaged due to the operations of utility work for this project shall be repaired to the satisfaction of the Owner or Utility Company without additional cost.

C. Utilities shall not be left disconnected at the end of a work day or over a weekend unless authorized by representatives of the Owner or Engineer.

D. Repairs and restoration of utilities shall be made before workmen leave the project at the end of the workday in which the interruption takes place.

E. Contractor shall include in his bid the cost of furnishing temporary facilities to provide services during interruption of normal utility service.

## 3.5 SELECTIVE DEMOLITION

A. General: Demolish, remove, demount, and disconnect abandoned Fire Suppression materials and equipment indicated to be removed and not indicated to be salvaged or saved.

B. Materials and equipment to be salvaged: Remove, demount, and disconnect existing Fire Suppression materials and equipment indicated to be removed and salvaged, and deliver materials and equipment to the location designated for storage.

C. Disposal and Cleanup: Remove from the site and legally dispose of demolished materials and equipment not indicated to be salvaged.

D. Fire Suppression Materials and Equipment: Demolish, remove, demount, and disconnect the following items:

1. Inactive and obsolete piping, fittings, specialties, equipment and controls.

a. Piping embedded in floors, walls, and ceilings may remain if such materials do not interfere with new installations. Remove exposed materials and materials above accessible ceilings. Drain and cap piping allowed to remain.

b. Perform cutting and patching required for demolition in accordance with Division 1, General Conditions and "Cutting and Patching" portion of this Section in Division 21.

## 3.6 EXCAVATION AND BACKFILLING

A. Perform excavation of every description, of whatever substance encountered and to the depth required in connection with the installation of the work under this Division. Excavation shall be in conformance with applicable Division and section of the General Specifications.

B. Roads, alleys, streets and sidewalks damaged during this work shall be restored to the satisfaction of Authorities Having Jurisdiction.

C. Trenches close to walks or columns shall not be excavated without prior consultation with the Architect.

D. The Contractor shall erect barricades around excavations, for safety, and shall place an adequate number of amber lights on or near the work and shall keep them burning from dusk to dawn. The Contractor shall be held responsible for any damage that any parties may sustain in consequence of neglecting the necessary precautions in prosecuting the work.

E. Slope sides of excavations to comply with local, state and federal codes and ordinances. Shoring and Bracing: Establish requirements for trench shoring and bracing to comply with local, state and federal codes and authorities. Maintain shoring and bracing in excavations regardless of time period excavations will be open.

1. Remove shoring and bracing when no longer required. Where sheeting is allowed to remain, cut top of sheeting at an elevation of 30 inches below finished grade elevation.

F. Install sediment and erosion control measures in accordance with local codes and ordinances.

G. Dewatering: Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.

1. Do not allow water to accumulate in excavations. Remove water to prevent softening of bearing materials. Provide and maintain dewatering system components necessary to convey water away from excavations.

2. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey surface water to collecting or run-off areas. Do not use trench excavations as temporary drainage ditches. In no case shall sewers be used as drains for such water.

H. Material Storage: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade, and shape stockpiles for proper drainage.

1. Locate and retain soil materials away from edge of excavations. Do not store within drip-line of trees indicated to remain.

2. Remove and legally dispose of excess excavated materials and materials not acceptable for use as backfill or fill.

I. Trenching: Excavate trenches for Fire Suppression installations as follows:

1. Excavate trenches to the uniform width, sufficiently wide to provide ample working room and a minimum of 6 to 9 inches clearance on both sides of pipe and equipment.

2. Excavate trenches to depth indicated or required for piping to establish indicated slope and invert elevations. Beyond building perimeter, excavate trenches to an elevation below frost line.

3. Limit the length of open trench to that in which pipe can be installed, tested, and the trench backfilled within the same day.

4. Where rock is encountered, carry excavation below required elevation and backfill with a layer of crushed stone or gravel prior to installation of pipe. Provide a minimum of 6 inches of stone or gravel cushion between rock bearing surface and pipe.

5. Excavate trenches for piping and equipment with bottoms of trench to accurate elevations for support of pipe and equipment on undisturbed soil.

a. For pipes or equipment 6 inches or larger in nominal size, shape bottom of trench to fit bottom 1/4 of the circumference. Fill unevenness with tamped sand backfill. At each pipe joint over-excavate to relieve the bell or pipe joint of the pipe of loads, and to ensure continuous bearing of the pipe barrel on the bearing surface.

J. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35°F.

K. Backfilling and Filling: Place soil materials in layers to required subgrade elevations for each area classification listed below, using materials specified in Part 2 of this Section.

1. Under walks and pavements, use a combination of subbase materials and excavated or borrowed materials.

2. Under building slabs, use drainage fill materials.

3. Under piping and equipment, use subbase materials where required over rock bearing surface and for correction of unauthorized excavation.

4. For piping less than 30 inches below surface of roadways, provide 4-inch-thick concrete base slab support. After installation and testing of piping, provide a 4-inch thick concrete encasement (sides and top) prior to backfilling and placement of roadway subbase.

5. Other areas, use excavated or borrowed materials.

L. Backfill excavations as promptly as work permits, but not until completion of the following:

1. Inspection, testing, approval, and locations of underground utilities have been recorded.

2. Removal of concrete formwork.

3. Removal of shoring and bracing, and backfilling of voids.

4. Removal of trash and debris.

M. Placement and Compaction: Place backfill and fill materials in layers of not more than 8 inches in loose depth for material compacted by heavy equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

N. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification specified below. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

O. Place backfill and fill materials evenly adjacent to structures, piping, and equipment to required elevations. Prevent displacement of piping and equipment by carrying material uniformly around them to approximately same elevation in each lift.

P. Compaction: Control soil compaction during construction, providing minimum percentage of density specified for each area classification indicated below.

1. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density for soils which exhibit a well-defined moisture-density relationship (cohesive soils), determined in accordance with ASTM D 1557 and not less than the following percentages of relative density, determined in accordance with ASTM D 2049, for soils which will not exhibit a well-defined moisture-density relationship (cohesionless soils).

a. Areas under structures, building slabs, steps, and pavements: Compact top 12 inches of subgrade and each layer of backfill or fill material to 90 percent maximum density for cohesive material, or 95 percent relative density for cohesionless material.

b. Areas under walkways: Compact top 6 inches of subgrade and each layer of backfill or fill material to 90 percent maximum density for cohesive material, or 95 percent relative density for cohesionless material.

c. Other areas: Compact top 6 inches of subgrade and each layer of backfill or fill material to 85 percent maximum density for cohesive soils, and 90 percent relative density for cohesionless soils.

2. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water. Apply water in minimum quantity necessary to achieve required moisture content and to prevent water appearing on surface during, or subsequent to, compaction operations.

Q. Subsidence: Where subsidence occurs at Fire Suppression installation excavations during the period 12 months after Substantial Completion, remove surface treatment (i.e., pavement, lawn, or other finish), add backfill material, compact to specified conditions, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent areas.

## 3.7 CUTTING AND PATCHING

A. The Contractor shall do necessary cutting of walls, floors, ceilings and roofs.

B. No structural member shall be cut without permission from Architect and Structural Engineer.

C. Patch around openings to match adjacent construction.

D. After the final waterproofing membrane has been installed, roofs may be cut only with written permission by the Architect.

## 3.8 CLEANING

A. Dirt and refuse resulting from the performance of the work shall be removed from the premises as required to prevent accumulation. The Fire Suppression Contractor shall cooperate in maintaining reasonably clean premises at all times.

B. Immediately prior to the final inspection, the Fire Suppression Contractor shall clean material and equipment installed under the Fire Suppression Contract. Dirt, dust, plaster, stains, and foreign matter shall be removed from surfaces including components internal to equipment. Damaged finishes shall be touched-up and restored to their original condition.

**END OF SECTION 210010**

# SECTION 210500 – COMMON WORK RESULTS FOR FIRE SUPPRESSION

## PART 1 - GENERAL REQUIREMENTS

### 1.1 SUMMARY

A. This Section includes limited scope general construction materials and methods for application with Fire Suppression installations as follows:

1. Access panels and doors in walls, ceilings, and floors for access to Fire Suppression materials and equipment.
2. Miscellaneous metals for support of Fire Suppression materials and equipment.
3. Wood grounds, nailers, blocking, fasteners, and anchorage for support of Fire Suppression materials and equipment.
4. Joint sealers for sealing around Fire Suppression materials and equipment.

B. Related Sections: The following sections contain requirements that relate to this Section:

1. Division 21 Section 210010 “General Fire Suppression Requirements” for requirements for hydraulic calculations, fire flow test data, obtaining electronic drawings files, shop drawings and record drawings.
2. Division 21 Section 210515 "Basic Fire Suppression Piping Material and Methods," for general piping and fitting materials and methods.
3. Division 21 Section 210553 “Identification for Fire Suppression Piping and Equipment” for labeling and identification of installed fire suppression equipment.
4. Division 21 Section 211313 "Water-Based Fire Suppression Systems" for fire suppression sprinkler systems inside the building.

### 1.2 SUBMITTALS

A. General: Submit the following in accordance with Division 1 and Division 21 Section “General Fire Suppression Requirements”.

1. Product data for the following products:
    a. Access panels and doors.
    b. Through and membrane-penetration firestopping systems.
2. Schedules indicating proposed methods and sequence of operations for selective demolition prior to commencement of Work. Include coordination for shut-off of utility services and details for dust and noise control.
    a. Coordinate sequencing with construction phasing and Owner occupancy specified in Division 1 Section "Summary of Work."

### 1.3 QUALITY ASSURANCE

A. Fire-Resistance Ratings: Where a fire-resistance classification is indicated, provide access door assembly with panel door, frame, hinge, and latch from manufacturer listed in the UL "Building Materials Directory" for rating shown.

1. Provide UL Label on each fire-rated access door.

## PART 2 - PRODUCTS AND MATERIALS

### 2.1 ACCESS TO EQUIPMENT

A. Acceptable Manufacturer:

1. Bar-Co., Inc.
2. Elmdor Stoneman.
3. JL Industries
4. Jay R. Smith Mfg. Co.
5. Karp Associates, Inc.
6. Milcor
7. Nystrom Building Products
8. Wade
9. Zurn

B. Access Doors:

1. Provide access doors for all concealed equipment, except where above lay-in ceilings. Refer to Section "Identification for Fire Suppression Piping and Equipment" for labeling of access doors.
2. Access doors shall be adequately sized for the devices served with a minimum size of 18 inches x 18 inches, furnished by the respective Contractor or Subcontractor and installed by the General Contractor.
3. Access doors must be of the proper construction for type of construction where installed.
4. The exact location of all access doors shall be verified with the Architect prior to installation.
5. Steel Access Doors and Frames: Factory-fabricated and assembled units, complete with attachment devices and fasteners ready for installation. Joints and seams shall be continuously welded steel, with welds ground smooth and flush with adjacent surfaces.
6. Frames: 16-gauge steel, with a 1-inch-wide exposed perimeter flange for units installed in unit masonry, pre-cast, or cast-in-place concrete, ceramic tile, or wood paneling.
    a. For installation in masonry, concrete, ceramic tile, or wood paneling: 1-inch-wide exposed perimeter flange and adjustable metal masonry anchors.
    b. For installation in gypsum wallboard or plaster: perforated flanges with wallboard bead.
    c. For installation in full-bed plaster applications: galvanized, expanded metal lath and exposed casing bead, welded to perimeter of frame.

7. Flush Panel Doors: 14-gauge sheet steel, with concealed spring hinges or concealed continuous piano hinge set to open 175 degrees; factory-applied prime paint.

8. Locking Devices: Flush, screwdriver-operated cam locks.

## 2.2 FIRE SUPPRESSION EQUIPMENT NAMEPLATE DATA

A. For each piece of power operated Fire Suppression equipment, provide a permanent operational data nameplate indicating manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliance's, and similar essential data. Locate nameplates in an accessible location.

## 2.3 MISCELLANEOUS METALS

A. Steel plates, shapes, bars, and bar grating: ASTM A 36.

B. Cold-Formed Steel Tubing: ASTM A 500.

C. Hot-Rolled Steel Tubing: ASTM A 501.

D. Steel Pipe: ASTM A 53, Schedule 40, welded.

E. Fasteners: Zinc-coated, type, grade, and class as required.

## 2.4 MISCELLANEOUS LUMBER

A. Framing Materials: Standard Grade, light-framing-size lumber of any species. Number 3 Common or Standard Grade boards complying with WCLIB or AWPA rules, or Number 3 boards complying with SPIB rules. Lumber shall be preservative treated in accordance with AWPB LP-2, and kiln dried to a moisture content of not more than 19 percent.

1. Framing materials shall be fire resistant treated for use in Type I and II buildings.

B. Construction Panels: Plywood panels; APA C-D PLUGGED INT, with exterior glue; thickness as indicated, or if not indicated, not less than 15/32 inches.

1. Framing materials shall be fire resistant treated for use in Type I and II buildings.

## 2.5 JOINT SEALERS

A. General: Joint sealers, joint fillers, and other related materials compatible with each other and with joint substrates under conditions of service and application.

B. Colors: As selected by the Architect from manufacturer's standard colors.

C. Elastomeric Joint Sealers: Provide the following types:

1. One-part, nonacid-curing, silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 25, for uses in non-traffic areas for masonry, glass, aluminum, and other substrates recommended by the sealant manufacturer. Provide one of the following:

a. "Dow Corning 790," Dow Corning Corp.

b. "Silglaze II SCS 2801," General Electric Co.

c. "Silpruf SCS 2000," General Electric Co.

d. "864," Pecora Corp.

e. "Rhodia 5C," Rhone-Poulenc, Inc.

f. "Spectrem 1," Tremco, Inc.

g. "Spectrem 2," Tremco, Inc.

h. "Dow Corning 795," Dow Corning Corp.

i. "Rhodia 7B," Rhone-Poulenc, Inc.

j. "Rhodia 7S," Rhone-Poulenc, Inc.

k. "Omniseal," Sonneborn Building Products Div.

2. One-part, mildew-resistant, silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 25, for uses in non-traffic areas for glass, aluminum, and nonporous joint substrates; formulated with fungicide; intended for sealing interior joints with nonporous substrates; and subject to in-service exposure to conditions of high humidity and temperature extremes. Provide one of the following:

a. "Dow Corning 786," Dow Corning Corp.

b. "Sanitary 1700," General Electric Co.

c. "898 Silicone Sanitary Sealant," Pecora Corp.

d. "OmniPlus," Sonneborn Building Products Div.

D. Acrylic-Emulsion Sealants: One-part, nonsag, mildew-resistant, paintable complying with ASTM C 834 recommended for exposed applications on interior and protected exterior locations involving joint movement of not more than plus or minus 5 percent.

1. Products: Subject to compliance with requirements, provide one of the following:

a. "Chem-Calk 600," Bostik Construction Products Div.

b. "AC-20," Pecora Corp.

c. "Sonolac," Sonneborn Building Products Div.

d. "Tremflex 834," Tremco, Inc.

## 2.6 ACOUSTICAL SEALANTS

A. General: Penetrations by pipes through surfaces that are around and between noise critical spaces shall be sleeved, packed and sealed airtight with foam rod, non-hardening sealant and/or packing material as described herein.

B. Foam Rod: Foam backer rod shall be closed cell polyethylene suitable for use as a backing for non-hardening sealant.

C. Non-Hardening Sealant: Sealant for penetrations shall be non-hardening polysulphide type. Permanently flexible, approved firestop putty may be used in lieu of the sealant on foam rod in noise critical walls that are also fire rated.

D. Packing Material: Mineral fiber; non-combustible; resistant to water, mildew and vermin. Expanding resilient foams manufactured for this purpose are an acceptable alternative only if the material density is at least 15 pcf (40 kg/m3).

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF ACCESS DOORS

A. Set frames accurately in position and securely attached to supports, with face panels plumb and level in relation to adjacent finish surfaces.

B. Adjust hardware and panels after installation for proper operation.

### 3.2 ERECTION OF METAL SUPPORTS AND ANCHORAGE

A. Cut, fit, and place miscellaneous metal fabrications accurately in location, alignment, and elevation to support and anchor Fire Suppression materials and equipment.

B. Field Welding: Comply with AWS "Structural Welding Code."

### 3.3 ERECTION OF WOOD SUPPORTS AND ANCHORAGE

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorage accurately in location, alignment, and elevation to support and anchor Fire Suppression materials and equipment.

B. Select fastener sizes that will not 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 members.

C. Attach to substrates as required to support applied loads.

### 3.4 PREPARATION FOR JOINT SEALERS

A. Surface Cleaning for Joint Sealers: Clean surfaces of joints immediately before applying joint sealers to comply with recommendations of joint sealer manufacturer.

B. Apply joint sealer primer to substrates as recommended by joint sealer manufacturer. Protect adjacent areas from spillage and migration of primers, using masking tape. Remove tape immediately after tooling without disturbing joint seal.

### 3.5 APPLICATION OF JOINT SEALERS

A. General: Comply with joint sealer manufacturers' printed application instructions applicable to products and applications indicated, except where more stringent requirements apply.

1. Comply with recommendations of ASTM C 962 for use of elastomeric joint sealants.

2. Comply with recommendations of ASTM C 790 for use of acrylic-emulsion joint sealants.

B. Tooling: Immediately after sealant application and prior to time shinning or curing begins, tool sealants to form smooth, uniform beads; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

## 3.6 PENETRATIONS:

A. New Construction:

1. Coordinate with Divisions 03 and 04 for installation of sleeves and sleeve seals integrally in cast-in-place, precast, and masonry walls and horizontal slabs where indicated on the Drawings or as required to support piping penetrations.

B. Construction in Existing Facilities:

1. Saw cut or core drill existing walls and slabs to install sleeves and sleeve seals in existing facilities. Do not cut or drill any walls or slabs without first coordinating with, and receiving approval from, the Architect, Owner, or both. Seal sleeves and sleeve seals into concrete walls or slabs with a waterproof non-shrink grout acceptable to the Architect.

C. Provide sleeves and/or box frames for openings in all concrete and masonry construction and fire or smoke partitions, for all mechanical work that passes through such construction; Coordinate with other trades and Divisions to dimension and lay out all such openings.

D. The General Contractor will provide only those openings specifically indicated on the Architectural or Structural Drawings as being provided under the General Contractor's work.

E. The cutting of new or existing construction shall not be permitted except by written approval of the Architect.

F. Floor sleeves shall be fitted with means for attachment to forms and shall be of length to extend at least two inches above the floor level.

G. Cut sleeves to length for mounting flush with both surfaces of walls.

H. Seal space outside of sleeves with grout for penetrations of concrete and masonry.

I. Seal space outside of sleeves with approved joint compound for penetrations of gypsum board assemblies.

J. All openings sleeved through underground exterior walls shall be sealed with mechanical sleeve seals as specified in Division 21 Section “Basic Fire Suppression Piping Materials and Methods

**END OF SECTION 210500**

# SECTION 210515 – BASIC FIRE SUPPRESSION PIPING MATERIALS AND METHODS

## PART 1 - GENERAL REQUIREMENTS

### 1.1 SUMMARY

A. This Section specifies piping materials and installation methods common to more than one Section of Division 21 and includes piping, joining materials, piping specialties and basic piping installation instructions.

B. Related Sections: The following sections contain requirements that relate to this Section:

1. Division 21 Section 210010 “General Fire Suppression Requirements” for requirements for hydraulic calculations, fire flow test data, obtaining electronic drawings files, shop drawings and record drawings.
2. Division 21 Section 210500 "Common Work Results for Fire Suppression," for materials and methods for wall and floor penetrations.
3. Division 21 Section 210553 “Identification for Fire Suppression Piping and Equipment” for labeling and identification of installed fire suppression equipment.
4. Division 21 Section 211313 "Water-Based Fire Suppression Systems" for fire-suppression sprinkler systems inside the building.

### 1.2 SUBMITTALS

A. Refer to Division 1 and Division 21 “General Fire Suppression Requirements” for administrative and procedural requirements for submittals.

B. Product Data: Submit product data on the following items:

1. Piping and Fittings
2. Escutcheons
3. Sleeves and Mechanical Sleeve Seals
4. Wall Pipes

### 1.3 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

B. Soldering and Brazing procedures shall conform to ANSI B9.1 Standard Safety Code for Plumbing Refrigeration.

C. Threaded joints shall conform to ASME B1.20.1, Pipe Threads, General Purpose and the Pipe Fitters Handbook.

D. UL and FM Global Compliance: Fire protection system materials and components shall be Underwriter's Laboratories listed and labeled, and Factory Mutual approved (FM Global Insureds only) for fire service.

E. Pipe, piping specialties and fittings shall be manufactured in plants located in the United States.

## PART 2 - PRODUCTS AND MATERIALS

### 2.1 GENERAL REQUIREMENTS

A. All fire suppression system materials and components essential to successful system operation shall be listed for their intended purpose.

B. General: Refer to the individual piping system specification sections in Division 21 for specifications on piping and fittings relative to that particular system.

### 2.2 STEEL PIPE AND FITTINGS

A. All piping 2-inch and smaller:

1. With the use of welded or roll grooved fittings: ASTM A135 or 795, Grade A, Schedule 10 or 40, seamless or ERW, black steel pipe.

2. With the use of threaded fittings: ASTM A135 or 795, Grade A, Schedule 40, seamless or ERW, black steel pipe.

B. All piping 2-1/2" and larger: ASTM A135 or 795, Grade A, Schedule 10, ERW, black steel pipe, roll grooved ends.

C. Piping used in dry pipe and preaction sprinkler systems shall be ASTM A135 or 795, Type E, Grade A, Schedule 40, black steel pipe, threaded or roll grooved ends.

D. All piping on the exterior of the building shall be externally galvanized or painted.

E. Acceptable alternatives to Schedule 40 and Schedule 10 pipe shall be manufactured to standards recognized by NFPA 13. Threaded pipe shall have a corrosion resistance rating (CRR) of 1.0 or greater. Crimp type couplings shall not be used. Threadable thinwall pipe with CRR less than 1.0 not permitted.

F. Cast-Iron Threaded Fittings: ANSI B16.4, Class 125, standard pattern, for threaded joints. Threads shall conform to ANSI B1.20.1.

G. Black Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends.

H. Steel Couplings: ASTM A 865, threaded

I. Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.

J. Malleable-Iron Threaded Fittings: ANSI B16.3, Class 150, standard pattern, for threaded joints. Threads shall conform to ANSI B1.20.1.

K. Malleable- or Ductile-Iron Unions: UL 860.

L. Cast-Iron Flanges: ASME 16.1, Class 125.

M. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.

N. Steel Welding Fittings: ASTM A 234/A 234M and ASME B16.9.

O. Grooved-Joint, Steel-Pipe Appurtenances

1. Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting; with dimensions matching steel pipe.

2. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213, rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

3. Grooved mechanical couplings including gaskets used on dry-pipe systems shall be listed for dry-pipe service.

## 2.3 JOINING MATERIALS

A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free.

1. Class 125, Cast-Iron Flanges and Class 150, Bronze Flat-Face Flanges: Full-face gaskets.

2. Class 250, Cast-Iron Flanges and Class 300, Steel Raised-Face Flanges: Ring-type gaskets.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

D. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

1. Use solvent cement that has a VOC content of 490 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Use adhesive primer that has a VOC content of 650 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

E. Plastic, Pipe-Flange Gasket, and Bolts and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

## 2.4 LISTED FIRE-PROTECTION VALVES

A. General Requirements:

1. Valves shall be UL listed.

2. Minimum Pressure Rating for Standard-Pressure Piping: 175 psig.

B. Check Valves:

1. Description: Swing-check type, rubber-face checks unless otherwise indicated, and ends matching piping.
2. Standard: UL 312.
3. Pressure Rating: 250 psig minimum.
4. Type: Swing check.
5. Body Material: Cast iron.
6. End Connections: Flanged or grooved.

C. Bronze OS&Y Gate Valves:

1. Description: Bronze body and bonnet and bronze stem.
2. Standard: UL 262.
3. Pressure Rating: 175 psig.
4. Body Material: Bronze.
5. End Connections: Threaded or grooved.

D. Iron OS&Y Gate Valves:

1. Description: Iron body and bonnet and bronze seating material.
2. Standard: UL 262.
3. Pressure Rating: 250 psig minimum.
4. Body Material: Cast or ductile iron.
5. End Connections: Flanged or grooved.

E. Indicating-Type Butterfly Valves:

1. Standard: UL 1091.
2. Pressure Rating: 175 psig minimum.
3. Valves NPS 2 and Smaller:
    a. Valve Type: Ball or butterfly.
    b. Body Material: Bronze.
    c. End Connections: Threaded or grooved.
4. Valves NPS 2-1/2 and Larger:
    a. Valve Type: Butterfly.
    b. Body Material: Cast or ductile iron.
    c. End Connections: Flanged or grooved.
5. Valve Operation: Integral, prewired supervisory switch and visual indicating device.

## 2.5 TRIM AND DRAIN VALVES

A. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing.
2. Pressure Rating: 175 psig minimum.

B. Automatic (Ball Drip) Drain Valves:

1. Standard: UL 1726.
2. Pressure Rating: 175 psig minimum.
3. Type: Automatic draining, ball check.
4. Size: NPS 3/4.
5. End Connections: Threaded.

## 2.6 AUTOMATIC AIR RELEASE VALVE

A. Standard: UL 2573

B. Pressure Rating: 175 psig minimum.

## 2.7 FIRE-DEPARTMENT CONNECTIONS

A. Exposed-Type, Fire-Department Connection:

1. Standard: UL 405.
2. Type: Exposed, Remote.
3. Pressure Rating: 175 psig minimum.
4. Body Material: Corrosion-resistant metal.
5. Inlets: NPS 2-1/2 brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.
6. Caps: Brass, lugged type, with gasket and chain.
7. Escutcheon Plate: Round, brass, wall type.
8. Outlet: Back, with pipe threads, NPS 4”
9. Number of Inlets: Two.
10. Escutcheon Plate Marking: Similar to "AUTO SPKR."
11. Finish: <Polished chrome plated> <Rough brass or bronze>.

## 2.8 PIPING SPECIALTIES

A. Escutcheons: Inside diameter shall closely fit pipe outside diameter, or outside of pipe insulation where pipe is insulated. Outside diameter shall completely cover the opening in floors, walls, or ceilings.

1. One-Piece, Cast-Brass Type: With polished, chrome-plated finish and setscrew fastener.
2. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.

3. Split-Casting Brass Type: With<polished, chrome-platedfinish and with concealed hinge and setscrew.

4. Split-Plate, Stamped-Steel Type: With chrome-platedfinish, concealed hinge, and spring-clip fasteners.

B. Floor Plates: Inside diameter shall closely fit pipe outside diameter. Outside diameter shall completely cover the opening in floors, walls, or ceilings.

1. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.

2. Split-Casting Floor Plates: Cast brass with concealed hinge.

C. Unions: Malleable-iron, Class 150 for low pressure service and class 250 for high pressure service; hexagonal stock, with ball-and-socket joints, metal-to-metal bronze seating surfaces; female threaded ends.

D. Dielectric Unions and Fittings: Provide factory-fabricated dielectric unions and fittings with appropriate end connections for the pipe materials in which installed (screwed, soldered, or flanged), which effectively isolate dissimilar metals, prevent galvanic action, and stop corrosion.

E. Pressure Gauges

1. Standard: UL 393.

2. Dial Size: 3-1/2- to 4-1/2-inch diameter.

3. Pressure Gage Range: 0 to 300 psig.

4. Water System Piping Gage: Include "WATER" or "AIR/WATER" label on dial face.

5. Air System Piping Gage: Include "AIR" or "AIR/WATER" label on dial face.

## 2.9 PENETRATIONS

A. Sleeves:

1. Steel Sleeves: Schedule 40 galvanized, welded steel pipe, ASTM A-53 grade A or 12 gauge (0.1084 inches) welded galvanized steel formed to a true circle concentric to the pipe.

2. Sheet-Metal Sleeves: 10 gauge (0.1382 inches), galvanized steel, round tube closed with welded longitudinal joint.

3. Frames for rectangular openings attached to forms and of a maximum dimension established by the Architect. For sleeve cross-section rectangle perimeter less than 50 inches and no side greater than 16 inches, provide 18 gauge (0.052 inches) welded galvanized steel. For sleeve cross-section rectangle perimeter equal to, or greater than, 50 inches and 1 or more sides equal to, or greater than, 16 inches, provide 10 gauge (0.1382 inches) welded galvanized steel. Notify the General Contractor or Architect before installing any box openings not shown on the Architectural or Structural Drawings.

4. Box Frames: Frames for rectangular openings shall be of welded 12 gauge steel attached to forms and of a maximum dimension established by the Architect. Contractor shall notify the General Contractor or Architect before installing any box openings not shown on the Architectural or Structural Drawings.

B. Wall Pipes

1. Cast-iron sleeve with integral clamping flange with clamping ring, bolts, and nuts for membrane flashing.

a. Underdeck Clamp: Clamping ring with setscrews.

C. Mechanical Sleeve Seals: Modular Plumbing type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve, connected with bolts and pressure plates which cause rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.

a. Pressure Plates: Carbon steel or stainless steel.

b. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, or Stainless steel of length required to secure pressure plates to sealing elements.

## PART 3 - EXECUTION

### 3.1 PREPARATION

A. Ream ends of pipes and tubes, and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris for both inside and outside of piping and fittings before assembly.

### 3.2 PIPING INSTALLATIONS

A. General Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of the piping systems. Location and arrangement of piping layout take into consideration pipe sizing and friction loss, expansion, pump sizing, and other design considerations. So far as practical, install piping as indicated. Refer to individual system specifications for requirements for coordination drawing submittals.

B. Coordinate installation of horizontal piping with other components. Allow sufficient space above removable ceiling panels to allow for panel removal (minimum 6” clearance).

C. Install system such that all piping is rigidly secured and supported. All ductwork, lights, structural members and main runs of piping shall take precedence over sprinkler piping. Cutting of structural members for passage of sprinkler pipes or hangers shall not be permitted. All horizontal piping in ceiling space shall be at an elevation above the top of light fixtures and air outlets to allow for access to light fixtures and air outlets without

removing horizontal piping. Route all sprinkler piping and provide all offsets, bends, and elbows around all mechanical, electrical, and structural members as required.

D. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated otherwise. In areas with ceilings, piping shall be routed concealed, above ceiling. In areas without ceilings, piping shall extend as high as possible.

E. Install piping free of sags and bends and with ample space between piping to permit proper insulation applications.

F. Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted, unless expressly indicated on the Drawings.

G. Locate groups of pipes parallel to each other, spaced to permit applying full insulation and servicing of valves.

H. Support piping from structure. Do not support piping from ceilings, equipment, ductwork, conduit and other non-structural elements.

I. Install sprinkler piping to provide for system drainage in accordance with NFPA 13. Install drains at low points in mains, risers, and branch lines consisting of a tee fitting, NPS 3/4 ball valve, and short NPS 3/4 threaded nipple and cap.

J. Coordinate pipe routing near electrical equipment in accordance with NFPA 70.

K. Verify final equipment locations for roughing in.

L. Deviations from approved "Working Plans" for sprinkler piping require written approval of the Authority Having Jurisdiction. Written approval shall be on file with the Engineer prior to deviating from the approved "Working Plans."

M. Install escutcheons for exposed piping penetrations of walls, ceilings, and floors.

## 3.3 JOINT CONSTRUCTION

A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.

B. Use approved fittings to make all changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

C. Install unions in pipes NPS 2 and smaller, adjacent to each valve. Unions are not required on flanged devices or in piping installations using grooved mechanical couplings.

D. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

E. Install dielectric unions to connect piping materials of dissimilar metals in dry piping systems.

F. Non-ferrous Pipe Joints:

1. Brazed and Soldered Joints: For copper tube and fitting joints, braze joints in accordance with ANSI B31.9 - Standard Code for Building Services Piping.

2. Thoroughly clean tube surface and inside surface of the cup of the fittings, using very fine emery cloth, prior to making soldered or brazed joints. Wipe tube and fittings clean and apply flux. Flux shall not be used as the sole means for cleaning tube and fitting surfaces.

G. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.

a. Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.

H. Threaded Joints: Conform to ANSI B1.20.1, tapered pipe threads for field cut threads and Pipe Fitter's Handbook. Join pipe, fittings, and valves as follows:

1. Note the internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.

2. Align threads at point of assembly.

3. Apply appropriate tape or thread compound to the external pipe threads.

4. Assemble joint to appropriate thread depth. When using a wrench on valves place the wrench on the valve end into which the pipe is being threaded.

5. Damaged Threads: Do not use pipe with threads that are corroded, or damaged. If a weld opens during cutting or threading operations, that portion of pipe shall not be used.

I. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9. Align flanged surfaces parallel. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly to appropriate torque specified by the bolt manufacturer.

J. Mechanical Grooved Joints: Roll grooves on pipe ends dimensionally compatible with the couplings. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.

K. Joints for other piping materials are specified within the respective piping system sections.

L. CPVC Pipe: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements. Apply primer.

2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.

## 3.4 FIRE DEPARTMENT CONNECTION INSTALLATION

A. Install remote-type, fire department connection where indicated on drawings.

B. Install connections between 18- and 36-inches above finished grade and as indicated on the Drawings.

C. Grout or caulk pipe penetration in exterior wall.

D. Provide minimum 36-inch working clearance around connection for fire department access.

E. Install automatic (ball drip) drain valve at each check valve for fire department connection. The drain shall discharge to floor drain.

## 3.5 ALARM DEVICE INSTALLATION

A. General: Comply with NFPA 24 for devices and methods of valve supervision.

B. Supervisory Switches: Supervise valves in open position unless noted otherwise.

1. Valves: Grind away portion of exposed valve stem. Bolt switch, with plunger in stem depression, to OS&Y gate-valve yoke.

2. Indicator Posts: Drill and thread hole in upper-barrel section at target plate. Install switch, with toggle against target plate, on barrel of indicator post.

C. Locking and Sealing: Secure unsupervised valves as follows:

1. Valves: Install chain and padlock on open OS&Y gate valve.

2. Post Indicators: Install padlock on wrench on indicator post.

D. Water-Flow Indicators: Install in fire suppression piping where indicated. Select indicator with saddle and vane matching pipe size. Drill hole in pipe, insert vane, and bolt saddle to pipe.

E. Connect alarm devices to building's fire-alarm system. Wiring and fire-alarm devices are specified in Division 28 Sections.

## 3.6 PIPING PROTECTION

A. Protect piping during construction period, to avoid clogging with dirt and debris, and to prevent damage from traffic and construction work.

B. Place plugs in ends of uncompleted piping at the end of each day or whenever work stops.

## 3.7 PENETRATIONS

A. Fire suppression penetrations occur when piping penetrate concrete slabs, concrete or masonry walls, or fire / smoke rated floor and wall assemblies.

B. Above Grade Concrete or Masonry Penetrations

1. Provide sleeves for pipes passing through above grade concrete or masonry walls, concrete floor or roof slabs. Sleeves are not required for core drilled holes in existing masonry walls, concrete floors or roofs. Provide sleeves as follows:

    a. Provide schedule 40 galvanized steel pipe for sleeves smaller than 6 inches in diameter.

    b. Provide galvanized sheet metal for sleeves 6 inches in diameter and larger, thickness shall be 10 gauge (0.1382 inches).

    c. Provide welded galvanized sheet metal for rectangular sleeves with the following minimum metal thickness:

        1) For sleeve cross-section rectangle perimeter less than 50 inches and no side greater than 16 inches, thickness shall be 18 gauge (0.052 inches).

        2) For sleeve cross-section rectangle perimeter equal to, or greater than, 50 inches and 1 or more sides equal to, or greater than, 16 inches, thickness shall be 10 gauge (0.1382 inches).

    d. Schedule 40 PVC pipe sleeves are acceptable for use in areas without return air plenums.

2. Seal elevated floor, exterior wall and roof penetrations watertight and weathertight with non-shrink, non-hardening commercial sealant. Pack with mineral wool and seal both ends with minimum of ½" of sealant.

C. Underground, Exterior-Wall Penetrations: Install cast-iron wall pipes for sleeves. Size sleeves to allow for 1-inch (or larger, if required by the mechanical sleeve manufacturer) annular clear space between pipe and sleeve. Provide mechanical sleeve seal.

1. Use type and number of sealing elements recommended by manufacturer for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

2. Inspect installed sleeve and sleeve-seal installations for damage and faulty work. Verify watertight integrity of sleeves and seals installed below grade to seal against hydrostatic pressure.

D. Elevated Floor Penetrations of Waterproof Membrane:

1. Provide cast-iron wall pipes for sleeves, extend top of wall pipe minimum 1" above finish floor. Size wall pipe for minimum ½" annular space between pipe and wall pipe.

2. Extend pipe insulation for insulated pipe through wall pipe. The vapor barrier shall be maintained. Size wall pipe for a minimum of 1" annular clear space between inside of sleeve and outside of insulation.

3. Pack with mineral wool and seal both ends with minimum of ½" of waterproof sealant. Refer to Division 07 Section "Joint Sealants" for materials and installation.

4. Secure waterproof membrane flashing between clamping flange and clamping ring. Comply with requirements for flashing specified in Division 7 Section "Sheet Metal Flashing and Trim."

E. Interior Foundation Penetrations: Provide sleeves for horizontal pipe passing through or under foundation. Sleeves shall be cast iron soil pipe two nominal pipe sizes larger than the pipe served.

F. Concrete Slab on Grade Penetrations:

1. Provide schedule 40 PVC pipe sleeves for vertical pressure pipe passing through concrete slab on grade. Sleeves shall be one nominal pipe size larger than the pipe served and two pipe sizes larger than pipe served for ductile iron pipes with restraining rods. Seal water-tight with silicone caulk.

2. Provide 1/2-inch thick cellular foam insulation around perimeter of non-pressure pipe passing thru concrete slab on grade. Insulation shall extend to 2-inch above and below the concrete slab.

G. Interior Penetrations of Non-Fire-Rated Walls: Seal annular space between sleeve and pipe or duct, using joint sealant appropriate for size, depth, and location of joint. Pack with mineral wool and seal both ends with minimum of 1/2-inch of sealant. Refer to Division 21 Section "Common Work Results for Fire Suppression" for materials and installation.

1. Extend pipe insulation for insulated pipe through sleeve. The vapor barrier shall be maintained. Size sleeve for a minimum of 1-inch annular clear space between inside of sleeve and outside of insulation.

H. Exterior Wall Penetrations: Seal annular space between sleeve and pipe or duct, using joint sealant appropriate for size, depth, and location of joint. Pack with mineral wool and seal both ends with minimum of 1/2-inch of waterproof sealant. Refer to Division 07 Section "Joint Sealants" for materials and installation.

1. Extend pipe insulation for insulated pipe through sleeve. The vapor barrier shall be maintained. Size sleeve for a minimum of 1-inch annular clear space between inside of sleeve and outside of insulation.

I. Fire / Smoke Rated Floor and Wall Assemblies: Seal around penetrations of fire rated assemblies to maintain fire resistance rating of assemblies. Coordinate fire ratings and locations with the architectural drawings. Install sealants in compliance with the manufacturer’s UL listing. Refer to Division 21 Section “Common Work Results for Fire Suppression” for firestopping and materials.

## 3.8 PIPE FIELD QUALITY CONTROL

A. Testing: Refer to individual piping system specification sections.

## END OF SECTION 210515

# SECTION 210553 – IDENTIFICATION FOR FIRE-SUPPRESSION PIPING AND EQUIPMENT

## PART 1 - GENERAL REQUIREMENTS

### 1.1 SUMMARY

A. Extent of Fire Suppression work to be identified as required by this Section is indicated on drawings and/or specified in other Division 21 Sections.

B. Types of identification devices specified in this Section include the following:

1. Equipment labels.
2. Valve tags.
3. Hydraulic placards.

C. Related Sections

1. Division 21 Section 210010 “General Fire Suppression Requirements” for requirements for hydraulic calculations, fire flow test data, obtaining electronic drawings files, shop drawings and record drawings.
2. Division 21 Section 210500 "Common Work Results for Fire Suppression," for materials and methods for wall and floor penetrations.
3. Division 21 Section 210515 "Basic Fire Suppression Piping Material and Methods," for general piping and fitting materials and methods.
4. Division 21 Section 211313 "Water-Based Fire Suppression Systems" for fire-suppression sprinkler systems inside the building.

### 1.2 CODES AND STANDARDS:

A. ANSI Standards: Comply with ANSI A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

B. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.

### 1.3 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data and installation instructions for each identification material and device required.

B. Maintenance Data: For each piping system to include in maintenance manuals.

## PART 2 - PRODUCTS

### 2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Material and Thickness: Brass, aluminum, or anodized aluminum, 0.032 inch thick, with predrilled holes for attachment hardware.
2. Background/Letter Color: Red/White or Bare Metal/Black.
3. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
4. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
5. Fasteners: Stainless-steel rivets or self-tapping screws.
6. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, with predrilled holes for attachment hardware.
2. Background/Letter Color: Red/White
3. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
4. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch
5. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
6. Fasteners: Stainless-steel rivets or self-tapping screws.
7. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

C. Label Content: Include equipment's Drawing designation or unique equipment number,

## 2.2 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch (6.4-mm) letters for piping-system abbreviation and 1/2-inch (13-mm) numbers.

1. Tag Material: Brass, stainless steel, aluminum or anodized aluminum, 0.032 inch thick, with predrilled holes for attachment hardware.
2. Fasteners: Brass wire-link chain, beaded chain or S-hook.
3. Valve-Tag Color: Red.
4. Letter Color: White.

## 2.3 HYDRAULIC PLACARDS

A. Provide hydraulic calculation placard attached to each riser in accordance with NFPA 13. Placard shall include location of design area or areas, discharge densities over the design area or areas, required flow and pressures at the base of riser, occupancy classification and maximum permitted storage height and configuration, hose stream allowance included in addition to the sprinkler demand and name of installing contractor. Information shall be permanently and clearly displayed on placard.

# PART 3 - EXECUTION

## 3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

## 3.2 EQUIPMENT IDENTIFICATION

A. General: Install metal or plastic equipment marker on or near each major item of fire protection equipment and each operational device, as specified herein if not otherwise specified for each item or device. Provide signs for the following general categories of equipment and operational devices:

1. Backflow Preventers

## 3.3 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in fire suppression systems

## 3.4 LABEL INSTALLATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install or permanently fasten labels on each major piece of equipment.

D. Locate equipment labels where accessible and visible.

**END OF SECTION 210553**

# SECTION 211313 – WATER BASED FIRE SUPPRESSION SYSTEMS

## PART 1 - GENERAL REQUIREMENTS

### 1.1 SUMMARY

A. The extent of this fire sprinkler system shall be as specified herein. Contractor shall be responsible for preparation of design drawings, hydraulic calculations, fabrication and installation for complete fire sprinkler protection for the building.

B. Section Includes:

1. Pipes, fittings, and specialties.
2. Fire protection valves.
3. Sprinkler pipe fittings.
4. Sprinklers.

C. Related Sections:

1. Division 21 Section 210010 “General Fire Suppression Requirements” for requirements for hydraulic calculations, obtaining electronic drawings files, shop drawings and record drawings.
2. Division 21 Section 210500 "Common Work Results for Fire Suppression," for materials and methods for wall and floor penetrations.
3. Division 21 Section 210515 "Basic Fire Suppression Piping Material and Methods," for general piping and fitting materials and methods.
4. Division 21 Section 210553 “Identification for Fire Suppression Piping and Equipment” for labeling and identification of installed fire suppression equipment.

### 1.2 SYSTEM DESCRIPTION

A. Fire protection system in the location or portion of the building is a Wet Pipe and Antifreeze system..

1. Wet Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water and that is connected to a water supply. Water discharges immediately from sprinklers when they are opened. Sprinklers open when heat melts a fusible link or destroys a frangible device. Hose connections are included if indicated.

B. Provide system(s) as specified herein and as shown on drawings. The sprinkler system shall be supplied by the underground system as shown on the Drawings.

C. Provide dry pipe fire protection system for non-heated spaces and other areas of building subject to freezing including the loading docks and canopies, mansards, and balconies. Portions of systems subject to freezing or temperatures below 40° F shall be protected against freezing as required by NFPA 13. The Contractor shall be responsible for repairs and for all costs incurred from damage caused by freezing of the fire protection system.

## 1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design fire suppression system, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Standard Pressure, Fire Suppression System Component: Listed for 175-psig minimum working pressure.

C. Performance Criteria

1. Protect entire area of work, unless noted otherwise, with a sprinkler system designed in accordance with NFPA 13 for Light Hazard requirements.

2. Protect entire area of work, unless noted otherwise, with a sprinkler system designed in accordance with NFPA 13 for Ordinary Hazard Group 2 requirements.

3. Protect mechanical and electrical areas/rooms with a sprinkler system designed in accordance with NFPA 13 for Ordinary Hazard Group 1 requirements.

4. Protect storage areas, unless noted otherwise, with a sprinkler system designed in accordance with NFPA 13 for Ordinary Hazard Group 2 requirement.

5. Other Occupancy Hazard Classifications.

a. Building Service Areas: Ordinary Hazard Group 1.

b. Automobile Parking Areas: Ordinary Hazard, Group 1.

6. Design Criteria for Automatic-Sprinkler Piping Design:

a. Light Hazard Occupancy:

1) Minimum Design Density: 0.10 gpm over 1,500 sq.ft. area.

2) Maximum protection area per sprinkler: 225 sq.ft.

3) Minimum Combined Hose Stream Demand Requirement: 100 gpm for 30 minutes.

b. Ordinary Hazard Group 1 Occupancy:

1) Minimum Design Density: 0.15 gpm over 1,500 sq.ft. area.

2) Maximum area per sprinkler: 130 sq.ft..

3) Minimum Combined Hose Stream Demand: 250 gpm for 60 to 90 minutes.

c. Ordinary Hazard Group 2 Occupancy:

1) Minimum Design Density: 0.20 gpm over 1,500 sq.ft. area.

2) Maximum protection area per sprinkler: 130 sq.ft.

3) Minimum Combined Hose Stream Demand: 250 gpm for 60 to 90 minutes.

D. The criteria listed herein shall not preclude the use of extended coverage or special application fire sprinklers designed and installed in accordance with their listing and manufacturer’s instructions.

E. The hydraulic area of operation may not be reduced as allowed by NFPA 13 for areas utilizing quick response sprinklers in unfinished shell spaces. For all other areas, the hydraulic area of operation shall not be reduced as allowed by NFPA 13 for areas utilizing quick response sprinklers unless specifically approved by the Engineer via a formally submitted RFI.

F. Sprinkler spacing shall conform to NFPA 13 and shall not exceed 256 SF per sprinkler in unfinished shell spaces.

G. The hydraulic area of operation shall be increased by 30% without revising the density for areas with sloped ceilings with a pitch exceeding 1 in 6 (16.7% slope) in accordance with NFPA 13.

H. The hydraulic area of operation shall be increased by 30% without revising the density for dry-pipe and double interlock preaction systems in accordance with NFPA 13.

## 1.4 SUBMITTALS

A. Submit shop drawings prepared in accordance with NFPA 13 as specified in Division 21 Section 210010 "General Fire Suppression Requirements."

## 1.5 QUALITY ASSURANCE

A. Contractor shall be responsible for all permits and fees associated with preparation and approval of Drawings and the installation and approval of a fire sprinkler system.

B. Tests and Inspections: Contractor shall arrange, test, and pay for all tests required by code and authorities having jurisdiction.

## 1.6 PROJECT CONDITIONS

A. Interruption of Existing Fire Sprinkler Protection: Do not interrupt fire sprinkler system protection to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary fire sprinkler protection according to requirements indicated:

1. Notify Construction Manager no fewer than two days in advance of proposed interruption of fire-sprinkler protection.

2. Do not proceed with interruption of fire sprinkler protection without Construction Manager's written permission.

## 1.7 COORDINATION

A. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

## 1.8 EXTRA MATERIALS

A. Sprinkler Wrenches: Furnish to Owner, 2 sprinkler wrenches for each type of sprinkler installed.

B. Sprinklers: Furnish extra sprinklers of each style, type and finish included in the project as required by NFPA 13.

C. Sprinkler Cabinet and Wrench: Provide a finished steel cabinet(s), suitable for wall mounting, with hinged cover and space for the quantity of spare sprinklers provided plus sprinkler wrench(es).

D. Provide hydraulic calculation placard attached to each riser.

## PART 2 - PRODUCTS AND MATERIALS

### 2.1 EQUIPMENT

A. All fire protection equipment shall be UL listed for its intended use and in conformance with the applicable NFPA documents.

### 2.2 PIPE AND FITTING MATERIALS

A. Refer to Division 21 Section 210515 “Basic Fire Suppression Piping Materials and Methods” for specifications on piping and fittings.

### 2.3 HANGERS

A. Shall be UL listed and shall meet requirements of NFPA 13 for type, dimension and location.

### 2.4 GENERAL DUTY VALVES

A. Refer to Division 21 Section 210515 “Basic Fire Suppression Piping Materials and Methods” for specifications on general duty valves.

### 2.5 SPECIALTY VALVES

A. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing.
2. Pressure Rating:
    a. Standard Pressure Piping Specialty Valves: 175-psig minimum.
    b. High Pressure Piping Specialty Valves: 250-psig minimum.
3. Body Material: Cast- or ductile- iron.
4. Size: Same as connected piping.
5. End Connections: Flanged or grooved.

### 2.6 PIPE FITTINGS

A. Branch Outlet Fittings:

1. Standard: UL 213.
2. Pressure Rating: 175-psig minimum.

3. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.

4. Type: Mechanical-T and -cross fittings.

5. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.

6. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.

7. Branch Outlets: Grooved, welded or threaded.

B. Flow Detection and Test Assemblies:

1. Standard: UL's "Fire Protection Equipment Directory" listing.

2. Pressure Rating: 175-psig minimum.

3. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.

4. Size: Same as connected piping.

5. Inlet and Outlet: Grooved or threaded.

C. Sprinkler Inspector's Test Fittings:

1. Standard: UL's "Fire Protection Equipment Directory" listing.

2. Pressure Rating: 175-psig minimum.

3. Body Material: Cast- or ductile-iron housing with sight glass.

4. Size: Same as connected piping.

5. Inlet and Outlet: Threaded.

D. Flexible Piping Systems:

1. At Contractor’s option, UL listed and FM Global approved flexible piping connections to sprinklers may be used for both acoustical panel and gypsum board ceilings when suitable for their intended use. Piping shall be seismically qualified per ICC-ES AC-156 where required.

2. Description: Connections shall include a leak-tested sprinkler drop with a minimum internal corrugated hose diameter of 1 inch.

3. Flexible piping lengths shall not exceed 6 feet.

4. Installation shall not exceed the minimum bend radius and maximum allowable bends as specified by the manufacturer.

5. Change in direction shall be gradual enough to allow flexible piping to bend without crimping, distorting or reducing internal diameter.

## 2.7 AUTOMATIC SPRINKLERS

A. Sprinklers: type and style as indicated or required by application. Sprinkler operating temperatures to comply with NFPA 13. Sprinklers in Light Hazard areas shall be quick response type.

B. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing
2. Pressure Rating for Automatic Sprinklers: 175-psig minimum.
3. Pressure Rating for High-Pressure Automatic Sprinklers: 250-psig minimum.

C. Automatic Sprinklers with Heat-Responsive Element:
1. Early-Suppression, Fast-Response Applications: UL 1767.
2. Nonresidential Applications: UL 199.
3. Residential Applications: UL 1626.
4. Characteristics: Nominal 1/2-inch orifice with discharge coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.

D. Use sprinkler types below for the following applications:
1. Rooms without Ceilings: Upright sprinklers.
2. Rooms with Suspended Ceilings: Recessed sprinklers
3. Rooms with Gypsum Board Ceilings: Recessed sprinklers.
4. Wall Mounting: Sidewall sprinklers.
5. Spaces Subject to Freezing: Dry pendent or dry sidewall sprinklers as indicated on drawings.

E. Provide sprinkler types below with finishes indicated.
1. Finished Areas:
a. Recessed Sprinklers: Bright chrome, with bright chrome escutcheon.
b. Upright, Pendent, and Sidewall Sprinklers: Bright chrome, with bright chrome escutcheon
c. Unfinished Areas: Rough bronze in unfinished spaces not exposed to view.

F. Coordinate sprinkler temperature ratings near heat-producing sources in accordance with NFPA 13.

G. Sprinklers shall be wax coated where exposed to acids, chemicals, or other corrosive fumes.

H. Sprinkler Guards: Provide sprinkler guard where sprinklers are less than 7-feet above finished floor; where subject to physical damage, and/or where indicated on drawings. Guard shall be UL 199 listed, wire cage type with fastening device for attaching to sprinkler.

I. Sprinkler Cabinet and Wrench: Provide a finished steel cabinet, suitable for wall mounting, with hinged cover and space for the appropriate quantity of spare sprinklers plus sprinkler wrench(es).

## 2.8 ALARM DEVICES

A. General: Alarm device types shall match piping and equipment connections.

B. Water Motor Operated Alarm:

1. Standard: UL 753.
2. Type: Mechanically operated, with Pelton wheel.
3. Alarm Gong: Cast aluminum with red-enamel factory finish.
4. Size: 10-inch diameter.
5. Components: Shaft length, bearings, and sleeve to suit wall construction.
6. Inlet: NPS 3/4.
7. Outlet: NPS 1 drain connection.
8. Provide engraved lamacoid plate under Bell lettered “Building Fire Sprinkler System.”

C. Electrically Operated Alarm Bell:

1. Standard: UL 464.
2. Type: Vibrating, metal alarm bell.
3. Size: 6-inch minimum diameter.
4. Finish: Red-enamel factory finish, suitable for outdoor use.
5. Provide engraved lamacoid plate under bell lettered “Building Fire Sprinkler System.”

D. Audible/Visual Alarm Notification Appliances (Horn/Strobe):

1. Standard: UL 1971 combination horn and strobe appliance.
2. Horn: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet from the horn.
3. Strobes: Xenon strobe lights complying with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch (25-mm) high letters on the lens.
4. Audible/visual notification appliance shall be exterior, weatherproof with weatherproof backbox.

E. Water Flow Indicators:

1. Standard: UL 346.
2. Water-Flow Detector: Electrically supervised.
3. Components: Two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory set, field-adjustable retard element to prevent false signals and tamperproof cover.
4. Type: Paddle operated.

5. Pressure Rating: 250 psig.

6. Design Installation: Horizontal or vertical.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

A. Install in accordance with manufacturer's instructions.

### 3.2 PREPARATION

A. Perform fire hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article.

### 3.3 WATER SUPPLY CONNECTION

A. Connect sprinkler piping to existing branch lines and crossmains.

B. Wet pipe systems shall be equipped with a listed relief valve not less than ½-inch in size and set to operate at 175 psi or 10 psi in excess of the maximum system pressure, whichever is greater.

### 3.4 PIPE APPLICATIONS

A. Piping Above Grade: Refer to Division 21 Section 210515 "Basis Fire Suppression Piping Materials and Methods."

### 3.5 PIPING INSTALLATIONS

A. Refer to Division 21 Section 210515"Basic Fire Suppression Piping Materials and Methods" for general fire suppression piping installation requirements.

B. Piping Standard: Comply with requirements for installation of sprinkler piping in NFPA 13.

C. Hangers and Supports: Comply with the requirements of NFPA 13. Hanger and support spacing and locations for piping joined with grooved mechanical couplings shall be in accordance with the grooved mechanical coupling manufacturer's written instructions, for rigid systems. Provide protection from damage where subject to earthquake if required by the applicable building code, designed in accordance with NFPA 13. Locate hangers at or directly adjacent to the joist panel points. Provide two nuts on threaded supports to securely fasten the support.

D. Install test connections sized and located in accordance with NFPA 13 complete with shutoff valve. Test connections may also serve as drain pipes.

E. Install pressure gauge on the riser or feed main at or near each test connection. Provide pressure gauge with a connection not less than 1/4 inch and having a soft metal seated globe valve, arranged for draining pipe between gauge and valve. Install gauges to permit removal, and install where they will not be subject to freezing.

F. Install automatic (ball drip) drain valves to drain piping between fire department connections and check valves. Drain to floor drain.

G. Fill wet-type sprinkler system piping with water.

H. Fill antifreeze system.

I. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 21 Section 210515 "Basic Fire Suppression Piping Materials and Methods"

J. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 21 Section 210515 "Basic Fire Suppression Piping Materials and Methods."

## 3.6 PIPE JOINT CONSTRUCTION

A. Refer to Division 21 Section 210515 “Basic Fire Suppression Piping Materials and Methods” for general pipe joint construction requirements.

## 3.7 VALVE AND SPECIALTIES INSTALLATION

A. Install listed fire protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.

B. Install listed fire protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.

C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable water supply sources.

## 3.8 SPRINKLER INSTALLATIONS

A. Use proper tools to prevent damage during installations.

B. Areas with ceilings: Install sprinklers not less than 6-inches from the edge of a ceiling tile in areas with suspended ceilings, in a symmetrical pattern with lights and outlets.

C. Install sprinklers in suspended ceilings in center or quarter point of acoustical ceiling panels, in a symmetrical pattern with lights and outlets.

D. Install sprinklers in a symmetrical pattern with lights and outlets in all other areas with ceilings.

E. Install dry-type sprinklers with water supply from heated space. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing.

F. Install sprinklers into flexible, sprinkler hose fittings and install hose into bracket on ceiling grid.

G. Do not install more than one sprinkler on a one inch outlet unless hydraulic calculations are included to verify performance.

## 3.9 IDENTIFICATION

A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13 and Division 21 Section 210553 “Identification for Fire Suppression Piping and Equipment.”

B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

## 3.10 FIELD QUALITY CONTROL

A. Perform required tests and inspections.

B. Tests and Inspections:

1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Flush, test, and inspect sprinkler systems according to NFPA 13, “Systems Acceptance” Chapter.
4. Energize circuits to electrical equipment and devices.
5. Start and run compressors.
6. Coordinate with fire alarm tests. Operate as required.
7. Coordinate with fire pump tests. Operate as required.
8. Verify that equipment hose threads are same as local fire department equipment.

C. Replace piping system components that do not pass the test procedures specified, and retest repaired portion of the system.

## 3.11 CLEANING

A. Clean dirt and debris from sprinklers.

B. Remove and replace sprinklers with paint other than factory finish.

## 3.12 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain specialty valves.

## 3.13 COMMISSIONING

A. Sprinkler Systems: Test per NFPA 13, NFPA 25 and local authorities requirements. Submit Contractor’s Material & Test Certificates for Above Ground Piping. Submit certificates of completion to Authority Having Jurisdiction and Owner.

1. After completion of all installation, tests, etc., and prior to the opening date, the Sprinkler Subcontractor shall instruct the building personnel in the operation of the sprinkler system. Special care shall be taken to make sure the building personnel:

    a. Will immediately recognize whether the system control valves are in an 'Open' position or a 'Closed' position.

    b. Will know how to drain the system.

    c. Will know how to test the flow switches, tamper switches and alarm system.

    d. Will know how to test the dry pipe/preaction valve.

    e. Will know how to make complete weekly inspection.

    f. Will know how to perform periodic maintenance of the Fire Sprinkler System.

B. Fire Alarm Equipment: Test per NFPA 25, NFPA 72 and local authorities requirements in the presence of the Owner. Submit certificates of completion to authority having jurisdiction and Owner.

C. Preaction System: Test per NFPA 13, NFPA 25, NFPA 72 and local authorities requirements in the presence of the Owner. Submit certificates of completion to authority having jurisdiction and Owner.

**END OF SECTION 211313**

# SECTION 230010 – GENERAL MECHANICAL REQUIREMENTS

## PART 1 - GENERAL REQUIREMENTS

### 1.1 DESCRIPTION OF WORK

A. This Division requires the furnishing and installing of complete functioning systems, and each element thereof, as specified or indicated on the Drawings and Specifications or reasonably inferred; including every article, device or accessory (whether or not specifically called for by item) reasonably necessary to facilitate each system's functioning as indicated by the design and the equipment specified. Elements of the work include materials, labor, supervision, supplies, equipment, transportation, and utilities.

B. Division 23 of the Specifications and Drawings numbered with prefixes M, MP or ME, or MEP generally describe these systems, but the scope of the Mechanical work includes all such work indicated in the Contract Documents: Instructions to Bidders; Proposal Form; General Conditions; Supplementary General Conditions; Architectural, Structural, Mechanical, Plumbing and Electrical Drawings and Specifications; and Addenda.

C. The Drawings have been prepared diagrammatically intended to convey the scope of work, indicating the intended general arrangement of the equipment, fixtures, ductwork, piping, etc. without showing all the exact details as to elevations, offsets, control lines, and other installation requirements. The Contractor shall use the Drawings as a guide when laying out the work and shall verify that materials and equipment will fit into the designated spaces, and which, when installed per manufacturers requirements, will ensure a complete, coordinated, satisfactory and properly operating system.

### 1.2 QUALITY ASSURANCE

A. All work under this Division shall be executed in a thorough professional manner by competent and experienced workmen licensed to perform the Work specified.

B. All work shall be installed in strict conformance with manufacturers' requirements, recommendations, and installation instructions. Equipment and materials shall be installed in a neat and professional manner and shall be aligned, leveled, and adjusted for satisfactory operation.

C. Material and equipment shall be new, shall be of the best quality and design, shall be current model of the manufacturer, shall be free from defects and imperfections and shall have markings or a nameplate identifying the manufacturer and providing sufficient reference to establish quality, size and capacity. Material and equipment of the same type shall be made by the same manufacturer whenever practicable.

D. Unless specified otherwise, manufactured items shall have been installed and used, without modification, renovation, or repair for not less than one year prior to date of bidding for this project.

### 1.3 CODES, REFERENCES AND STANDARDS

A. Execute Work in accordance with the National Fire Protection Association and all Local, State, and National codes, ordinances and regulations in force governing the particular

class of Work involved. Obtain timely inspections by the constituted authorities, and upon final completion of the Work obtain and deliver to the Owner executed final certificates of acceptance from the Authority Having Jurisdiction.

B. Any conflict between these Specifications and accompanying Drawings and the applicable Local, State and Federal codes, ordinances and regulations shall be reported to the Engineer in sufficient time, prior to the opening of Bids, to prepare the Supplementary Drawings and Specification Addenda required to resolve the conflict.

C. The governing codes are minimum requirements. Where these Drawings and Specifications exceed the code requirements, these Drawings and Specification shall prevail.

D. All material, manufacturing methods, handling, dimensions, method or installation and test procedure shall conform to but not be limited to the following industry standards and codes:

| | |
|---|---|
| BOCA | Building Officials Code Administration |
| IBC | International Building Code |
| IMC | International Mechanical Code |
| IPC | International Plumbing Code |
| IECC | International Energy Conservation Code |
| IFC | International Fire Code |
| IFGC | International Fuel Gas Code |
| ADA | American Disabilities Act |
| ADC | Air Diffusion Council |
| AMCA | Air Movement and Control Association, Inc. |
| ANSI | American National Standards Institute |
| AHRI | Air Conditioning, Heating and Refrigeration Institute |
| ASHRAE | American Society of Heating Refrigerating and Air Conditioning Engineers |
| ASME | American Society of Mechanical Engineers |
| ASSE | American Society of Sanitary Engineering |
| ASTM | American Society of Testing Materials |
| AWS | American Welding Society |
| AWWA | American Water Works Association |
| CISPI | Cast Iron Soil Pipe Institute |
| ETL | Electrical Testing Laboratories |
| HI | Hydraulic Institute |
| MSS | Manufacturer’s Standardization Society of the Valve and Fitting Industry |
| NBFU | National Board of Fire Underwriters |
| NEC | National Electrical Code |
| NFPA | National Fire Protection Association |
| NEMA | National Electrical Manufactures' Association |
| OSHA | Occupational Safety and Health Act |
| PDI | Plumbing and Drainage Institute |
| SMACNA | Sheet Metal and Air Conditioning Contractors National Association, Inc. |
| UL | Underwriter's Laboratories |

E. Contractor shall comply with rules and regulations of public utilities and municipal departments affected by connections of services.

F. All mechanical work shall be performed in compliance with applicable safety regulations, including OSHA regulations. Safety lights, guards, shoring and warning signs required for the performance of the mechanical work shall be provided by the Contractor.

## 1.4 DEFINITIONS

A. General:

1. Furnish: The term “furnish” is used to mean “supply and deliver to the project site, ready for unloading, unpacking, assembly, installation and similar operations.”

2. Install: The term “install” is used to describe operations at the project site including the actual “unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.”

3. Provide: The term “provide” means “to furnish and install, complete and ready for the intended use. When ‘furnish’, ‘install’, ‘perform’, or ’provide’ is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, “provide” is implied.

4. Furnished by Owner or Furnished by Others: The item will be furnished by the Owner or Others. It is to be installed and connected under the requirements of this Division, complete and ready for operation, including items incidental to the Work, including services necessary for proper installation and operation. The installation shall be included under the guarantee required by this Division.

5. Engineer: Where referenced in this Division, “Engineer” is the Engineer of Record and the Design Professional for the Work under this Division.

6. AHJ: The local code and/or inspection agency (Authority) Having Jurisdiction over the Work.

7. NRTL: Nationally Recognized Testing Laboratory, as defined and listed by OSHA in 29 CFR 1910.7 (e.g., UL, ETL, CSA, etc.), and acceptable to the Authority having Jurisdiction (AHJ) over this project. Nationally Recognized Testing Laboratories and standards listed are used only to represent the characteristics required and are not intended to restrict the use of other listed Manufacturers and models that meet the specified criteria.

8. Substitution: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor. Substitutions include Value Engineering proposals.

    a. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.

    b. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

9. Value Engineering: A systematic method to improve the “value” of goods and services by using an examination of function. Value, as defined, is the ratio of function to cost. Value can therefore be increased by either improving the function or reducing the cost. The goal of VE is to achieve the desired function at the lowest overall cost consistent with required performance.

B. The terms "approved equal", “equivalent”, or "equal" are used synonymously and shall mean “accepted by or acceptable to the Engineer as equivalent to the item or manufacturer

specified". The term "approved" shall mean labeled, listed, or both, by an NRTL, and acceptable to the AHJ over this project.

## 1.5 COORDINATION

A. The Contractor shall visit the site and ascertain the conditions to be encountered while installing the Work under this Division, verify all dimensions and locations before purchasing equipment or commencing work, and make due provision for same in the bid. Failure to comply with this requirement shall not be considered justification for omission, alteration, incorrect or faulty installation of Work under this Division or for additional compensation for Work covered by this Division.

B. The Contractor shall refer to Drawings of the other disciplines and to relevant equipment drawings and shop drawings to determine the extent of clear spaces. The Contractor shall make offsets required to clear equipment, beams and other structural members; and to facilitate concealing piping and ductwork in the manner anticipated in the design.

C. The Contractor shall confirm and coordinate the final location and routing of all mechanical, electrical, plumbing, fire protection, control and audio-visual systems with all architectural features, structural components, and other trades. The contractor shall locate equipment, components, ductwork, piping, conduit, and related accessories to maintain the desired ceiling heights as indicated on the architectural drawings. The contractor shall inform the architect of any areas where conflicts may prevent the indicated ceiling height from being maintained. The contractor shall not proceed with any installation in such areas until the architect has given written approval to proceed or has provided modified contract drawings or written instructions to resolve the apparent conflict.

D. The Contractor shall provide materials with trim which will fit properly the types of ceiling, wall, or floor finishes actually installed.

E. The Contractor shall maintain a foreman on the jobsite at all times to coordinate the work with other contractors and subcontractors so that various components of the mechanical systems will be installed at the proper time, will fit the available space, and will allow proper service access to the equipment. Carry on the Work in such a manner that the Work of the other contractors and trades will not be handicapped, hindered, or delayed at any time.

F. Work of this Division shall progress according to the "Construction Schedule" as established by the Prime Contractor and their subcontractors and as approved by the Engineer. Cooperate in establishing these schedules and perform the Work under this Division, in a timely manner in conformance with the construction schedule so as to ensure successful achievement of schedule dates.

## 1.6 MEASUREMENTS AND LAYOUTS

A. The drawings are schematic in nature, but show the various components of the systems approximately to scale and attempt to indicate how they are to be integrated with other parts of the building. Figured dimensions shall be taken in preference to scale dimensions. Determine exact locations by job measurements, by checking the requirements of other trades, and by reviewing the Contract Documents. The Contractor will be held responsible for errors which could have been avoided by proper checking and inspection.

## 1.7 SUBMITTALS

A. Refer to Division 01 and General Conditions for submittal requirements in addition to requirements specified herein.

## 1.8 ELECTRONIC DRAWING FILES

A. In preparation of shop drawings or record drawings, Contractor may, at their option, obtain electronic drawing files in AutoCAD or DXF format from the Engineer for a shipping and handling fee of $200 for a drawing set up to 12 sheets and $15 per sheet for each additional sheet. Contractor shall request and complete the Electronic File Release Agreement form from the Engineer. Send the form along with a check made payable to Henderson Engineers, Inc. Contractor shall indicate the desired shipping method and drawing format on the attached form. In addition to payment, Engineer's release agreement form must be received before electronic drawing files will be sent.

## 1.9 SUBSTITUTIONS

A. Refer to Division 01 and General Conditions for Substitutions in addition to requirements specified herein.

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

C. The base bid shall include only the products from manufacturers specifically named in the drawings and specifications.

## 1.10 OPERATION AND MAINTENANCE MANUALS

A. Refer to Division 01 and General Conditions for Operation and Maintenance Manuals in addition to requirements specified herein.

## 1.11 SPARE PARTS

A. Provide to the Owner the spare parts specified in the individual sections in Division 23 of this specification.

## 1.12 RECORD DRAWINGS

A. Refer to Division 01 and General Conditions for Record Drawings in addition to requirements specified herein.

## 1.13 PAINTING

A. Factory finishes, shop priming and special finishes are specified in the individual equipment specification sections.

B. Where factory finishes are provided and no additional field painting is specified, marred or damaged surfaces shall be touched up or refinished so as to leave a smooth, uniform finish.

## 1.14 DELIVERY, STORAGE AND HANDLING

A. Refer to Division 01 and General Conditions for Delivery, Storage and Handling in addition to requirements specified herein.

## 1.15 GUARANTEES AND WARRANTIES

A. Refer to Division 01 and General Conditions for Guarantees and Warranties in addition to requirements specified herein.

B. Each system and element thereof shall be warranted against defects due to faulty workmanship, design or material for a period of 12 months from date of Substantial Completion, unless specific items are noted to carry a longer warranty in the Construction Documents or manufacturer's standard warranty. The Contractor shall remedy defects occurring within a period of one year from the date of Substantial Completion or as stated in the General Conditions.

C. The following additional items shall be guaranteed:

1. Piping shall be free from obstructions, holes or breaks of any nature.
2. Insulation shall be effective.
3. Proper circulation of fluid in each piping system.

D. The above guarantees shall include both labor and material; and repairs or replacements shall be made without additional cost to the Owner.

E. The remedial work shall be performed promptly, upon written notice from the Architect or Owner.

F. At the time of Substantial Completion, deliver to the Owner warranties with terms extending beyond the one year guarantee period, each warranty instrument being addressed to the Owner and stating the commencement date and term.

## 1.16 TEMPORARY FACILITIES

A. Refer to Division 01 and General Conditions for Temporary Facilities requirements in addition to requirements specified herein.

## 1.17 PROJECT CONDITIONS

A. Conditions Affecting Work In Existing Buildings:

1. The Drawings describe the general nature of remodeling to the existing building. However, the Contractor shall visit the Site prior to submitting their bid to determine the nature and extent of work involved.
2. Work in the existing building shall be scheduled with the Owner.
3. Certain demolition work must be performed prior to the remodeling. The Mechanical Contractor shall perform the demolition which involves Mechanical systems, equipment, piping, equipment supports or foundations and materials.

4. Mechanical Contractor shall remove articles which are not required for the new Work. Unless otherwise indicated, each item removed by the Mechanical Contractor during this demolition shall become their property and shall be removed by the Mechanical Contractor from the premises and dispose of them in accordance with applicable federal, state and local regulations.

5. Mechanical Contractor shall relocate and reconnect Mechanical facilities that must be relocated in order to accomplish the remodeling shown in the Drawings or indicated in the Specifications. Where Mechanical equipment or materials are removed, the Mechanical Contractor shall cap unused piping beyond the floor line or wall line to facilitate restoration of finish.

6. General Contractor shall install finish material.

7. Obtain permission from the Architect for channeling of floors or walls not specifically noted on the Drawings.

8. Protect adjacent materials indicated to remain. Install and maintain dust and noise barriers to keep dirt, dust, and noise from being transmitted to adjacent areas. Remove protection and barriers after demolition operations are complete.

9. Locate, identify, and protect mechanical services passing through demolition area and serving other areas outside the demolition limits. Maintain services to areas outside demolition limits. When services must be interrupted, install temporary services for affected areas.

B. Site Information: Subsurface conditions were investigated during the design of the Project. Reports of these investigations are available for information only; data in the reports are not intended as representations or warranties of accuracy or continuity of conditions. The Owner will not be responsible for interpretations or conclusions drawn from this information.

C. Use of explosives is not permitted.

D. Environmental Conditions: Apply joint sealers under temperature and humidity conditions within the limits permitted by the joint sealer manufacturer. Do not apply joint sealers to wet substrates.

## PART 2 - PRODUCTS AND MATERIALS

### 2.1 NOT USED

## PART 3 - EXECUTION

### 3.1 PERMITS

A. Contractor to secure and pay for permits required in connection with the installation of the Mechanical Work. Arrange with the various utility companies for the installation and connection of required utilities for this facility and pay charges associated therewith including connection charges and inspection fees, except where these services or fees are designated to be provided by others.

## 3.2 EXISTING UTILITIES

A. Schedule and coordinate with the Utility Company, Owner and with the Engineer connection to, or relocation of, or discontinuation of normal utility services from existing utility lines. Premium time required for any such work shall be included in the bid.

B. Existing utilities damaged due to the operations of utility work for this project shall be repaired to the satisfaction of the Owner or Utility Company without additional cost.

C. Utilities shall not be left disconnected at the end of a work day or over a weekend unless authorized by representatives of the Owner or Engineer.

D. Repairs and restoration of utilities shall be made before workmen leave the project at the end of the workday in which the interruption takes place.

E. Contractor shall include in their bid the cost of furnishing temporary facilities to provide services during interruption of normal utility service.

## 3.3 SELECTIVE DEMOLITION

A. General: Demolish, remove, demount, and disconnect abandoned mechanical materials and equipment indicated to be removed and not indicated to be salvaged or saved.

B. Materials and Equipment to Be Salvaged: Remove, demount, and disconnect existing mechanical materials and equipment indicated to be removed and salvaged, and deliver materials and equipment to the location designated for storage.

C. Disposal and Cleanup: Remove from the site and legally dispose of demolished materials and equipment not indicated to be salvaged.

D. Mechanical Materials and Equipment: Demolish, remove, demount, and disconnect the following items:

1. Inactive and obsolete piping, fittings and specialties, equipment, ductwork, controls, and insulation.

    a. Piping and ducts embedded in floors, walls, and ceilings may remain if such materials do not interfere with new installations. Remove exposed materials and materials above accessible ceilings. Drain and cap piping and ducts allowed to remain.

    b. Perform cutting and patching required for demolition in accordance with Division 01, General Conditions and "Cutting and Patching" portion of this Section in Division 23.

E. Provide schedules indicating proposed methods and sequence of operations for selective demolition prior to commencement of Work. Include coordination for shut-off of utility services and details for dust and noise control.

1. Coordinate sequencing with construction phasing and Owner occupancy specified in Division 01 Section "Summary of Work."

## 3.4 CUTTING AND PATCHING

A. Cut walls, floors, ceilings, and other portions of the facility as required to install work under this Division.

B. Obtain permission from the Architect prior to cutting. Do not cut or disturb structural members without prior approval from the Architect and Structural Engineer.

C. Penetrations shall be made as small as possible while maintaining required clearances between the building element penetrated and the system component.

D. Patch around openings to match adjacent construction, including fire ratings, if applicable.

E. Repair and refinish areas disturbed by work to the condition of adjoining surfaces in a manner satisfactory to the Architect.

## 3.5 CLEANING

A. Dirt and refuse resulting from the performance of the work shall be removed from the premises as required to prevent accumulation. The Mechanical Contractor shall cooperate in maintaining reasonably clean premises at all times.

B. Immediately prior to the final inspection, the Mechanical Contractor shall clean material and equipment installed under the Mechanical Contract. Dirt, dust, plaster, stains, and foreign matter shall be removed from surfaces including components internal to equipment. Damaged finishes shall be touched-up and restored to their original condition.

**END OF SECTION 230010**

# SECTION 230015 – ELECTRICAL COORDINATION FOR MECHANICAL EQUIPMENT

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

A. This Section specifies the basic requirements for electrical components which are an integral part of packaged mechanical equipment. These components include, but are not limited to factory furnished motors, starters, and disconnect switches furnished as an integral part of packaged mechanical equipment.

B. Specific electrical requirements (i.e. horsepower and electrical characteristics) for mechanical equipment are scheduled on the Drawings.

C. System shall be complete and operational with power and control wiring provided to meet the design intent shown on the drawings and specified within the specification sections.

### 1.2 SUBMITTALS

A. No separate submittal is required. Submit product data for motors, starters, and other electrical components with submittal data required for the equipment for which it serves, as required by the individual equipment specification Sections.

### 1.3 QUALITY ASSURANCE

A. Electrical components and materials shall be UL labeled.

B. All electrical equipment provided and the wiring and installation of electrical equipment shall be in accordance with the requirements of this Section and Division 26.

## PART 2 - PRODUCTS AND MATERIALS

### 2.1 GENERAL

A. The Contractors shall provide all motors, starters, disconnects, wire, conduit, etc. as specified in the Construction Documents. If, however, the Division 23 Contractor furnishes a piece of equipment requiring a different motor, starter, disconnect, wire size, etc. than what is shown and/or intended on the Construction Documents, this Contractor shall coordinate the requirements with any other Contractor and shall be responsible for any additional cost incurred by any other Contractor that is associated with installing the different equipment and related accessories for proper working condition.

B. Refer to Division 26, "COMMON WORK RESULTS FOR ELECTRICAL" for specification of motor connections.

## PART 3 - EXECUTION

### 3.1 CONTRACTOR COORDINATION

A. Unless otherwise indicated, all motors, equipment, controls, etc. shall be furnished, set in place and wired in accordance with Table 1. Any items not listed but shown on the drawings shall be considered part of the Contract Documents and brought to the attention of the Architect.

B. The General Contractor is the central authority governing the total responsibility of all trade contractors. Therefore, deviations and clarifications of this schedule are permitted provided the General Contractor assumes responsibility to coordinate the trade contractors different than as indicated herein. If deviations or clarifications to this schedule are implemented, submit a record copy to the Engineer.

## TABLE 1: ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT

| ITEM | FURN BY | SET BY | POWER WIRING | CONTROL WIRING |
|---|---|---|---|---|
| Equipment motors | DIV23m | DIV23m | DIV26 | --- |
| Factory furnished motor starters contactors and disconnects | DIV23m | DIV23m | DIV26 | DIV23t |
| Loose motor starters, disconnect switches, thermal overloads and heaters. | DIV26 | DIV26 | DIV26 | DIV23t |
| Manual operating multi-speed switches | DIV23m | DIV26 | DIV26 | DIV23t |
| Control relays | DIV23t | DIV23t | DIV26 | DIV23t |
| Thermostats (line voltage) | DIV23m | DIV23m | DIV26 | --- |
| Control power transformers | DIV23t | DIV23t | DIV26 | DIV23t |
| Control power transformers furnished with equipment | DIV23m | DIV23m | DIV26 | DIV23t |
| Damper operators, PE & switches | DIV23t | DIV23t | DIV23t | DIV23t |
| Smoke dampers and combination fire/smoke dampers | DIV23m | DIV23m | DIV26 | DIV28 |
| Duct Smoke detectors | DIV28 | DIV23m | DIV28 | DIV28 |
| Interlocks between HVAC fans and damper operators | --- | --- | DIV26 | DIV23t |

DIV23m = Mechanical Contractor
DIV23t = Temperature Controls Sub-Contractor
DIV26 = Electrical Contractor
DIV28 = Electronic Safety and Security

**END OF SECTION 230015**

# SECTION 230500 – COMMON WORK RESULTS FOR HVAC

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

A. Mechanical equipment nameplate data.

B. Non-shrink grout for equipment installations.

C. Sleeves for mechanical penetrations.

D. Miscellaneous metals for support of mechanical materials and equipment.

E. Wood grounds, nailers, blocking, fasteners, and anchorage for support of mechanical materials and equipment.

F. Joint sealers for sealing around mechanical materials and equipment.

G. Firestopping

### 1.2 SUBMITTALS

A. General: Submit the following in accordance with Division 01 and Division 23 Section General Mechanical Requirements.

1. Product data for the following products:

   a. Access panels and doors.

   b. Joint sealers.

   c. Through and membrane-penetration firestopping systems.

2. Schedules indicating proposed methods and sequence of operations for selective demolition prior to commencement of Work. Include coordination for shut-off of utility services and details for dust and noise control.

   a. Coordinate sequencing with construction phasing and Owner occupancy specified in Division 01 Section "Summary of Work."

3. Through and Membrane Penetration Firestopping Systems Product Schedule: Submit a schedule for each piping system penetration that includes UL listing, location, wall or floor rating and installation drawing for each penetration fire stop system.

   a. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

## 1.3 QUALITY ASSURANCE

A. Fire-Resistance Ratings: Where a fire-resistance classification is indicated, provide access door assembly with panel door, frame, hinge, and latch from manufacturer listed in the UL "Building Materials Directory" for rating shown.

1. Provide UL Label on each fire-rated access door.

B. Through and Membrane Penetration Firestopping Systems Installer Qualifications: A firm experienced in installing penetration firestopping systems similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its penetration firestopping system products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

# PART 2 - PRODUCTS AND MATERIALS

## 2.1 MECHANICAL EQUIPMENT NAMEPLATE DATA

A. For each piece of power operated mechanical equipment, provide a permanent operational data nameplate indicating manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliance's, and similar essential data. Locate nameplates in an accessible location.

## 2.2 GROUT

A. Provide nonshrink, nonmetallic grout conforming to ASTM C 1107, Grade B, in premixed and factory-packaged containers.

B. Grout shall have post-hardening, volume-adjusting, dry, non-staining, non-corrosive, non-gaseous, hydraulic-cement characteristics and shall be as recommended by manufacturer for interior and exterior applications.

C. Grout shall have 5,000 psi, 28-day compressive strength design mix.

## 2.3 PENETRATIONS

A. Sleeves:

1. Steel Sleeves: Schedule 40 galvanized, welded steel pipe, ASTM A-53 grade A or 12 gauge (0.1084 inches) welded galvanized steel formed to a true circle concentric to the pipe.

2. Sheet-Metal Sleeves: 10 gauge (0.1382 inches), galvanized steel, round tube closed with welded longitudinal joint.

B. Frames for rectangular openings attached to forms and of a maximum dimension established by the Architect. For sleeve cross-section rectangle perimeter less than 50 inches and no side greater than 16 inches, provide 18 gauge (0.052 inches) welded galvanized steel. For sleeve cross-section rectangle perimeter equal to, or greater than, 50

inches and 1 or more sides equal to, or greater than, 16 inches, provide 10 gauge (0.1382 inches) welded galvanized steel. Notify the General Contractor or Architect before installing any box openings not shown on the Architectural or Structural Drawings.

## 2.4 MISCELLANEOUS METALS

A. Steel plates, shapes, bars, and bar grating: ASTM A 36.

B. Cold-Formed Steel Tubing: ASTM A 500.

C. Hot-Rolled Steel Tubing: ASTM A 501.

D. Steel Pipe: ASTM A 53, Schedule 40, welded.

E. Fasteners: Zinc-coated, type, grade, and class as required.

## 2.5 MISCELLANEOUS LUMBER

A. Framing Materials: Standard Grade, light-framing-size lumber of any species. Number 3 Common or Standard Grade boards complying with WCLIB or AWPA rules, or Number 3 boards complying with SPIB rules. Lumber shall be preservative treated in accordance with AWPB LP-2, and kiln dried to a moisture content of not more than 19 percent.

B. Construction Panels: Plywood panels; APA C-D PLUGGED INT, with exterior glue; thickness as indicated, or if not indicated, not less that 15/32 inches.

## 2.6 JOINT SEALERS

A. General: Joint sealers, joint fillers, and other related materials compatible with each other and with joint substrates under conditions of service and application.

B. Colors: As selected by the Architect from manufacturer's standard colors.

C. Nonacid Curing Sealer: One-part, nonacid-curing, silicone sealant complying with ASTM C920, Type S, Grade NS, Class 25, for uses in non-traffic areas for masonry, glass, aluminum, and other substrates recommended by the sealant manufacturer.

1. Manufacturers:
    a. Dow Corning, Dowsil 790.
    b. Dow Corning, Dowsil 795.
    c. GE, Silglaze II SCS 2350.
    d. GE, Silpruf SCS 2000.
    e. Owens Corning, Energy Complete.
    f. Pecora, 864 NST.
    g. Tremco, Spectrem 1.
    h. Tremco, Spectrem 2.

D. High Humidity Sealer: One-part, mildew-resistant, silicone sealant complying with ASTM C920, Type S, Grade NS, Class 25, for uses in non-traffic areas for glass, aluminum, and nonporous joint substrates; formulated with fungicide; intended for sealing interior joints with nonporous substrates; and subject to in-service exposure to conditions of high humidity and temperature extremes.

1. Manufacturers:

a. Dow Corning, Dowsil 786.

b. GE, Momentum SCS1700.

c. Pecora, 898 Silicone NST.

E. Hybrid Joint Sealer: One-part, non-sag, paintable complying with ASTM C920, Type S, Grade NS, Class 50, recommended for exposed applications on interior and exterior locations involving joint movement of not more than plus or minus 50 percent.

1. Manufacturers:

a. BASF, MasterSeal NP 100.

b. Pecora, DyanTrol I-XL.

c. Tremco, Dymonic FC.

F. Acrylic Latex Joint Sealer: One-part, non-sag, mildew-resistant, paintable acrylic latex or siliconized acrylic latex, complying with ASTM C834, Type OP, Grade NF, recommended for exposed applications on interior and protected exterior locations involving joint movement of not more than plus or minus 5 percent.

1. Manufacturers:

a. Pecora, AC-20

b. Sherwin Williams 950A

c. Tremco, Tremflex 834

## 2.7 FIRESTOPPING

A. Sealants and accessories shall have fire-resistance ratings indicated, as established by testing identical assemblies in accordance with UL 2079 or ASTM E814, or other NRTL acceptable to AHJ.

B. Manufacturers:

1. 3M Corp., Fire Barrier Sealant.

2. Hilti.

3. Owens Corning, Firestopping Insulation.

4. Pecora, AC-20 FTR.

5. RectorSeal.

6. Specified Technologies Inc., Firestop.

7. USG SHEETROCK Firecode Compound.

8. Tremco, Tremstop Fyre-Sil.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

A. Install products in accordance with manufacturer's instructions.

### 3.2 ERECTION OF METAL SUPPORTS AND ANCHORAGE

A. Cut, fit, and place miscellaneous metal fabrications accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.

B. Field Welding: Comply with AWS "Structural Welding Code."

### 3.3 ERECTION OF WOOD SUPPORTS AND ANCHORAGE

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorage accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.

B. Select fastener sizes that will not 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 members.

C. Attach to substrates as required to support applied loads.

### 3.4 PREPARATION FOR JOINT SEALERS

A. Surface Cleaning for Joint Sealers: Clean surfaces of joints immediately before applying joint sealers to comply with recommendations of joint sealer manufacturer.

B. Apply joint sealer primer to substrates as recommended by joint sealer manufacturer. Protect adjacent areas from spillage and migration of primers, using masking tape. Remove tape immediately after tooling without disturbing joint seal.

### 3.5 APPLICATION OF JOINT SEALERS

A. General: Comply with joint sealer manufacturers' printed application instructions applicable to products and applications indicated, except where more stringent requirements apply.

1. Comply with recommendations of ASTM C 962 for use of elastomeric joint sealants.

2. Comply with recommendations of ASTM C 790 for use of acrylic-emulsion joint sealants.

B. Tooling: Immediately after sealant application and prior to time shinning or curing begins, tool sealants to form smooth, uniform beads; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

## 3.6 PENETRATIONS:

A. Construction in Existing Facilities:

1. Saw cut or core drill existing walls and slabs to install sleeves and sleeve seals in existing facilities. Do not cut or drill any walls or slabs without first coordinating with, and receiving approval from, the Architect, Owner, or both. Seal sleeves and sleeve seals into concrete walls or slabs with a waterproof non-shrink grout acceptable to the Architect.

B. Provide sleeves and/or box frames for openings in all concrete and masonry construction and fire or smoke partitions, for all mechanical work that passes through such construction; Coordinate with other trades and Divisions to dimension and lay out all such openings.

C. The General Contractor will provide only those openings specifically indicated on the Architectural or Structural Drawings as being provided under the General Contractor's work.

D. The cutting of new or existing construction shall not be permitted except by written approval of the Architect.

E. Floor sleeves shall be fitted with means for attachment to forms and shall be of length to extend at least two inches above the floor level.

F. All sleeves shall be of ample size to allow for movement of conduit, duct or pipe and insulation through the sleeves without damage to the insulation.

G. Cut sleeves to length for mounting flush with both surfaces of walls.

H. Extend sleeves installed in floors 2 inches above finished floor level.

I. Seal space outside of sleeves with grout for penetrations of concrete and masonry.

J. Seal space outside of sleeves with approved joint compound for penetrations of gypsum board assemblies.

K. All circular and oval openings sleeved through underground exterior walls shall be sealed with mechanical sleeve seals as specified in Division 23 Section “Basic Piping Materials and Methods”. All rectangular openings through underground exterior walls shall be flanged and flashed with non-corrosive material on each side and the gap sealed with weatherproof sealant.

**END OF SECTION 230500**

# SECTION 230513 – COMMON MOTOR REQUIREMENT FOR HVAC EQUIPMENT

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

A. General construction and requirements.

B. Applications.

C. Single phase electric motors.

D. Electronically Commutated Motors (ECM).

E. Capacitors.

### 1.2 SUBMITTALS

A. Conform with the submittal procedures in Division 01.

B. Product Data: Provide wiring diagrams with electrical characteristics and connection requirements. Provide nameplate data and ratings, mounting arrangements, size and location of winding termination lugs, overload relays, conduit entry, grounding lug, and coatings.

C. Test Reports: Indicate test results verifying nominal efficiency and power factor for three phase motors larger than 1/2 horsepower.

D. Manufacturer's Installation Instructions: Indicate setting, mechanical connections, lubrication, and wiring instructions.

E. Operation Data: Include instructions for safe operating procedures.

F. Maintenance Data: Include assembly drawings, bearing data including replacement sizes, and lubrication instructions.

### 1.3 QUALITY ASSURANCE

A. Comply with NFPA 70 National Electrical Code.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

### 1.4 DELIVERY STORAGE AND HANDLING.

A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

## 1.5 WARRANTY

A. Provide five year manufacturer warranty for motors larger than 20 horsepower.

## PART 2 - PRODUCTS AND MATERIALS

## 2.1 MANUFACTURERS

A. Baldor Electric Company.

B. General Electric.

C. Gould.

D. Marathon.

E. Regal-Beloit Corporation (Century).

F. Westinghouse

## 2.2 GENERAL CONSTRUCTION AND REQUIREMENTS

A. Electrical Service: All motors shall be supplied in accordance with the following voltage and phase unless noted otherwise on the Drawings.

1. Motors 1/2 HP and Smaller: 115 volts, single phase, 60 Hz.

B. Construction:

1. Open drip-proof except where noted otherwise.
2. Design for continuous operation in 104 degrees F environment.
3. Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
4. Motors with frame sizes 254T and larger: Energy Efficient Type.

C. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.

D. Wiring Terminations:

1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
2. For fractional horsepower motors where connection is made directly, provide flexible conduit connection in end frame. Maximum length of flexible conduit shall be five feet.

## 2.3 APPLICATIONS

A. Exception: Motors less than 250 Watts, for intermittent service may be the equipment manufacturer's standard and need not comply with these specifications.

B. Single phase motors for shaft mounted fans or blowers: Permanent split capacitor type.

C. Single phase motors for fans, pumps, blowers and air compressors: Capacitor start type.

D. Single phase motors for fans less than 1 hp and greater than 1/12 hp: Electronically commutated type.

## 2.4 ELECTRONICALLY COMMUTATED MOTORS (ECM)

A. Minimum efficiency: 70 percent when rated in accordance with NEMA Standard MG 1 at full load rating conditions.

B. Motor shall be permanently lubricated with heavy-duty ball bearings to match the equipment load and prewired to the specific voltage and phase.

C. Internal motor circuitry shall convert AC power supplied to the equipment to DC power to operate the motor.

D. Motor shall be speed controllable down to 20% of full speed (80% turndown). Speed shall be controlled by either a potentiometer dial mounted on the motor or by a 0-10 VDC signal.

## 2.5 CAPACITORS

A. Furnish capacitors for power factor correction as specified herein on motors furnished under Division 23 that are not connected to variable frequency drives. KVAR size shall be as required to correct motor power factor to 90 percent or better and shall be installed on all motors 1 horsepower and larger, that have an uncorrected power factor of less than 85 percent at rated load.

B. Features:

1. Individual unit cells.
2. All welded steel housing.
3. Each capacitor internally fused.
4. Non-flammable synthetic liquid impregnated.
5. Craft tissue insulation.
6. Aluminum foil electrodes.

# PART 3 - EXECUTION

## 3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install securely on firm foundation.

C. Check line voltage and phase and ensure agreement with nameplate.

D. Install motor overload relays in a common enclosure adjacent to the variable frequency drive

## 3.2 NEMA OPEN MOTOR SERVICE FACTOR SCHEDULE

| HP | 3600 RPM | 1800 RPM | 1200 RPM | 900 RPM |
|---|---|---|---|---|
| 1/6-1/3 | 1.35 | 1.35 | 1.35 | 1.35 |
| 1/2 | 1.25 | 1.25 | 1.25 | 1.15 |
| 3/4 | 1.25 | 1.25 | 1.15 | 1.15 |
| 1 | 1.25 | 1.15 | 1.15 | 1.15 |
| 1.5-150 | 1.15 | 1.15 | 1.15 | 1.15 |

**END OF SECTION 230513**

# SECTION 230529 – HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

A. Support and attachment components.

B. Horizontal piping hangers and supports.

C. Anchors and fasteners.

D. Miscellaneous materials.

### 1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
2. Coordinate the work with other trades to provide additional framing and materials required for installation.
3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:

1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured.

### 1.3 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for each type of hanger and support. Include a hanger and support schedule showing manufacturer's figure number, size, location, and features for each hanger and support. Submit style and type to Structural Engineer for approval prior to installation.

B. Installer's Qualifications: Include evidence of compliance with specified requirements.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

## 1.4 QUALITY ASSURANCE

A. Comply with applicable building code.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Flame/Smoke Ratings: Provide hangers and supports with flame-spread index of 25 or less, and smoke-developed index of 50 or less, as tested by UL 723 or ASTM E84 (NFPA 255) method.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

## 1.5 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

# PART 2 - PRODUCTS AND MATERIALS

## 1.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test fluid. Include the weight of the pipe, valves, insulation and piping accessories.

2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

## 1.2 SUPPORT AND ATTACHMENT COMPONENTS

B. General Requirements:

1. Comply with MSS SP-58.

2. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of work.

3. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.

4. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.

5. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.

6. Materials: Products and materials listed in this specification are based on indoor, dry locations. Use corrosion resistant materials suitable for the environment where installed.

   a. Indoor Dry Locations: Provide painted carbon steel, galvanized steel or zinc-plated steel. Where supports will be field painted in exposed locations, provide carbon steel.

a. Indoor Damp or Wet Locations: Galvanized steel or type 304 stainless steel.

C. Metal Channel (Strut) Framing Systems:

1. Manufacturers:

   a. Cooper B-Line.

   b. Ferguson Enterprises/FNW.

   c. PHD Manufacturing.

   d. Thomas & Betts Corporation.

   e. Unistrut, a brand of Atkore International Inc.

   f. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.

2. Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.

3. Comply with MSS SP-58, Type 59, MSS SP-89, and . Welds shall comply with AWS D1.1.

4. Channel Material:

   a. Indoor Dry Locations: Provide carbon steel, galvanized steel or zinc-plated steel. Where supports will be field painted in exposed locations, provide carbon steel .

   b. Indoor Damp or Wet Locations: Galvanized steel or Type 304 stainless steel.

   c. Outdoor Locations: Galvanized steel or Type 304 stainless steel.

   d. Natatorium or other treated pool environments: Type 316 stainless steel.

   e. All nuts, brackets, and clamps shall have the same finish as the channel.

5. Minimum Channel Thickness: Steel sheet, 14 gage, 0.0747 inch.

6. Minimum Channel Dimensions: 1-5/8 inch width by 13/16 inch height with factory-punched attachment holes.

7. Provide plastic galvanic isolators for connecting bare copper pipe for use with pre-engineered support strut system where indicated.

D. Hanger Rods:

1. Material:

   a. Indoor Dry Locations: Zinc-plated steel.

b. Indoor Damp or Wet Locations or Outdoor Locations: Zinc-plated steel or type 304 stainless steel.

c. Natatorium or other treated pool environments: Type 316 stainless steel.

2. Threaded both ends or continuously threaded.

3. Minimum Size: Reference piping specification sections for rod thicknesses.

4. Threaded Rods: Threaded rods are not allowed for floor supports except when the maximum length of the rod is less than 12". Threaded rod sizes shall be the same size diameter as specified for pipe hanger rods based upon pipe size being supported. Refer to system piping specification sections for rod size requirements.

## 2.2 ANCHORS AND FASTENERS

A. Manufacturers:

1. Hilti, Inc.

2. Illinois Tool Works, Inc.

3. Phillips.

4. Powers Fasteners, Inc.

5. Rawl.

6. Simpson Strong-Tie Company Inc.

B. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

1. Concrete: Use preset concrete inserts or expansion anchors.

2. Solid or Grout-Filled Masonry: Use expansion anchors.

3. Hollow Masonry: Use toggle bolts.

4. Hollow Stud Walls: Use toggle bolts.

5. Steel: Use beam clamps.

6. Sheet Metal: Use sheet metal screws.

7. Wood: Use wood screws.

8. Plastic and lead anchors are not permitted.

9. Hammer-driven anchors and fasteners are permitted only as follows:

a. Nails are permitted for attachment of nonmetallic boxes to wood frame construction.

b. Staples are permitted for attachment of nonmetallic-sheathed cable to wood frame construction.

C. Beam Clamps: MSS SP-58 C-Type or adjustable, Types 19 through 23, 25 or 27 through 30 based on required load.

1. Material: ASTM A36/A36M carbon steel or ASTM A181/A181M forged steel.

1. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.

D. Vibration Isolation Anchors: Reference Section “Vibration Isolation for HVAC” for vibration isolation anchors.

## 2.3 MISCELLANEOUS MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A 36.

B. Malleable Iron: ASTM A47

C. Cement Grout: Portland cement (ASTM C 150, Type I or Type III) and clean uniformly graded, natural sand (ASTM C 404, Size No. 2). Mix ratio shall be 1.0 part cement to 3.0 parts sand, by volume, with minimum amount of water required for placement and hydration.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive support and attachment components.

C. Verify that conditions are satisfactory for installation prior to starting work.

## 3.2 INSTALLATION, GENERAL

A. Install products in accordance with manufacturer’s instructions.

B. Provide hangers and supports according to the Pipe Hanger and Support Schedule below.

C. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

D. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.

E. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

F. Unless specifically indicated or approved by Architect, do not provide support from roof deck.

G. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

H. Provide thermal insulated pipe supports complete with hangers and accessories. Install thermal insulated pipe supports during the installation of the piping system.

I. Provide vibration isolators at hangers and supports where specified in Section “Vibration Isolation for HVAC”.

## 3.3 EQUIPMENT SUPPORT AND ATTACHMENT

A. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.

B. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls.

C. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.

D. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

E. Secure fasteners according to manufacturer's recommended torque settings.

F. Remove temporary supports.

G. Fabricate structural steel supports to suspend equipment from structure above or support equipment from floor.

H. Grouting: Place grout under supports for piping and equipment.

## 3.4 METAL FABRICATION

A. Cut, drill, and fit miscellaneous metal fabrications for pipe anchors and equipment supports. Install and align fabricated anchors in indicated locations.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

## 3.5 FIELD QUALITY CONTROL

A. Examine support and attachment components for damage and defects.

B. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

D. For galvanized surfaces clean welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A 780.

E. Correct deficiencies and replace damaged or defective support and attachment components.

## END OF SECTION 230529

# SECTION 230553 – IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

A. Nameplates.

### 1.2 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data for each product required.

B. Manufacturer’s Installation Instructions: Indicate special procedures and installation for each product required.

## PART 2 - PRODUCTS AND MATERIALS

### 2.1 ACCEPTABLE MANUFACTURERS

A. Advanced Graphic Engraving, LLC.

B. Brady Corporation.

C. Brimar Industries, Inc.

D. Craftmark.

E. Industrial Safety Supply Co., Inc.

F. Kolbi Pipe Marker Co.

G. MIFAB, Inc.

H. Seton Identification Products, a Tricor Direct Company..

### 2.2 IDENTIFICATION APPLICATIONS AND REQUIREMENTS

A. General:

1. Provide manufacturer's standard products of categories and types required for each application as referenced in other Division 23 sections. Where more than a single type is specified for application, selection is the installer's option, but provide single selection for each product category.

2. Lettering: Coordinate names, abbreviations, and other designations used in mechanical identification work with the corresponding designations shown on the drawings, scheduled, and specified. If not otherwise indicated, provide numbering, lettering, and wording as recommended by the manufacturer or as required for proper identification, operation, and maintenance of mechanical systems and equipment.

3. Where multiple systems of same generic name are shown and specified, provide identification which indicates individual system number as well as service (e.g., Boiler No. 3, Air Supply No. 1H, etc.).

B. Fans: Nameplates.

C. Thermostats: Nameplates.

## 2.3 NAMEPLATES

A. Nomenclature: Include the following, matching terminology on schedules as closely as possible:

1. Name and mark number.
2. Equipment service.
3. Design capacity.
4. Other design parameters such as pressure drop, entering and leaving conditions, rpm, etc.

B. Size: 2-1/2 inch x 4 inch for control panels and components, 4-1/2 inch x 6 inch for equipment.

C. Letter Color: White.

D. Letter Height: 1/4 inch.

E. Background Color:

1. Cooling equipment: Green.
2. Heating equipment: Yellow.
3. Combination cooling and heating equipment: Yellow/Green.
4. Energy reclamation equipment: Brown.
5. Hazardous equipment: Colors and designs recommended by ASME.
6. Equipment and components that do not meet any of the above criteria: Blue.

F. Plastic: Conform to ASTM D709.

# PART 3 - EXECUTION

## 3.1 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

## 3.2 GENERAL INSTALLATION

A. Coordination: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces,

install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.

B. Install products in accordance with manufacturer's instructions.

C. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

## 3.3 EQUIPMENT IDENTIFICATION

A. Install nameplates and engraved plastic laminate signs for identification of equipment. Provide additional signs and lettering as follows:

1. To distinguish between multiple units in close proximity.
2. To inform operator of operational requirements.
3. To indicate safety and emergency precautions.
4. To warn of hazards and improper operations.

B. Adjust lettering size based on viewing distance from normal location of identification:

1. Less than 2 feet: Minimum 1/4 inch.
2. Up to 6 feet: Minimum 1/2 inch.
3. Greater than 6 feet: Proportionally increase letter size based on recommendations above.
4. Provide secondary lettering 2/3 to 3/4 of size of principal lettering.

C. Where equipment to be identified is concealed above acoustical ceilings or similar removeable concealment, equipment tags may be installed in the concealed space to reduce the amount of text in exposed sign.

**END OF SECTION 230553**

# SECTION 230700 – HVAC INSULATION

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

A. External Ductwork Insulation.

### 1.2 DEFINITIONS

A. Cold Duct: Ductwork that carries airflow with a minimum operating temperature less than 65 degrees F temperature.

B. Hot Duct: Ductwork that carries airflow with a minimum operating temperature greater than 75 degrees F temperature.

C. Neutral Ductwork: Ductwork that carries airflow with temperatures between the defined cold and hot temperatures.

D. Exposed: Insulation that is visible from the occupied space.

E. Exposed to Weather: Insulation that is exposed to potential damage caused by weather, including sunlight, moisture, wind, and solar radiation.

F. Exterior: Locations outside of or within the building envelope (walls, roof, floors, etc) as defined by the architectural drawings and specifications.

G. Unconditioned Spaces: An enclosed space within a building that is not provided with mechanical heating or cooling.

### 1.3 SUBMITTALS

A. Product Data: Submit technical product data, thermal characteristics, and materials for each type of mechanical insulation.

B. Insulation Schedule: Include product name, conductivity k-value, thickness, and furnished accessories for each service.

C. Maintenance Data: Submit maintenance data and replacement material lists for each type of mechanical insulation. Include this data and product data in maintenance manual.

D. Manufacturer’s Instructions: Include installation instructions for storage, handling, protection, examination, preparation, and installation of the product.

### 1.4 QUALITY ASSURANCE

A. Manufacturer Qualification: Company specializing in manufacturing the products specified in this section with not less than three years of documented experience.

B. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

C. Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics and adhesives) with flame-spread index of 25 or less and smoke-developed index of 50 or less, as tested by UL 723 or ASTM E84 (NFPA 255) method.

1. Exception: Exterior mechanical insulation may have flame spread index of 75 and smoke developed index of 150.

2. Exception: Industrial mechanical insulation that will not affect life safety egress of building may have flame spread index of 75 and smoke developed index of 150.

3. Exception: Polyisocyanurate insulation that is not installed in a return air plenum may have a flame spread index of 25 and smoke developed index of 450.

## 1.5 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage; store in original wrapping.

## 1.6 FIELD CONDITIONS

A. Maintain ambient conditions required by manufacturers of each product.

B. Maintain temperature before, during, and after installation for minimum of 24 hours.

# PART 2 - PRODUCTS

## 2.1 EXTERNAL DUCTWORK INSULATION MATERIALS

A. Flexible Mineral Fiber (rock, slag, or glass):

1. Manufacturers:

a. CertainTeed Corp.

b. Johns Manville.

c. Knauf Insulation.

d. Owens Corning.

2. Insulation: ASTM C553, Type I or II, flexible mineral fiber blanket.

a. K-value: ASTM C518 or C177, maximum 0.31 at 75 degrees F.

b. Minimum Service Temperature: Minus 20 degrees F

c. Maximum Service Temperature: 450 degrees.

d. Density:

1) 1.5 pounds per cubic foot.

3. Factory Applied Vapor Barrier Jacket: ASTM C1136, Type II.

   a. Foil Scrim Kraft (FSK): Kraft paper with glass fiber yarn and bonded to aluminized film, water vapor permeance of 0.02 perms and 2 inch stapling tab.

   b. Polypropylene Scrim Kraft (PSK): Kraft paper with glass fiber yarn and bonded to metalized polypropylene, water vapor permeance of 0.02 perms and 2 inch stapling tab.

   c. Color: White.

B. Ductwork Insulation Accessories: Provide staples, bands, wires, tape, pins with insulation retaining washers, anchors, corner angles and other appurtenances as recommended by insulation manufacturer for applications indicated.

C. Adhesives, Sealers, Mastics, and Protective Finishes: Provide cements, adhesives, coatings, sealers, mastics, protective finishes, and similar compounds as recommended by insulation manufacturer for applications indicated.

1. Mineral Fiber Lagging Adhesive: Comply with ASTM C916, Type 2 or MIL-A-3316C, Class 2, Grade A. Provide Foster 85-60, Childers CP-127, or equal water-based adhesive.

2. Vapor Barrier Tape: Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber-based adhesive.

3. Water-Based Vapor Barrier Mastic: Comply with MIL-PRF-19565C, Type II, with water vapor permeance 0.05 perms or less at 47 mils dry per ASTM E96. Provide Fosters 30-80, Childers CP-38, Design Polymerics 3040, or equal.

4. Solvent-Based Vapor Barrier Mastic: Comply with MIL-PRF-19565C, Type II, with water vapor permeance 0.05 perms or less at 35 mils dry per ASTM F 1249.

5. Tie Wire: Annealed steel, 16 gauge, 0.0508 inch diameter.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Test ductwork for design pressure, liquid tightness, and continuity prior to applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

### 3.2 PROTECTION AND REPLACEMENT

A. Provide all required protection for insulation (installed and uninstalled) throughout the duration of construction to avoid exposure to plaster, dust, dirt, paint, moisture, deterioration, and physical damage.

B. Repair existing mechanical insulation that is damaged during this construction period. Use insulation of same type and thickness as existing insulation. Install new jacket lapping and sealed over existing.

C. Replace damaged insulation which cannot be repaired satisfactorily at no additional expense to the Owner, including insulation with vapor barrier damage and insulation that has been exposed to moisture during shipping, storage, or installation. Drying the insulation is not acceptable. Dry surfaces prior to installation of new insulation that replaces the damaged or wet insulation.

## 3.3 INSTALLATION, GENERAL

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NAIMA National Insulation Standards.

## 3.4 DUCTWORK INSULATION SYSTEM INSTALLATION

A. Maintain continuous thermal and vapor-barrier integrity throughout entire installation and protect it from puncture and other damage.

B. Install insulation on duct systems subsequent to painting, testing, and acceptance of tests.

C. Install insulation materials with smooth and even surfaces.

D. Clean and dry ductwork prior to insulating. Butt insulation joints firmly together to ensure complete and tight fit over surfaces to be covered.

E. Install insulation without sag on underside of duct. Where rectangular ducts are 24 inches in width or greater, secure external insulation to the bottom of the duct with mechanical fasteners, spaced on 18 inches on center (maximum). Fasteners shall include 2-inch square self-sticking galvanized carbon-steel base plates with minimum 0.106-inch diameter zinc-coated, low carbon steel, fully annealed shank spindle, length to suit depth of insulation. Secure insulation to spindles with self-locking washers incorporating a spring steel insert to ensure permanent cap retention. Lift duct off trapeze hangers and insert spacers to avoid insulation compression.

F. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.

G. Corner Angles: Except for oven and hood exhaust duct insulation, install corner angles on external corners of insulation on ductwork in exposed finished spaces before covering with jacketing.

H. Cold Ducts:

1. Insulate entire system, including fittings, joints, flanges, expansion joints, and air duct accessories.
2. Provide vapor barrier jacket according to the Ductwork Jacket Schedule.
3. Seal joints with vapor barrier mastic.
4. Continue insulation, including vapor barrier, through walls, sleeves, hangers, and other duct penetrations.
5. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.

6. Where cold ducts are installed in mechanical rooms or non-conditioned spaces (excludes return air plenums), prevent condensation from forming on the duct supports by providing one or more of the following:

   a. Install thermal break such as rigid board insulation between the support and duct.

   b. Wrap support that is in contact with the duct with external duct wrap insulation to prevent condensation. Wrap shall extend a minimum of 12 inches from point of contact of the support with the duct. Tape joints to provide a thermal and vapor barrier. Coat all taped joints, punctures and seams with 4 inch wide coating of vapor barrier mastic.

   c. If a support device similar to Unistrut is used, foam fill or stuff tube.

I. Hot and Neutral Ducts:

1. Insulate entire system, including fittings, joints, flanges, expansion joints, and air duct accessories.

2. Provide jackets with or without vapor barrier according to the Ductwork Jacket Schedule.

3. Secure joints with staples, tape, or wires.

4. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.

## 3.5 DUCTWORK SYSTEM INSULATION SCHEDULE

A. Omit insulation on the following:

1. Fibrous glass ductwork (ductboard).

2. Lined ductwork that is interior to the building unless otherwise indicated on the drawings.

3. Ductwork with sound absorbing linings unless otherwise indicated on the drawings.

B. Prohibited insulation:

1. Polyisocyanurate installed within a return air plenum.

C. Outdoor Air:

1. Service:

   a. Interior untreated outdoor air intake ducts.

2. Acceptable Insulation:

   a. Flexible mineral fiber.

## 3.6 DUCT SYSTEM INSULATION THICKNESS SCHEDULE

A. Flexible Mineral Fiber:

1. Interior Ductwork:

a. 1.5 pounds per cubic foot density:

1) 2 inch thick, minimum R-6.0.

2. Meet R-value installed at maximum 25% compression, application limited to concealed locations.

## 3.7 DUCTWORK JACKET SCHEDULE

A. Omit jacket on internally lined ductwork.

B. Ductwork in an unconditioned space:

1. Foil Scrim Kraft (FSK).
2. Polypropylene Scrim Kraft (PSK).
3. All-Service Jacket (ASJ).
4. Polypropylene Scrim Polyester (PSP).

**END OF SECTION 230700**

# SECTION 230913 – INSTRUMENTATION AND CONTROL DEVICES FOR HVAC

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

A. Control dampers.

B. Operators.

C. Output control devices.

D. Power Supplies.

E. Thermostats.

### 1.2 DEFINITIONS

A. BAS: Building Automation System.

B. Control Wiring: Includes conduit, wire and wiring devices to install complete control systems including motor control circuits, interlocks, thermostats, EP and IP switches and like devices. Includes all wiring from Intelligent Devices and Controllers to all sensors and points defined in the input/output summary shown on the drawings or specified herein and required to execute the sequence of operations.

C. Cv: Design Valve Flow Coefficient.

D. DDC: Direct Digital Control.

E. EPDM: Ethylene Propylene Diene Monomer.

F. High voltage: 50 volts or higher.

G. Low voltage: Below 50 volts.

H. PTFE: Polytetrafluoroethylene.

I. TEFZEL: A modified ETFE (ethylene tetrafluoroethylene) fluoroplastic.

### 1.3 CONTRACTOR RESPONSIBILITIES

A. Reference Division 23 Section ”Electrical Coordination for Mechanical Equipment” for contractor responsibilities.

B. BAS Contractor:

1. Installation of the BAS shall be by the BAS Contractor or their subcontractors.

2. Low voltage control wiring.

3. Coordinate high voltage control wiring to instrumentation and control devices with Division 26. Where high voltage power is required for instrumentation and control

devices that is in addition to what is shown on the drawings, the BAS contractor shall cover the cost of providing this wiring.

4. All interlock wiring regardless of voltage (e.g., exhaust fan interlocked to supply fan).

5. Coordinate with Division 26 that motor starters are provided with auxiliary contacts as required for interlocks.

6. Coordinate power wiring to BAS controllers and instrumentation and control devices with Division 26.

7. Coordinate installation of back-box rough-in for wall-mounted control devices sensors, etc. with Division 26. Coordinate with mechanical contractor all locations, quantities, and sizes required for installation by Division 26.

8. Perform startup and demonstration services as specified in Section "Direct Digital Control for HVAC".

C. Sheet Metal Contractor:

1. Installation of automatic control dampers, smoke control dampers, and necessary blank off plates.

2. Access doors where and as required.

D. Mechanical Contractor:

1. Installation of immersion wells.

2. Installation of flow switches.

3. Installation of automatic control valves.

4. Installation of pressure tappings and associated shut-off cocks.

5. Coordinate conduit and wall box rough-in, power wiring and magnetic starter requirements for controls and mechanical equipment with Division 26.

## 1.4 SUBMITTALS

A. Refer to Division 01 for submittal procedures.

B. Product Data: Provide description and engineering data for each control system component. Include dimensions, capacities, size, performance characteristics, electrical characteristics, and finishes of materials.

C. Shop Drawings: Indicate complete operating data, system drawings, wiring diagrams, and written detailed operational description of sequences. Submit schedule of valves indicating size, flow, and pressure drop for each valve. For automatic dampers indicate arrangement, velocities, and static pressure drops for each system.

D. Schedule for control valves and actuators, including the following:

1. Tag.

2. Quantity.

3. Model number.

4. Equipment served.
5. Flow at project design conditions.
6. Selected valve flow coefficient (Cv). For butterfly valves, submit the corresponding valve position at which the Cv is calculated.
7. Pressure differential drop across valve at project design flow conditions and selected Cv.
8. Maximum close-off pressure.
9. Valve Configuration (2-way/3-way).
10. Valve Normal Position and Fail Position (e.g., NO/FO; normally open/fail open).
11. Valve Size.
12. Line Size.
13. Valve Type.
14. Actuator Signal Type (Open/Close, Modulating 0-10 Vdc, 2-10 Vdc, 4-20 mA, etc.)
15. Torque required to close valve at pump shutoff head.
16. Selected actuator maximum torque output.

E. Manufacturer's Instructions: Provide for all manufactured components.

F. Operation and Maintenance Data: Include inspection period, cleaning methods, recommended cleaning materials, and calibration tolerances.

G. Project Record Documents: Record actual locations of control components, including panels, thermostats, and sensors. Accurately record actual location of control components, including panels, thermostats, and sensors.

H. Warranty: Submit manufacturer warranty and ensure forms have been filled out in Owner’s name and registered with manufacturer.

## 1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

C. Measurement devices and sensors shall be calibrated using NIST traceable standards.

## 1.6 WARRANTY

A. Correct defective Work within a one year period after Substantial Completion.

B. Provide extended warranty for control devices and equipment as specified herein.

## PART 2 - PRODUCTS

### 2.1 CONTROL DAMPERS

A. Dampers shall be factory fabricated and sized as shown on drawings and as specified.

B. Individual damper sections shall not be larger than 48 inches x 60 inches. Provide a minimum of one damper actuator per section.

C. Performance: Test in accordance with AMCA 500-D.

1. Pressure Drop: Unless otherwise scheduled or indicated on the Drawings, size control dampers as follows:

a. Two Position Dampers: Dampers shall be full duct size and selected to minimize pressure drop.

2. Leakage:

a. Motorized dampers for outdoor, exhaust and relief air and for shaft and stairway vents shall be Class I leakage and shall not exceed 4.0 CFM/square foot in full closed position at 1 inch W.G. pressure differential across damper.

b. Motorized dampers for other applications shall be Class II leakage.

D. Frames: Galvanized steel, extruded aluminum, or stainless steel, welded or riveted with corner reinforcement.

1. Use minimum 16 gauge for rectangular dampers.

2. For aluminum frames, use 1/8 inch thick material.

3. All damper frames shall have a flange for duct mounting.

4. Reference Part 3 Execution for application of the material type.

E. Blades: Galvanized steel, extruded aluminum, or stainless steel, maximum blade size 6 inches wide, 48 inches long, attached to minimum 1/2 inch shafts with set screws.

1. Use minimum 16 gauge for rectangular dampers.

2. For aluminum blades, use 1/8 inch thick material.

3. The blades shall be suitable for the air velocities to be encountered in the system.

4. Dampers longer than the maximum blade length shall be fabricated in sections.

5. Reference Part 3 Execution for application of the material type.

F. Blade Seals: Synthetic elastomeric inflatable or Neoprene, mechanically attached, field replaceable.

1. Installed along the top and bottom of the frame and on all mating surfaces.

G. Jamb Seals: Spring stainless steel.

1. Installed inside the frame sides.

H. Shaft Bearings: One of the following as recommended by manufacturer for the application:

1. Oil impregnated sintered bronze.
2. Graphite impregnated nylon sleeve with thrust washers at bearings.
3. Lubricant free, stainless steel, single row, ground, flanged, radial, antifriction type with extended inner race.
4. Molded synthetic bearings.

I. Linkage Bearings: One of the following as recommended by manufacturer for the application:

1. Oil impregnated sintered bronze
2. Graphite impregnated nylon.

J. Maximum Pressure Differential: 6 inches wg.

K. Temperature Limits: -40 to 200 degrees F.

L. Manufacturers:

1. Greenheck.
2. CESCO.
3. Pottorff.
4. Nailor.
5. Ruskin.

M. Reference the Damper Schedule in Part 3 for basis of design damper model and material for the application.

## 2.2 OPERATORS

A. General:

1. Voltage: Voltage selection shall be as required to achieve the required torque for the application.
    a. Reference Part 3 for Damper Operator Voltage Schedule.
2. Type: Motor operated, with or without gears. Motor type shall be continuous duty.
3. Construction:
    a. For Actuators Less Than 100 W: Fiber or reinforced nylon gears with steel shaft, copper alloy or nylon bearings, and pressed steel enclosures.
    b. For Actuators from 100 to 400 W: Gears ground steel, oil immersed, shaft hardened steel running in bronze, copper alloy or ball bearings. Operator and gear trains shall be totally enclosed in dustproof cast-iron, cast-steel or cast-aluminum housing.
    c. For Actuators Larger Than 400 W: Totally enclosed reversible induction motors with auxiliary hand crank and permanently lubricated bearings.
4. Field Adjustment:

a. Spring Return Actuators: Easily switchable from fail open to fail closed in the field without replacement.

b. Gear Type Actuators: External manual adjustment mechanism to allow manual positioning when the actuator is not powered.

5. Two-Position Actuators: Single direction, spring return or reversing type. End-switches shall be integral to the actuator to determine actuator status.

6. Attachment:

a. Unless otherwise required for valve interface, provide an actuator designed to be directly coupled to device without the need for connecting linkages.

b. Attach actuator to device drive shaft in a way that ensures maximum transfer of power and torque without slippage.

7. Temperature and Humidity:

a. Temperature: Suitable for operating temperature range encountered by application.

b. Humidity: Suitable for humidity range encountered by application, non-condensing.

8. Enclosure:

a. Suitable for ambient conditions encountered by application.

9. Stroke Time:

a. Coordinate with stroke time indicated on the control drawings.

b. Unless otherwise noted, select operating speed to be compatible with equipment and system operation.

B. Damper Operators:

1. Controls contractor shall size damper operator.

2. Sizing: Provide smooth proportional control with sufficient power for air velocities 20 percent greater than maximum design velocity and to provide tight seal against maximum system pressures. Provide spring return for two position control and for fail safe operation.

a. Provide sufficient number of operators to achieve unrestricted movement throughout damper range.

b. Provide one operator for maximum 20 sq ft damper section or maximum 7 in-lb/sq ft damper area.

3. Fail Positions:

a. Spring return to normal position as indicated on freeze, fire, temperature, or loss of power protection. Normal positions are indicated on the control drawings.

1) Outside air damper, normally closed.

b. Operator shall fail in place for all other applications not listed under spring return.

C. Manufacturers:

1. Damper Operators:

a. Belimo.

b. Honeywell.

c. Johnson Controls.

d. Schneider Electric (Invensys).

e. Siemens.

## 2.3 INPUT/OUTPUT SENSORS AND TRANSMITTERS

A. General:

1. Performance Requirements:

a. Device must be compatible with project DDC controllers.

b. Elements used shall be general-purpose type.

c. Provide transmitters or transducers with sensors as required, with range suitable for the system encountered.

1) Transmitters and transducers shall have offset and span adjustments.

2) Shock and vibration shall not harm the transmitter or transducer.

3) Transmitters and transducers shall have a zeroing capability of readjusting the transmitter zero.

d. Accuracy requirements shall include the combined effects of linearity, hysteresis, repeatability, and the transmitter.

2. Output: Linear, proportional type over shielded cable pair, 4 - 20 mA or 0 – 10 Vdc signal.

3. Input Power: Low voltage, nominal 24 Vdc.

B. Temperature Sensors:

1. General: Temperature sensing elements shall have characteristics resistant to moisture, vibration, and other conditions consistent with the application without affecting accuracy and life expectancy. Sensor shall be UL 873 listed for temperature equipment.

2. Performance Requirements:

a. Thermistor:

1) Accuracy (All): Plus/minus 0.36 degrees F minimum.

2) Temperature Differential Accuracy: Plus/minus 0.15 degrees F minimum.

3) Resolution: Plus/minus 0.2 degrees F minimum.

4) Heat Dissipation Constant: 2.7 mW per degree C.

5) Drift: 0.04 degree F after 10 years within temperature range.

b. RTD:

1) Construct RTD of nickel or platinum with base resistance of 1000 ohms at 70 degrees F. 100 ohm platinum RTD is acceptable if used with project DDC controllers.

2) Accuracy (All): Plus/minus 1 degree F minimum, unless otherwise noted below.

a) Room Sensor Accuracy: Plus/minus 0.5 degrees F minimum.

b) Chilled Water Accuracy: Plus/minus 0.5 degrees F minimum.

c) Temperature Differential Accuracy: Plus/minus 0.15 degrees F minimum.

3) Resolution: Plus/minus 0.2 degree F.

4) Drift: 0.04 degrees F after 10 years within temperature range.

c. Sensing Range:

1) Provide limited range sensors if required to sense the range expected for a respective point.

d. Wire Resistance:

1) Use appropriate wire size to limit temperature offset due to wire resistance to 1.0 degree F or use temperature transmitter when offset is greater than 1.0 degree F due to wire resistance.

2) Compensate for wire resistance in software input definition when feature is available in the DDC controller.

3. Room Temperature Sensors:

a. Construct for surface or wall box, or enclosure with insulated backing suitable for exterior wall mounting.

b. Provide the following features:

1) Non-adjustable, blank front panel.

## 2.4 OUTPUT CONTROL DEVICES

A. Control Relays:

1. Provide relay with contact rating, configuration, and coil voltage that is suitable for the application.

2. Provide NEMA 1 enclosure when relay is not installed in a local control panel.

3. Control relays shall be UL listed plug-in type with dust cover and LED "energized" indicator.

4. Time delay relays shall be UL listed solid-state plug-in type with adjustable time delay. Delay shall be adjustable plus/minus 200 percent minimum from setpoint.

5. Electromechanical relays shall be UL listed, compact in size, provided with quick connect terminals and be impervious to shock and vibration.

6. Electronic relays shall be microcomputer-based with PI, time proportioning control capability, have average life greater than 500,000 cycles, have a built-in transformer and have LED status indication.

B. Fan Speed Controllers:

1. Solid-state model providing field-adjustable proportional control of motor speed. Equip with filtered circuit to eliminate radio interference.

## 2.5 POWER SUPPLIES

A. Control power transformers shall meet NEMA/ANSI standards.

B. Control power transformers shall be UL listed for Class 2 current-limited service or provided with over-current protection on both primary and secondary circuits for Class 2 current-limited service.

C. Connected load on the transformer shall not exceed 80 percent of the transformer's rated capacity.

D. The core and windings shall be completely encased in a UL approved thermoplastic. No metal parts shall be exposed other than the terminals.

E. Performance Characteristics:

1. Accuracy: Plus/minus 1 percent at 5.0 A full scale output.

F. Provide a disconnect switch for each transformer.

## 2.6 THERMOSTATS

A. General:

1. Programmable, with the following features:

a. 7-day programmable scheduling.

b. Temperature information display.

c. Setpoint display and adjust.

d. Operation mode display and adjust.

e. Fan switch setting (Off/Auto/Low/Med/High), configured with the fan system it serves.

f. Override.

g. Remote temperature sensor interface terminal.

1) Provide remote temperature sensor with line voltage thermostat for remote reading of temperature within attic of Cottage B. Locate thermostat and remote sensor as shown on the plans.

2. Performance Requirements:

a. Accuracy: Plus/minus 1.0 degree F minimum.

b. Resolution: Plus/minus 0.2 degrees F.

c. Range:

1) Operating Temperature: 0 degrees F to 122 degrees F minimum.

2) Operating Humidity: 0 percent to 95 percent relative humidity, non-condensing.

3) Setpoint Control:

a) Cooling: 85 degrees to 122 degrees F.

d. Multi-stage as required to match unit cooling and heating stages scheduled on the drawings.

B. Line Voltage Thermostats:

1. Line voltage thermostats with features and performance requirements listed above.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that systems are ready to receive work.

C. Beginning of installation means installer accepts existing conditions.

D. Sequence work to ensure installation of components is complementary to installation of similar components in other systems.

E. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

### 3.2 EXISTING EQUIPMENT

A. Pneumatic Equipment: Where equipment is allowed to be reused for project scope as indicated on the drawings, verify the integrity and proper operation of equipment prior to reuse.

B. Wiring: The contractor may reuse any abandoned wires. The integrity of the wire and its proper applications to the installation are the responsibility of the contractor. The wire shall be properly identified and tested. Unused or redundant wiring that remains in place shall be identified as such.

C. Local Control Panels: The contractor may reuse any existing local control panels to locate new equipment. All redundant equipment within these panels shall be removed. Panel face cover shall be patched to fill all holes caused by removal of unused equipment or replaced with new.

D. Repair: Unless otherwise directed, the contractor is not responsible for repair or replacement of existing energy equipment and systems, valves, dampers, or actuators. Should the contractor find existing equipment that requires maintenance, notify the engineer immediately.

E. Temperature sensor wells: The contractor may reuse any existing wells in piping for temperature sensors. The wells shall be modified as required for proper fit of new sensors.

F. Indicator Gauges: Where these devices remain and are not removed, recalibrate and ensure reasonable accuracy.

G. Patch holes and finish to match existing walls.

## 3.3 INSTALLATION

A. Cooperate with other contractors performing work on this project as necessary to achieve a complete and coordinated installation. Each Contractor shall consult the Drawings and Specifications for all trades to determine the nature and extent of others work.

B. General Workmanship:

1. Install equipment, piping, and wiring/raceway parallel to building lines wherever possible.
2. Provide sufficient slack and flexible connections to allow for vibration of piping and equipment.
3. Install all equipment in readily accessible locations.
4. All installations shall comply with industry specifications and standards for performance, reliability, and compatibility and be executed in strict adherence to local codes and standard practices.
5. Install all products in accordance with manufacturer's instructions.
6. Verify location and mounting height of thermostats, humidistats, and exposed control sensors with plans and room details before installation.
7. Provide separable sockets for liquids and flanges for air bulb elements.
8. Provide guards on thermostats in areas indicated on the drawings.
9. Calibrate each instrument installed that is not factory calibrated and provided with calibration documentation.

C. Control Dampers:

1. Install dampers with extruded aluminum or stainless steel frames and blades in corrosive environments and areas with high humidity.
2. Install smooth transitions, not exceeding 30 degrees, to dampers smaller than adjacent duct. Install transitions as close to damper as possible but at distance to avoid interference and impact to performance. Consult manufacturer for recommended clearance.
3. Clearance:

a. Locate dampers for easy access and provide separate support of dampers that cannot be handled by service personnel without hoisting mechanism.

b. Install dampers with at least 24 inches of clear space on sides of dampers requiring service access.

4. Service Access:

a. Dampers and actuators shall be accessible for visual inspection and service.

b. Install access door(s) in duct or equipment located upstream of damper to allow service personnel to hand clean any portion of damper, linkage, and actuator. Comply with requirements in Division 23 Section, "Air Duct Accessories.".

5. Duct openings shall be free of any obstruction or irregularities that might interfere with blade or linkage rotation or actuator mounting.

6. Install dampers straight and true, level in all planes, and square in all dimensions. Install supplementary structural steel reinforcement for large multiple-section dampers if factory support alone cannot handle loading.

7. Provide mixing dampers of parallel blade construction arranged to mix streams. Where shown on the drawings, provide separate minimum outside air damper section adjacent to return air dampers with separate damper motor.

8. Provide isolation (two position) dampers of parallel blade construction.

9. Provide opposed blade damper configuration for all other applications.

10. Install damper motors on outside of duct in warm areas. Do not install motors in locations at outdoor temperatures.

11. After installation of low-leakage dampers and seals, caulk between frame and duct or opening to prevent leakage around perimeter of damper.

D. Operators:

1. Mount and link control damper actuators according to manufacturer's instructions.

a. To compress seals when spring-return actuators are used on normally closed dampers, power actuator to approximately 5 degrees open position, manually close the damper, and then tighten the linkage.

b. Check operation of damper/actuator combination to confirm that actuator modulates damper smoothly throughout stroke to both open and closed positions.

c. Provide all mounting hardware and linkages for actuator installation.

2. Dampers: Actuators shall be direct-mounted on damper shaft or jackshaft unless shown as a linkage installation. For low-leakage dampers with seals, the actuator shall be mounted with a minimum 5 degree available for tightening the damper seals.

## 3.4 MAINTENANCE

A. Refer to Division 01 closeout requirements for additional requirements relating to maintenance service.

B. Provide service and maintenance of control system for one year from Date of Substantial Completion.

C. Provide complete service of controls systems, including call backs, and submit written report of each service call.

## 3.5 STARTUP AND DEMONSTRATION

A. Control Dampers:

1. Stroke and adjust control dampers following manufacturer's recommended procedure, from 100 percent open to 100 percent closed back to 100 percent open.

2. Check and document open and close cycle times for applications with a cycle time of less than 30 seconds.

3. For control dampers equipped with positive position indication, check feedback signal at multiple positions to confirm proper position indication.

4. Verify that all two-position dampers operate properly and that the normal positions are correct.

5. Verify that all modulating dampers and valves are functional, that the start and span are correct, that direction and normal positions are correct, and that they achieve proper closure.

## 3.6 DAMPER SCHEDULE

| SERVICE | RUSKIN MODEL | MATERIAL |
|---|---|---|
| Outside, Exhaust and Relief Air Control | CD-50 | Aluminum |

## 3.7 DAMPER OPERATOR VOLTAGE SCHEDULE

| SERVICE | VOLTAGE |
|---|---|
| Interlocked with HVAC fans | 120V |
| Multi-section dampers | 120V |
| Large dampers (> 60 inches in any dimension) | 120V |
| All other operators control wiring | 24V |

1. Note: Coordinate with Division 26 if 120V power is required for operator to achieve appropriate torque requirements for damper actuation.

**END OF SECTION 230913**

# SECTION 233300 – AIR DUCT ACCESSORIES

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

A. Backdraft dampers.

B. Duct access doors.

C. Duct hardware.

D. Fire dampers.

E. Duct opening closure film.

### 1.2 SUBMITTALS

A. Product Data: Provide for each type of ductwork accessory the following:

1. Electrical characteristics.
2. Connection requirements.
3. Dimensions.
4. Capacities.
5. Pressure drops,
6. Leakage rates.
7. Materials of construction.

B. Performance Data: Submit performance data for duct silencers including insertion loss performance in octave bands from 63 Hz to 8,000 Hz and pressure drop at specified airflow.

C. Project Record Drawings: Record actual locations of access doors and test holes.

D. Maintenance Data: Submit manufacturer's maintenance data including parts lists for each type of duct accessory. Include this data, product data, and shop drawings in maintenance manual.

### 1.3 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. SMACNA Compliance: Comply with applicable portions of SMACNA (DCS) “HVAC Duct Construction Standards Metal and Flexible”.

C. UL Compliance:

1. Fire Dampers: Construct, test, and label fire dampers in accordance with current edition of UL Standard 555 Standard for Fire Dampers.

2. Duct Tape: Label in accordance with UL Standard 181B and marked 181B-FX.

3. Duct Clamps: Label in accordance with UL Standard 181B and marked 181B-C.

D. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated

E. NFPA Compliance:

1. Comply with applicable provisions of NFPA 90A Standard for the Installation of Air-Conditioning and Ventilating Systems and NFPA 90B Standard for the Installation of Warm Air Heating and Air-Conditioning Systems pertaining to installation of ductwork accessories.

2. Comply with NFPA 96 Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations for fire-rated grease exhaust ducts.

F. ASTM Compliance: Products shall have flame-spread index of 25 or less, and smoke-developed index of 50 or less, as tested by ASTM E 84 "Standard Test Method for Surface Burning Characteristics of Building Materials" (NFPA 255) method.

## 1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect ductwork accessories during shipping and storage from dirt, debris and moisture damage.

B. Protect dampers from damage to operating linkages and blades.

## 1.5 SPARE PARTS

A. Extra Fusible Links: One link for every 10 installed of each type, size and temperature range. Obtain receipt.

# PART 2 - PRODUCTS

## 2.1 BACKDRAFT DAMPERS

A. Manufacturers:

1. Air Balance, Inc.
2. Arrow United Industries.
3. Cesco
4. Greenheck
5. Louvers & Dampers, Inc.
6. Nailor Industries, Inc.
7. Pottorff
8. Ruskin Mfg. Co.
9. TAMCO

10. Vent Products

B. Backdraft Dampers: Provide dampers with parallel blades, counterbalanced and factory-set to open at indicated static pressure. Provide adjustment device to permit setting for varying differential static pressure

1. Construct frames of minimum16 gauge galvanized steel or 10 gauge aluminum.
2. Construct blades of minimum 16 gauge aluminum.
3. Provide minimum 1/2" diameter, corrosion-resistant bearings and 1/2" diameter, galvanized or stainless steel axles.
4. Mechanically lock blade edge seals into blade edge. Provide neoprene seals for round dampers and silicone or vinyl seals for rectangular dampers.

## 2.2 DUCT ACCESS DOORS

A. Manufacturers:

1. Air Balance Inc.
2. Ductmate Industries.
3. Duro Dyne Corp.
4. Greenheck.
5. Register & Grille Mfg. Co., Inc.
6. Ruskin Mfg. Co.
7. Ventifabrics, Inc.
8. Vent Products.
9. Zurn Industries, Inc.; Air Systems Div.

B. Provide, where indicated on the drawings or where specified in Part 3 of this section, duct access doors of size allowable by duct dimensions with, unless otherwise noted on the drawings, minimum size of 10” by 10” and maximum size of 24” by 24”. Fabricate in accordance with SMACNA (DCS) and as indicated. Label access doors for fire and smoke dampers as specified in Part 3.

C. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. Construct of same or greater gauge as ductwork served. For insulated ductwork. install minimum 1 inch thick insulation with sheet metal cover. Provide flush frames for uninsulated ductwork, extended frames for externally insulated duct.

1. 12 inches square or less: Provide one size hinged, other side with one handle-type latch for doors 12" high and smaller, 2 handle-type latches for larger doors. Provide removable section of duct where duct size is too small for a 10” by 10” access door.
2. Larger than 12 inches square: Provide two hinges and two handle-type latches.

## 2.3 DUCT HARDWARE

A. Manufacturers:

1. Ductmate Industries.
2. Elgen Manufacturing Co., Inc.
3. Ventfabrics, Inc.
4. Young Regulator Co.

B. Test Holes: Provide in ductwork at fan inlet and outlet, and elsewhere as indicated.

1. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.
2. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

C. Quadrant Locks: Provide for each damper, quadrant lock device on one end of shaft; and end bearing plate on other end for damper lengths over 12". Provide extended quadrant locks and end extended bearing plates for externally insulated ductwork.

## 2.4 FIRE DAMPERS

A. Manufacturers:

1. Air Balance, Inc.
2. Cesco Products.
3. Greenheck
4. Louvers & Dampers, Inc.
5. Nailor Industries, Inc.
6. Pottorff
7. Prefco Products, Inc.
8. Ruskin Mfg. Co.

B. General: Provide fire dampers at locations indicated on the drawings. Damper ratings shall be as required to maintain the fire ratings noted on the architectural drawings. Provide duct access door for inspection and service to each fire damper and fusible link as required. Provide sleeves of length as required to meet the installed location.

C. Fabricate in accordance with NFPA 90A and UL 555 and as indicated.

D. Fire dampers shall be dynamic-rated for closure under pressure.

E. Provide positive lock in closed position.

F. Curtain Type Dampers: Galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations. Configure with blades out of air stream. Construct frames of 20-gauge stainless steel where installed in corrosive or moisture laden airstreams or where noted on the drawings.

G. Fusible links: UL 33 rated at 160 to 165 degrees F unless otherwise indicated.

## 2.5 DUCT OPENING CLOSURE FILM

A. Mold-resistant, self-adhesive film to keep debris out of ducts during construction.

B. Thickness: 2 mils.

C. High tack water-based adhesive.

D. UV stable.

E. Elongation Before Break: 325 percent, minimum.

# PART 3 - EXECUTION

## 3.1 INSPECTION

A. Examine areas and conditions under which ductwork accessories will be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

## 3.2 INSTALLATION OF DUCTWORK ACCESSORIES

A. Install ductwork accessories in accordance with manufacturer's installation instructions, with applicable portions of details of construction as shown in SMACNA standards, and in accordance with recognized industry practices to ensure that products serve intended function.

B. Install backdraft dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.

C. Provide fire dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by Authorities Having Jurisdiction.

1. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.

2. Demonstrate re-setting of fire dampers to Owner's representative.

D. Provide duct access doors to maintain and/or clean components internal to ductwork including, but not limited to, coils, airflow stations, motorized and backdraft dampers, humidifiers, etc, Install access doors to open against system air pressure, with latches operable from either side, except outside only where duct is too small for person to enter.

1. Provide duct access door(s) as scheduled below, at each fire and smoke damper within 12 inches of the device to allow for testing and maintenance. Label each door (with minimum 1” lettering) indicating which damper type is served. Door shall be capable of being fully opened or provide removable door.

DUCT ACCESS DOOR SCHEDULE

| Duct Width/Depth | Door Size | Quantity |
|---|---|---|
| 10” TO 12” | 10 X 10 | 1 |
| 14” TO 18” | 12 X 12 | 1 |
| 20” TO 36” | 14 X 14 | 1 |
| 38” TO 54” | 18 X 18 | 1 |
| 56” TO 72” | 18 X 18 | 2 (1 EACH END) |

E. Coordinate with other work, including ductwork, as necessary to interface installation of ductwork accessories properly with other work.

## 3.3 FIELD QUALITY CONTROL

A. Operate installed ductwork accessories to demonstrate compliance with requirements. Test for air leakage while system is operating. Repair or replace faulty accessories, as required to obtain proper operation and leakproof performance.

## 3.4 ADJUSTING AND CLEANING

A. Adjusting: Adjust ductwork accessories for proper settings, install fusible links in fire dampers and adjust for proper action.

B. Label access doors in accordance with Division-23 section "Identification for HVAC Piping and Equipment".

C. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

## END OF SECTION 233300

# SECTION 233413 – AXIAL HVAC FANS

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

A. Propeller fans.

### 1.2 SUBMITTALS

A. General: Submit data in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels at rated capacity, and electrical characteristics and connection requirements. Include the following:

1. For fans with factory-furnished starters or variable frequency drives, include short circuit current ratings.
2. Materials gages and finishes, including color charts.
3. Dampers, including housings, linkages, and operators.

C. Wiring Diagrams: Wiring diagrams that detail power, signal, and control wiring. Differentiate between manufacturer-installed wiring and field-installed wiring.

D. Maintenance Data: Include instructions for lubrication, motor and drive replacement and spare parts list.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. Extra Fan Belts: One set for each individual fan.

### 1.3 QUALITY ASSURANCE

A. AMCA Compliance:

1. Provide propeller fan products that meet performance requirements and are licensed to use the AMCA Seal.
2. Testing Requirements: The following factory tests are required for propeller fans:
    a. Sound Power Level Ratings: Comply with AMCA Standard 301 "Certified Ratings Program Product Rating Manual for Fan Sound Performance". Test fans in accordance with AMCA Standard 300 " Reverberant Room Method for Sound Testing of Fans". Fans shall be licensed to bear the AMCA Certified Sound Ratings Seal.
    b. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings in accordance with AMCA Standard 210/ASHRAE Standard 51 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating.

B. UL Compliance: Fans and components shall be UL listed and labeled.

C. Nationally Recognized Testing Laboratory and NEMA Compliance (NRTL): Fans and components shall be NRTL listed and labeled. The term "NRTL" shall be as defined in OSHA Regulation 1910.7.

D. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.

E. Electrical Component Standard: Components and installation shall comply with NFPA 70 "National Electrical Code."

## 1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect motors, shafts, and bearings from weather and construction dust.

## 1.5 FIELD CONDITIONS

A. Permanent fans may not be used for ventilation during construction.

# PART 2 - PRODUCTS AND MATERIALS

## 2.1 FANS, GENERAL

A. General: Provide fans that are factory fabricated and assembled, factory tested, and factory finished with indicated capacities and characteristics.

B. Fans and Shafts: Statically and dynamically balanced and designed for continuous operation at the maximum rated fan speed and motor horsepower.

1. Fan Shaft: Turned, ground, and polished steel designed to operate at no more than 70 percent of the first critical speed at the top of the speed range of the fan's class.

C. Motors: Refer to Section “Common Motor Requirements for HVAC Equipment” for requirements.

D. Motor and Fan Wheel Pulleys: Adjustable pitch for use with motors through 15 HP; fixed pitch for use with motors larger than 15 HP. Select pulley so that pitch adjustment is at the middle of the adjustment range at fan design conditions.

## 2.2 PROPELLER FANS

A. Manufacturers:

1. Carnes Company, Inc.
2. Cook (Loren) Co.
3. Greenheck Fan Corp.
4. PennBarry.
5. Twin City Fan Company.

B. General Description: Direct-driven propeller fans as indicated consisting of fan blades, hub, casing, orifice ring, motor, drive, and accessories. Fans shall be rated for medium or heavy duty to meet specified conditions.

C. Casings: Galvanized, sheet steel with flanged edges, and integral orifice ring.

D. Frame: One piece, square steel with die formed venturi orifice, mounting flanges and supports, with baked enamel finish.

E. Fan Wheels: Provide fan wheels of one of the following materials. Wheels shall be keyed and locked to the shaft and directly connected to the motor or provided with V-belt drive.

1. Replaceable, cast-aluminum blades fastened to cast-aluminum hub. Factory set pitch angle of blades.

2. Replaceable, extruded-aluminum, airfoil blades fastened to cast-aluminum hub. Factory set pitch angle of blades.

F. Drive Assembly:

1. Direct-drive connection to the motor.

G. Accessories: Provide the following accessories where indicated:

1.

2. Gravity Shutters: Gravity-type shutters with aluminum blades in steel frames, mounted on discharge side of fan.

3. Backdraft Damper: Multiple blade with offset hinge pin, blades linked.

4. Safety Screens: Expanded galvanized metal over inlet, motor, drive; to comply with 29 CFR 1910.

5. Controller: Solid-state speed controller.

H. Factory Finishes:

1. Sheet Metal Parts: Prime coat before final assembly.

2. Exterior Surfaces: Baked-enamel finish coat after assembly.

## PART 3 - EXECUTION

### 3.1 SEQUENCING AND SCHEDULING

A. Coordinate the size and location of structural steel support members.

### 3.2 INSTALLATION

A. Install fans level and plumb, in accordance with manufacturer's written instructions.

B. Arrange installation to provide access space around fans for service and maintenance.

C. Provide safety screen where inlet or outlet is exposed.

## 3.3 ADJUSTING, CLEANING, AND PROTECTING

A. Adjust damper linkages for proper damper operation.

B. Clean the entire unit including cabinet interiors just prior to substantial completion to remove foreign material and construction dirt and dust. Vacuum clean fan wheel and cabinet.

## 3.4 STARTUP

A. Final Checks Before Start-Up: Perform the following operations and checks before start-up:

1. Remove shipping blocking and bracing.
2. Verify fan assembly is secure on mountings and supporting devices and that connections for ductwork, and electrical are complete. Verify proper thermal overload protection is installed in motors, starters, and disconnects.
3. Perform cleaning and adjusting specified in this Section.
4. Disconnect fan drive from motor and verify proper motor rotation direction and verify fan wheel free rotation and smooth bearings operations. Reconnect fan drive system, align belts, and install belt guards.
5. Lubricate bearings, pulleys, belts, and other moving parts with factory-recommended lubricants.
6. Verify manual and automatic volume control, and fire and smoke dampers in connected ductwork systems are in the full-open position.
7. Disable automatic temperature control operators.

B. Starting procedures for fans:

1. Energize motor, verify proper operation of motor, drive system, and fan wheel. Adjust fan to indicated RPM.
    a. Replace fan and motor pulleys as required to achieve design conditions.
    b. Measure and record motor electrical values for voltage and amperage.
    c. Shut unit down and reconnect automatic temperature control operators.
    d. Refer to Division 23 Section "Testing, Adjusting, and Balancing for HVAC" for procedures for air-handling-system testing, adjusting, and balancing.

## 3.5 DEMONSTRATION

A. Demonstration Services: Train Owner's maintenance personnel on the following:

1. Procedures and schedules related to start-up and shutdown, troubleshooting, servicing, preventative maintenance, and how to obtain replacement parts.

2. Familiarization with contents of Operating and Maintenance Manuals specified in Division 1 Section "Closeout Procedures" and Division 23 Section "General Mechanical Requirements."

B. Schedule training with at least 7 days' advance notice.

**END OF SECTION 233413**

# SECTION 233713 – DIFFUSERS, REGISTERS AND GRILLES

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

A. Louvers.

### 1.2 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data for air outlets and inlets including the following:

1. Schedule of air outlets and inlets indicating drawing designation, room location, number furnished, model number, size, and accessories furnished.

2. Data sheet for each type of air outlet and inlet, and accessory furnished; indicating construction, finish, and mounting details. Indicate selections on product data.

3. Performance data for each type of air outlet and inlet furnished, including aspiration ability, temperature and velocity traverses; throw and drop; and noise criteria ratings at specified airflows.

B. Maintenance Data: Submit maintenance data, including cleaning instructions for finishes, and spare parts lists. Include this data, product data, and shop drawings in maintenance manuals; in accordance with requirements of Division 1.

C. Coordination Drawings: Reflected ceiling plans and wall elevations drawn to scale to show locations and coordination of diffusers, registers, and grilles with other items installed in ceilings and walls.

### 1.3 QUALITY ASSURANCE

A. Test and rate air outlets and inlets in accordance with ASHRAE 70 “Method of Testing the Performance of Air Outlets and Inlets”.

B. Test and rate air outlets and inlets in certified laboratories under requirements of ADC 1062 “Certification, Rating and Test Manual”.

C. Provide air outlets and inlets bearing ADC Certified Rating Seal.

D. Test and rate sound data for air outlets and inlets in accordance with AHRI 885 “Procedure for Estimating Occupied Space Sound Levels in the Application of Air Terminals and Air Outlets (with Addendum 1)”.

E. Install air outlets and inlets in accordance with NFPA 90A “Standard for the Installation of Air Conditioning and Ventilating Systems”.

F. Test and rate louvers in accordance with AMCA 500 “Test Method for Louvers, Dampers and Shutters”.

## PART 2 - PRODUCTS

### 2.1 LOUVERS

A. Manufacturers: Subject to compliance with requirements, provide louvers of one of the following:

1. Carnes Co.; Div. of Wehr Corp.
2. Cesco
3. Greenheck
4. Nailor Industries, Inc.
5. Pottorff
6. Ruskin Mfg. Co.
7. Tampco.

B. General: Except as otherwise indicated, provide manufacturer's standard louvers as scheduled or indicated on the drawings; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and provided with accessories as required for a complete installation.

C. Performance: Provide louvers that have minimum free area, and maximum pressure drop of each type as listed in manufacturer's current data, complying with louver schedule.

1. Structural Performance: Louvers shall withstand the effects of gravity loads and wind and/or seismic loads as defined in the applicable building code for the installed location without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.

D. Substrate Compatibility: Provide louvers with frame and sill styles that are compatible with adjacent substrate, and that are specifically manufactured to fit into construction openings with accurate fit and adequate support, for weatherproof installation. Refer to general construction drawings and specifications for types of substrate which will contain each type of louver.

E. Materials: Construct of aluminum extrusions, ASTM B 221, Alloy 6063-T52. Weld units or use stainless steel fasteners.

F. Louver Screens: On inside face of exterior louvers, provide 1/2" square mesh anodized aluminum wire bird screens mounted in removable extruded aluminum frames.

G. Louver Supports: Louver design shall limit span between visible mullions to 10' and shall incorporate structural supports required to withstand a wind load of 20 lbs. per sq. ft.

H. Intermediate Blade Supports: Where needed blade supports shall be provided by louver manufacturer on the rear of blade only.

I. Louver Blank-Off Panels: Blank off any unused portions of louver with lined galvanized sheet metal panels and seal airtight. Back of panels shall be insulated with 1" thick, 3 lb. density duct liner.

## PART 3 - EXECUTION

### 3.1 INSPECTION

A. Examine areas and conditions under which air outlets and inlets are to be installed for compliance with installation tolerances and conditions that would affect the performance of the equipment. Do not proceed with work until unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

A. General: Install air outlets and inlets in accordance with manufacturer's written instructions, design drawings, referenced standards, and in accordance with recognized industry practices to ensure that products serve intended function.

B. Coordinate with other work, including ductwork and duct accessories, to interface installation of air outlets and inlets with other work.

### 3.3 CLEANING

A. After installation of louvers,inspect exposed finish. Clean exposed surfaces to remove dirt and smudges. Replace any air device that has damaged finishes.

## END OF SECTION 233713

# SECTION 260010 – GENERAL ELECTRICAL REQUIREMENTS

## 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 and to all following sections within Division 26.

### 1.2 SECTION INCLUDES

A. This Division requires providing complete functioning systems, and each element thereof, as specified, indicated, or reasonably inferred, on the Drawings and in these Specifications, including every article, device, or accessory (whether or not specifically called for by item) reasonably necessary to facilitate each system's functioning as indicated by the design and the equipment specified. Elements of the Work include, but are not limited to, materials, labor, supervision, supplies, tools, equipment, transportation and utilities.

B. Division 26 of these Specifications, and Drawings numbered with prefixes E, generally describe these systems, but the scope of the electrical work includes all such work indicated in all of the Contract Documents, including, but not limited to: Instructions to Bidders; Proposal Form; General Conditions; Supplementary General Conditions; Architectural, Structural, Mechanical, Plumbing and Electrical Drawings and Specifications; and Addenda.

C. Drawings are graphic representations of the Work upon which the Contract is based. They show the materials and their relationship to one another, including sizes, shapes, locations, and connections. They also convey the scope of work, indicating the intended general arrangement of the equipment, fixtures, outlets and circuits without showing all of the exact details as to elevations, offsets, control lines, and other installation requirements. Use the Drawings as a guide when laying out the Work and to verify that materials and equipment will fit into the designated spaces, and which, when installed per manufacturers' requirements, will ensure a complete, coordinated, satisfactory and properly operating system.

D. Specifications define the qualitative requirements for products, materials, and workmanship upon which the Contract is based.

### 1.3 DEFINITIONS

A. Whenever used in these Specifications or Drawings, the following terms shall have the indicated meanings:

1. Furnish: "To supply and deliver to the project site, ready for unloading, unpacking, assembling, installing, and similar operations."

2. Install: "To perform all operations at the project site, including, but not limited to, and as required: unloading, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, testing, commissioning, starting up and similar operations, complete, and ready for the intended use."

3. Provide: "To furnish and install complete, and ready for the intended use."

4. Furnished by Owner (or Owner-Furnished) or Furnished by Others: “An item furnished by the Owner or under other Divisions or Contracts, and installed under the requirements of this Division, complete, and ready for the intended use, including all items and services incidental to the Work necessary for proper installation and operation. Include the installation under the warranty required by this Division.

5. Engineer: Where referenced in this Division, “Engineer” is the Engineer of Record and the Design Professional for the Work under this Division.

    a. A Consultant to, and an authorized representative of, the Owner, as defined in the General and/or Supplementary Conditions. When used in this Division, it means increased involvement by, and obligations to, the Engineer, in addition to involvement by, and obligations to, the “Owner”.

6. Contract Administrator: Where referenced in this Division, “Contract Administrator” is the primary liaison between the Owner and the Contractor. Specifically, for this project this is the “Engineer”.

7. AHJ: The local code and/or inspection agency (Authority) Having Jurisdiction over the Work.

8. NRTL: Nationally Recognized Testing Laboratory, as defined and listed by OSHA in 29 CFR 1910.7 (e.g., UL, ETL, CSA, etc.), and acceptable to the Authority having Jurisdiction (AHJ) over this project. Nationally Recognized Testing Laboratories and standards listed are used only to represent the characteristics required and are not intended to restrict the use of other NRTLs that are acceptable to the AHJ, and standards that meet the specified criteria.

9. Substitution: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor. Substitutions include Value Engineering proposals.

    a. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.

    b. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

10. Value Engineering: A systematic method to improve the “value” of goods and services by using an examination of function. Value, as defined, is the ratio of function to cost. Value can therefore be increased by either improving the function or reducing the cost. The goal of VE is to achieve the desired function at the lowest overall cost consistent with required performance.

11. Basis-of-Design Product: Subject to compliance with requirements, provide either the named product or a comparable product by one of the other equivalent manufacturers specified

B. When 'furnish', 'install', 'perform', or 'provide' is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.

C. The terms "approved equal", “equivalent”, or "equal" are used synonymously and shall mean “accepted by or acceptable to the Engineer as equivalent to the item or manufacturer

specified". The term "approved" shall mean labeled, listed, or both, by an NRTL, and acceptable to the AHJ over this project.

D. Manufacturers: The listing of specific manufacturers does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed are not relieved from meeting these specifications in their entirety.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

3. Where a list is provided, manufacturers are listed alphabetically and not in accordance with any ranking or preference, unless otherwise noted.

## 1.4 REFERENCE STANDARDS

A. Execute all work in accordance with, and comply at a minimum with, National Fire Protection Association (NFPA) codes, state and local building codes, and all other applicable codes and ordinances in force, governing the particular class of work involved, for performance, workmanship, equipment, and materials. Additionally, comply with rules and regulations of public utilities and municipal departments affected by connection of services. Where conflicts between various codes, ordinances, rules, and regulations exist, comply with the most stringent. Wherever requirements of these Specifications, Drawings, or both, exceed those of the above items, the requirements of these Specifications, Drawings, or both, shall govern. Code compliance, at a minimum, is mandatory. Construe nothing in these Construction Documents as permitting work not in compliance, at a minimum, with these codes. Bring all conflicts observed between codes, ordinances, rules, regulations and these documents to the Contract Administrator's and Engineer's attention in sufficient time, prior to the opening of bids, to prepare the Supplementary Drawings and Specifications Addenda required to resolve the conflict.

B. If the conflict is not reported timely, prior to the opening of bids, resolve the conflict and provide the installation in accordance with the governing codes and to the satisfaction of the Contract Administrator and Engineer, without additional compensation. Contractor will be held responsible for any violation of the law.

C. Obtain timely inspections by the constituted authorities having jurisdiction; and, upon final completion of the Work, obtain and deliver to the Owner executed final certificates of acceptance from these authorities having jurisdiction.

D. All material, manufacturing methods, handling, dimensions, methods of installation, and test procedures shall conform to industry standards, acts, and codes, including, but not limited to the following, except where these Drawings and Specifications exceed them:

| | |
|---|---|
| IBC | International Building Code, 2018 |
| IECC | International Energy Conservation Code, 2009 amended |
| ADA | Americans with Disabilities Act |
| ANSI | American National Standards Institute |
| ASTM | American Society of Testing Materials |
| AWS | American Welding Society |
| AWWA | American Water Works Association |
| FGI | Facilities Guideline Institute |
| ICEA | Insulated Conductors Engineers Association |
| IEEE | Institute of Electrical and Electronics Engineers |

| | |
|---|---|
| IES | Illuminating Engineering Society |
| NBFU | National Board of Fire Underwriters |
| NEC | National Electrical Code, NFPA 70 |
| NECA | National Electrical Contractors Association |
| NEMA | National Electrical Manufactures' Association |
| NETA | InterNational Electrical Testing Association |
| NFPA | National Fire Protection Association |
| OSHA | Occupational Safety and Health Act |
| UL | Underwriter's Laboratories |

E. Comply with rules and regulations of public utilities and municipal departments affected by connections of services.

F. Perform all electrical work in compliance with applicable safety regulations, including OSHA regulations. All safety lights, guards, and warning signs required for the performance of the electrical work shall be provided by the Contractor.

G. Obtain and pay for all permits, licenses and fees that are required by the governing authorities for the performance of the electrical work.

## 1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with other divisions for electrical work included in them but not listed in Division 26 or indicated on electrical Drawings.

B. Visit the site and ascertain the conditions to be encountered in installing the Work under this Division, verify all dimensions and locations before purchasing equipment or commencing work, and make due provisions for same in the bid. Failure to comply with this requirement shall not be considered justification for omission, alteration, and incorrect or faulty installation of any of the Work under this Division or for additional compensation for any work covered by this Division.

C. Refer to Drawings and divisions of the other trades and to relevant equipment drawings and shop drawings to determine the extent of clear spaces. Make all offsets required to clear equipment, beams and other structural members, and to facilitate concealing conduit in the manner anticipated in the design.

D. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.

E. Provide materials with trim that will fit properly the types of ceiling, wall, or floor finishes installed.

F. Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

G. Maintain an electrical foreman on the jobsite at all times to coordinate this work with other trades so that various components of the electrical systems is installed at the proper time, fits the available space, and allows proper service access to all equipment. Carry on the Work in such a manner that the Work of the other trades will not be handicapped, hindered, or delayed at any time.

H. Work of this Division shall progress according to the "Construction Schedule" as described in Division 01 and as approved by the Contract Administrator. Cooperate in establishing these schedules and perform the Work under this Division, in a timely manner in conformance with the construction schedule so as to ensure successful achievement of all schedule dates.

## 1.6 MEASUREMENTS AND LAYOUTS:

A. The Drawings are schematic in nature but show the various components of the systems approximately to scale and attempt to indicate how they are to be integrated with other parts of the Work. Figured dimensions take precedence to scaled dimensions. Determine exact locations by job measurements, by checking the requirements of other trades, and by reviewing all Contract Documents. Correct, at no additional costs to the Owner, errors that could have been avoided by proper checking and inspection.

## 1.7 SUBMITTALS

A. Refer to Division 01 and General Conditions for submittal requirements in addition to requirements specified herein.

## 1.8 SUBSTITUTIONS

A. Refer to Division 01 and General Conditions for substitutions in addition to requirements specified herein.

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

C. The base bid shall include only the products from manufacturers specifically named in the drawings and specifications.

## 1.9 ELECTRONIC DRAWING FILES

A. In preparation of shop drawings or record drawings, Contractor may, at their option, obtain electronic drawing files in AutoCAD or DXF format from the Engineer for a shipping and handling fee of $200 for a drawing set up to 12 sheets and $15 per sheet for each additional sheet.

B. Contractor shall request and complete the Electronic File Release Agreement form from the Engineer. Send the form along with a check made payable to Henderson Engineers, Inc. Contractor shall indicate the desired shipping method and drawing format on the attached form.

C. The following must be received before electronic drawing files will be sent:

1. Engineer’s release agreement form
2. Payment

## 1.10 QUALITY ASSURANCE

A. Execute all work under this Division in a thorough and professional manner by competent and experienced workmen duly trained to perform the work specified.

B. Install all work in strict conformance with all manufacturers' requirements and recommendations, unless these Documents exceed those requirements. Install all equipment and materials in a neat and professional manner, aligned, leveled, and adjusted for satisfactory operation, in accordance with NECA guidelines.

C. Unless indicated otherwise on the Drawings, provide all material and equipment new, of the best quality and design, free from defects and imperfections and with markings or a nameplate identifying the manufacturer and providing sufficient reference to establish quality, size and capacity. Provide all material and equipment of the same type from the same manufacturer whenever practicable.

D. Unless specified otherwise, manufactured items of the same types specified within this Division shall have been installed and used, without modification, renovation, or repair for not less than one year prior to date of bidding for this Project.

## 1.11 OPERATION AND MAINTENANCE MANUALS

A. Refer to Division 01 and General Conditions for Operation and Maintenance Manuals in addition to requirements specified herein.

## 1.12 RECORD DRAWINGS

A. Refer to Division 01 and General Conditions for Record Drawings in addition to requirements specified herein.

## 1.13 DELIVERY, STORAGE AND HANDLING

A. Refer to Division 01 and General Conditions for Delivery, Storage and Handling in addition to requirements specified herein.

## 1.14 WARRANTIES

A. Refer to Division 01 and General Conditions for Warranties in addition to requirements specified herein.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

C. Warrant each system and each element thereof against all defects due to faulty workmanship, design or material for a period of 12 months from date of Substantial Completion, unless specific items are noted to carry a longer warranty in these Construction Documents or manufacturer’s standard warranty exceeds 12 months. Remedy all defects, occurring within the warranty period(s), as stated in the General Conditions and Division 01.

D. Also warrant the following additional items:

1. All raceways are free from obstructions, holes, crushing, or breaks of any nature.
2. All raceway seals are effective.
3. The entire electrical system is free from all short circuits and unwanted open circuits and grounds.

E. The above warranties shall include labor and material. Make repairs or replacements without any additional costs to the Owner.

F. Perform the remedial work promptly, upon written notice from the Contract Administrator or Owner.

G. At the time of Substantial Completion, deliver to the Owner all warranties, in writing and properly executed, including term limits for warranties extending beyond the one year period, each warranty instrument being addressed to the Owner and stating the commencement date and term.

## 1.15 FIELD CONDITIONS

A. Conditions Affecting Work In Existing Buildings: The following project conditions apply:

1. The Drawings describe the general nature of remodeling to the existing building; however, visit the site prior to submitting bid to determine the nature and extent of work involved.
2. Schedule work in the existing building with the Owner.
3. Perform certain demolition work prior to the remodeling. Perform the demolition that involves electrical systems, Light fixtures, equipment, raceways, equipment supports or foundations and materials.
4. Remove articles that are not required for the new work. Unless otherwise indicated, remove each item removed during this demolition from the premises and dispose in accordance with applicable federal, state and local regulations.
5. Relocate and reconnect electrical facilities that must be relocated in order to accomplish the remodeling shown in the Drawings or indicated in the Specifications. Where electrical equipment or materials are removed, cap unused raceways below the floor line or behind the wall line to facilitate restoration of finish.
6. Finish material will be installed under other divisions.
7. Obtain permission from the Contract Administrator for roof penetrations and channeling of floors or walls not specifically noted on the Drawings.
8. Protect adjacent materials indicated to remain. For work specific to this Division, install and maintain dust and noise barriers to keep dirt, dust, and noise from being transmitted to adjacent areas. Remove protection and barriers after demolition operations are complete.
9. Locate, identify, and protect electrical services passing through demolition area and serving other areas outside the demolition limits. Maintain services to areas outside demolition limits. When services must be interrupted, provide temporary services for affected areas.

B. Use of explosives is not permitted.

## PART 2 - PRODUCTS AND MATERIALS

(Not Used)

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

A. Install in accordance with manufacturer's instructions.

### 3.2 EXISTING CONDITIONS

A. Existing conditions indicated on the Drawings are taken from the best information available from the Owner, existing record drawings, and from limited, in-situ, visual site observations; and, they are not to be construed as "AS BUILT" conditions. The information is shown to help establish the extent of the new work.

B. Verify all actual existing conditions at the project site and perform the Work as required to meet the existing conditions and the intent of the Work indicated.

C. Notify Contract Administrator immediately of any dangerous conditions that exist on the job site, as they are discovered, before demolition, during selective demolition or before remodel work begins.

### 3.3 WORK IN EXISTING FACILITIES

A. The Drawings describe the general nature of remodeling to the existing facilities; however, visit the site prior to submitting a bid, to determine the nature and extent of work involved.

B. Schedule work in the existing facility with the Owner.

C. Certain demolition work shall be performed prior to the remodeling. Perform the demolition that involves electrical systems, fixtures, conduit, wiring, equipment, equipment supports or foundations and materials.

D. Remove all of these articles that are not required for the new work. Unless otherwise indicated, each item removed during this demolition shall be removed from the premises and disposed of in accordance with all state and local regulations.

E. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner, or others, unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

1. Notify Contract Administrator and the Owner no fewer than 7 days in advance of proposed interruption of electrical service.
2. Do not proceed with interruption of electrical service without Contract Administrator and the Owner's written permission.
3. Owner reserves the right to require Contractor to cease work in any area Owner requires access to on an emergency basis.
4. Make every effort to schedule outages during non-business or off-peak business hours to minimize disruptions to business operations.

F. Relocate and reconnect all electrical facilities that must be relocated in order to accomplish the remodeling shown in the Drawings or indicated in the Specifications. Where electrical fixtures or equipment are removed, cap all unused raceways behind the floor line or wall line to facilitate restoration of finish, and, remove all existing wiring from abandoned raceways.

G. Finish materials are specified in other divisions.

H. Where removal of existing wiring interrupts electrical continuity of circuits that are to remain in use, provide necessary wiring, raceways, junction boxes, etc., to ensure continued electrical continuity.

I. Penetrate roofs, channel walls and floors as required to produce the desired result; however, obtain permission from the Contract Administrator for all penetrations and channeling not specifically noted on the Drawings.

J. Provide new, typewritten card directory for distribution equipment (including but not limited to load centers, panelboards, switchboards and switchgear) where changes occur under this scope of work. Indicate exact loads served by each existing circuit breaker or switch. Where circuit designations are not specifically indicated on the Drawings, provide a unique identifier for each updated circuit within the directory.

K. Coordinate work with Architectural phasing drawings to properly stage transitions of work to provide power to existing, new and temporary loads. Monitor loads on distribution system to ensure shifting of loads does not overload electrical equipment.

L. Work in common areas, shafts or other Owner owned and/or operated spaces must be reviewed and approved by the Contract Administrator and Owner prior to commencement of the work.

1. Contractor shall minimize any disruption and disturbances to other tenants. All work within other tenant spaces must be coordinated with and approved by the Landlord and Owner.

## 3.4 PERMITS

A. Secure and pay for all permits required in connection with the installation of the Electrical Work. Arrange with the various utility companies for the installation and connection of all required utilities for this facility and pay all charges associated therewith including connection charges and inspection fees, except where these services or fees are designated to be provided by others.

## 3.5 TEMPORARY ELECTRICAL SERVICE AND WIRING

A. In existing facilities, with Owner's approval, Contractor may utilize the existing electrical system as the source of temporary power. Coordinate the point of connection and method of connection to the existing system with the Owner's Representative.

B. Work for the temporary power shall consist of all labor and materials, including, but not limited to conduit, wiring, panelboards, fuse blocks, fused disconnecting switches, fuses, pigtails, receptacles, wood panel switch supports, and other miscellaneous materials required to complete the power system.

C. Install all temporary wiring in accordance with applicable codes, and maintain in an OSHA-approved manner.

## 3.6 SELECTIVE DEMOLITION

A. Refer to Division 01 and General Conditions for Selective Demolition requirements in addition to the requirements specified herein.

B. General: Demolish, remove, demount, and disconnect abandoned electrical materials and equipment indicated to be removed and not indicated to be salvaged or saved.

C. Materials and Equipment To Be Salvaged: remove, demount, disconnect existing electrical materials and equipment indicated to be removed and salvaged, and deliver materials and equipment to the location designated for storage.

D. Disposal and Cleanup: Remove from the site and legally dispose of demolished materials and equipment not indicated to be salvaged.

E. Electrical Materials and Equipment: Demolish, remove, demount, and disconnect the following items:

1. Inactive and obsolete raceways, fittings, supports and specialties, equipment, wiring, controls, fixtures, and insulation:

a. Raceways and outlets embedded in floors, walls, and ceilings may remain if such materials do not interfere with new installations. Cut embedded raceways to below finished surfaces, seal, and refinish surfaces as specified or as indicated on the Architectural Finish Drawings. Remove materials above accessible ceilings. Cap raceways allowed to remain.

b. Perform cutting and patching required for demolition in accordance with Division 01, General Conditions and "Cutting and Patching" portion of this Section in Division 26.

## 3.7 ACCESS TO EQUIPMENT

A. Locate all pull boxes, junction boxes and controls to provide easy access for operation, service inspection and maintenance. Provide an access door where equipment or devices are located above inaccessible ceilings. Refer to Division 26 Section “Common Work Results for Electrical”.

B. Maintain all code required clearances and clearances required by manufacturers.

## 3.8 PENETRATIONS

A. Unless otherwise noted as being provided under other divisions, provide sleeves, box frames, or both, for openings in floors, walls, partitions and ceilings for all electrical work that passes through construction. Refer to Division 26 Section “Common Work Results for Electrical”.

B. Provide sleeves, box frames, or both, for all conduit, cable, and busways that pass through masonry, concrete or block walls.

C. The cutting of new and/or existing construction will not be permitted except by written approval of the Contract Administrator.

## 3.9 CUTTING AND PATCHING

A. Cut walls, floors, ceilings, and other portions of the facility as required to install work under this Division.

B. Obtain permission from the Architect prior to cutting. Do not cut or disturb structural members without prior approval from the Architect and Structural Engineer.

C. Penetrations shall be made as small as possible while maintaining required clearances between the building element penetrated and the system component.

D. Patch around openings to match adjacent construction, including fire ratings, if applicable.

E. Repair and refinish areas disturbed by work to the condition of adjoining surfaces in a manner satisfactory to the Architect.

## 3.10 CLEANING

A. Remove dirt and refuse, resulting from the performance of the Work, from the premises as required to prevent accumulation. Cooperate in maintaining reasonably clean premises at all times.

B. Immediately prior to the final inspection, the Electrical Contractor shall clean material and equipment installed under the Electrical Contract. Dirt, dust, plaster, stains, and foreign matter shall be removed from surfaces including components internal to equipment.

C. Damaged finishes shall be touched-up and restored to their original condition

## 3.11 ADJUSTING, ALIGNING AND TESTING

A. Adjust, align and test all electrical equipment furnished and/or installed under this Division.

B. Check motors for alignment with drive and proper rotation, and adjust as required.

C. Check and test protective devices for specified and required application, and adjust as required.

D. Check, test and adjust adjustable parts of all light fixtures and electrical equipment as required to produce the intended performance.

E. Verify that completed wiring system is free from short circuits, unintentional grounds, low insulation impedances, and unintentional open circuits.

F. After completion, perform tests for continuity, unwanted grounds, and insulation resistance in accordance with the requirements of NFPA 70 and NETA.

G. Be responsible for the operation, service and maintenance of all new electrical equipment during construction and prior to acceptance by the Owner of the complete project under this Contract. Maintain all electrical equipment in the best operating condition including proper lubrication.

H. Notify the Contract Administrator immediately of all operational failures caused by defective material, labor or both.

I. Maintain service and equipment for all testing of electrical equipment and systems until all work is approved and accepted by the Owner.

J. Keep a calibrated voltmeter and ammeter (true RMS type) available at all times. Provide service for test readings when and as required.

K. Refer to individual sections for additional and specific requirements.

## 3.12 START-UP OF SYSTEMS

A. Prior to start-up of electrical systems, check all components and devices, lubricate items appropriately, and tighten all screwed and bolted connections to manufacturers' recommended torque values using appropriate torque tools.

B. Each power, lighting and control circuit shall be energized, tested and proved free of breaks, short-circuits and unwanted grounds.

C. Balance all single phase loads at each panelboard, redistributing branch circuit connections until balance is achieved to plus or minus 10 percent.

D. After all systems have been inspected and adjusted, confirm all operating features required by the Drawings and Specifications and make final adjustments as necessary.

E. Demonstrate that all equipment and systems perform properly as designed per Drawings and Specifications.

F. At the time of final review and tests of the power and lighting systems, all equipment and system components shall be in place and all connections at panelboards, switches, circuit breakers, and the like, shall be complete. All fuses shall be in place, and all circuits shall be continuous from point of service connections to all switches, receptacles, outlets, and the like.

## 3.13 TEST REPORTS

A. Perform tests as required by these Specifications and submit the results to the Contract Administrator, for Engineer's review. Record the results, date and time of each test and the conditions under which the test was conducted. Include a copy of the finalized test results, with corrections made, in the operations and maintenance manuals. The tests shall establish the adequacy, quality, safety, and reliability for each electrical system installed. Notify the Contract Administrator and Engineer two working days prior to each test.

B. For specific testing requirements of special systems, refer to the Specification section that describes that system. The Contractor shall provide the following to facilitate the testing of the electrical systems:

1. Perform tests as described in the individual sections;

C. Upon completing each test, record the results, date and time of each test and the conditions under which the test was conducted. Submit to the Contract Administrator, for Engineer's review, in duplicate, the test results for the following electrical items:

1. Test all wiring devices for electrical continuity and proper polarity of connections.

D. Promptly correct all failures or deficiencies revealed by these tests in accordance with the manufacturer's recommendations and as determined by the Engineer.

**END OF SECTION 260010**

# SECTION 260500 – COMMON WORK RESULTS FOR ELECTRICAL

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

A. This Section includes limited scope general construction materials and methods, electrical equipment coordination, and common electrical installation requirements as follows:

1. Access doors in walls, ceilings, and floors for access to electrical materials and equipment.
2. Sleeves and seals for electrical penetrations.
3. Joint sealers for sealing around electrical materials and equipment, and for sealing penetrations in fire and smoke barriers, floors, and foundation walls.

### 1.2 DEFINITIONS

A. The following abbreviations apply to this and other Sections of these Specifications:

1. AHJ: Authority(ies) having Jurisdiction
2. ATS: Acceptance Testing Specifications
3. EPDM: Ethylene-propylene-diene monomer rubber
4. MC: Metal Clad
5. N/A: Not Available or Not Applicable
6. NBR: Acrylonitrile-butadiene rubber
7. NRTL: Nationally Recognized Testing Laboratory
8. PCF: Pounds per Cubic Foot

B. The following definitions apply to this and other Sections of these Specifications:

1. Homerun: That portion of an electrical circuit originating at a junction box, termination box, receptacle or switch with termination at an electrical panelboard. Note: Where MC Cable is utilized for receptacle and/or lighting branch circuiting loads, the originating point of the homerun shall be at the first load in the circuit or at a junction box in an accessible ceiling space immediately above the first load.

### 1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordinate arrangement, mounting, and support of electrical equipment:

1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
3. To allow right of way for piping, ducts, and other systems installed at required slopes and/or elevations.

4. So connecting raceways, cables, and wireways will be clear of obstructions and of the working and access space of other equipment.

B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

C. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed.

D. Coordinate electrical testing of electrical, mechanical, and architectural items, so equipment and systems that are functionally interdependent are tested to demonstrate successful interoperability.

## 1.4 SUBMITTALS

A. General: Submit the following in accordance with Division 01 and Division 26 Section "General Electrical Requirements":

1. Product data for the following products:

a. Sleeve seals.

b. Joint sealers

2. Record Drawings: Submit Record Drawings as required by Division 01 and Division 26

a. Accurately record actual locations of firestopped penetrations and access panel/door locations. Indicate dimensions from fixed structural elements.

# PART 2 - PRODUCTS AND MATERIALS

## 2.1 ACCESS TO EQUIPMENT

A. Manufacturers:

1. Bar-Co., Inc.
2. Elmdor Stoneman.
3. JL Industries
4. Jay R. Smith Mfg. Co.
5. Karp Associates, Inc.
6. Milcor
7. Nystrom Building Products
8. Wade
9. Zurn

B. Access Doors:

1. Provide access doors for all concealed equipment, except where above lay-in ceilings. Refer to Section "Identification for Electrical Systems" for labeling of access doors.

2. Access doors shall be adequately sized for the devices served with a minimum size of 18 inches x 18 inches, furnished by the respective Contractor or Subcontractor and installed by the General Contractor.

3. Access doors must be of the proper construction for type of construction where installed.

4. The exact location of all access doors shall be verified with the Contract Administrator prior to installation.

5. Steel Access Doors and Frames: Factory-fabricated and assembled units, complete with attachment devices and fasteners ready for installation. Joints and seams shall be continuously welded steel, with welds ground smooth and flush with adjacent surfaces.

6. Frames: 16-gauge steel, with a 1-inch-wide exposed perimeter flange for units installed in unit masonry, pre-cast, or cast-in-place concrete, ceramic tile, or wood paneling.

    a. For installation in masonry, concrete, ceramic tile, or wood paneling: 1-inch-wide exposed perimeter flange and adjustable metal masonry anchors.

    b. For installation in gypsum wallboard or plaster: perforated flanges with wallboard bead.

    c. For installation in full-bed plaster applications: galvanized, expanded metal lath and exposed casing bead, welded to perimeter of frame.

7. Flush Panel Doors: 14-gauge sheet steel, with concealed spring hinges or concealed continuous piano hinge set to open 175 degrees; factory-applied prime paint.

8. Locking Devices:

    a. Flush, screwdriver-operated cam locks.

## 2.2 SLEEVES

A. Steel sleeves for raceways and cables:

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends and drip rings.

## 2.3 SEALANTS

A. JOINT SEALERS

1. General: Joint sealers, joint fillers, and other related materials compatible with each other and with joint substrates under conditions of service and application.

2. Colors: As selected by the Contract Administrator from manufacturer's standard colors.

B. FIRESTOPPING

1. Sealants and accessories shall have fire-resistance ratings indicated, as established by testing identical assemblies in accordance with UL 2079 or ASTM E 814, by

Underwriters' Laboratories, Inc., or other NRTL acceptable to AHJ. Subject to compliance with requirements, provide one of the following:

a. Manufacturer:

1) 3M Corp., Fire Barrier Sealant

2) Hilti, Inc.

3) Tremco, Tremstop Fyre-Sil

4) Pecora, AC-20 FTR

5) RectorSeal

6) Specified Technologies Inc. Firestop

7) USG, SHEETROCK Firecode Compound

8) Owens Corning Firestopping Insulation

## PART 3 - EXECUTION

### 3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Comply with NECA 1.

C. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items, unless indicated otherwise.

D. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

E. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

F. Right of Way: Yield to raceways and piping systems installed at a required slope.

### 3.2 ACCESS DOORS

A. Verify the exact location, sizes, and types of all access doors with the Contract Administrator prior to purchase.

B. Provide access doors for all concealed electrical equipment, except where above lay-in ceilings.

C. Coordinate with architectural finishes to set frames accurately in position and securely attached to supports, with face panels plumb and level in relation to adjacent finish surfaces.

D. Adjust hardware and panels after installation for proper operation.

E. Label all access doors with a nameplate as described in Division 26 Section "Identification for Electrical Systems".

## 3.3 SLEEVES AND SLEEVE SEALS

A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.

B. Provide sleeves for required openings in all concrete and masonry construction and fire, smoke, or both, partitions, for all electrical work that passes through such construction. Coordinate with all other trades and divisions to dimension and lay out all such openings.

C. Only those openings specifically indicated on the Architectural or Structural Drawings will be provided under other divisions.

D. Construction in Existing Facilities:

1. Saw cut or core drill existing walls, roofs and slabs to install sleeves and sleeve seals in existing facilities. Do not cut or drill any walls, roofs or slabs without first coordinating with, and receiving approval from, the Contract Administrator, Owner, or both. Seal sleeves into concrete walls or slabs with a waterproof non-shrink grout acceptable to the Contract Administrator. Provide roofing penetration seals and covers to match existing roofing materials. Coordinate roofing repair of adjacent roofing material with Owner's roofing contractor to provide a waterproof installation.

E. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls. Do not cut or core drill new construction without written approval from the Contract Administrator and Structural Engineer.

F. Install pipe sleeves in above-grade walls and slabs, where penetrations are not subject to hydrostatic water pressures. Ensure that drip ring is fully encased and sealed within the wall or slab.

G. Sleeve Length:

1. Sleeves through walls: Cut sleeves to length for mounting flush with both surfaces of walls.

2. Sleeves through floors: Extend sleeves 2 inches above finished floor level.

H. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed

I. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.

J. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint

K. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials.

L. Aboveground, Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (or larger, if required by the seal manufacturer) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

M. Above Grade Concrete or Masonry Penetrations

1. Provide sleeves for cables or raceways passing through above grade concrete or masonry walls, concrete floor or roof slabs. Sleeves are not required for core drilled holes in existing masonry walls, concrete floors or roofs. Provide sleeves as follows:

   a. Install schedule 40 galvanized steel pipe for sleeves smaller than 6 inches in diameter.

   b. Install galvanized sheet metal for sleeves 6 inches in diameter and larger, thickness shall be 0.138 inches.

   c. Install galvanized sheet metal for rectangular sleeves

   d. Schedule 40 PVC pipe sleeves are acceptable for use in areas without return air plenums.

2. Seal elevated floor, exterior wall and roof penetrations watertight and weather tight with non-shrink, non-hardening commercial sealant. Pack with mineral wool and seal both ends with minimum of ½" of sealant.

N. Underground, Exterior-Wall Penetrations: Install cast-iron wall pipes for sleeves. Size sleeves to allow for 1-inch (or larger, if required by the mechanical sleeve manufacturer) annular clear space between sleeve and cable or raceway. Provide mechanical sleeve seal.

1. Use type and number of sealing elements recommended by manufacturer for pipe material and size. Position pipe in center of sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

2. Inspect installed sleeve and sleeve-seal installation for damage and faulty work. Verify watertight integrity of sleeves and seals installed below grade to seal against hydrostatic pressure.

O. Concrete Slab on Grade Penetrations:

1. Provide ½" thick cellular foam insulation around perimeter of raceway passing through concrete foundation. Installation shall extend to 2" above and below the concrete slab.

P. Interior Foundation Penetration: Provide sleeves for horizontal raceway passing through or under foundation. Sleeves shall be cast iron soil pipe two normal pipe sizes larger than the pipe served.

Q. Interior Penetrations of Non-Fire-Rated Walls: Seal annular space between sleeve and cable or raceway, using joint sealant appropriate for size, depth, and location of joint. Pack with mineral wool and seal both ends with minimum of ½" of sealant.

R. Exterior Wall Penetrations: Seal annular space between sleeve and raceway or duct, using joint sealant for size, depth, and location of joint. Pack with mineral wool and seal both ends with minimum of ½" of waterproof sealant.

S. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

T. Sleeve-Seal Installation

1. Install sleeve seals for all underground raceway penetrations through walls at elevations below finished grade. Additionally, install seals inside raceways, after conductors or cables have been installed, in all raceway penetrations through walls at elevations below finished grade.

2. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

U. Inspect installed sleeve and sleeve-seal installations for damage and faulty work. Verify watertight integrity of sleeves and seals installed below grade and above grade where installed to seal against hydrostatic pressure.

V. Sleeves shall be protected throughout the course of construction, and when damaged shall be replace and/or repaired to a satisfactory condition.

## 3.4 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

## 3.5 JOINT SEALERS

A. Preparation for Joint Sealers

1. Clean surfaces of penetrations, sleeves, or both, immediately before applying joint sealers, to comply with recommendations of joint sealer manufacturer.

2. Apply joint sealer primer to substrates as recommended by joint sealer manufacturer. Protect adjacent areas from spillage and migration of primers, using masking tape. Remove tape immediately after tooling without disturbing joint seal.

B. Application of Joint Sealers

1. General: Comply with joint sealer manufacturers' printed application instructions applicable to products and applications indicated, except where more stringent requirements apply.

a. Comply with recommendations of ASTM C 962 for use of elastomeric joint sealants.

b. Comply with recommendations of ASTM C 790 for use of acrylic-emulsion joint sealants.

2. Tooling: Immediately after sealant application and prior to time shining or curing begins, tool sealants to form smooth, uniform beads; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

**END OF SECTION 260500**

# SECTION 260502 – EQUIPMENT WIRING SYSTEMS

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

A. This Section includes limited scope for electrical connections to equipment specified under other sections or divisions, or furnished under separate contracts or by the Owner.

### 1.2 ADMINISTRATIVE REQUIREMENTS

A. Unless otherwise noted, perform all electrical work required for the proper installation and operation of equipment, furnishings, devices and systems specified in other divisions of these Specifications, furnished under other contracts, and/or furnished by the Owner for installation under this contract.

B. Obtain and review shop drawings, product data, and manufacturer's instructions for equipment furnished under other sections.

C. Determine connection locations and rough-in requirements based on shop drawings.

D. Sequence rough-in of electrical connections to coordinate with installation schedule for equipment.

E. Sequence electrical connections to coordinate with start-up schedule for equipment.

### 1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories:

1. Listed and labeled as defined in NFPA 70, Article 100, by an NRTL as defined by OSHA in 29 CFR 1910.7, and that is acceptable to Authorities Having Jurisdiction.

2. Marked for intended use.

B. Comply with NFPA 70.

## PART 2 - PRODUCTS AND MATERIALS

### 2.1 CORDS AND CAPS

A. Attachment Plugs: Conform to NEMA WD 1.

B. Configuration: NEMA WD 6, matching receptacle configuration at outlet provided for equipment, or as required by the equipment manufacturer.

C. Cord: See Paragraph “Flexible Cords” in Division 26 Section “Low-voltage Electrical Power Conductors and Cables”.

D. Provide cord size suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Verify conditions of equipment and installation prior to beginning work.

B. Verify that equipment is ready for connecting, wiring, and energizing.

### 1.2 INSTALLATION, GENERAL

A. Install in accordance with manufacturer's instructions.

### 3.2 ELECTRICAL DEVICES

A. Install disconnect switches, controllers, control stations, and control devices (other than temperature control devices) as indicated, specified in other divisions of these Specifications, furnished under other contracts, and/or furnished by the Owner for installation under this Contract.

### 3.3 ELECTRICAL CONNECTIONS

A. Make electrical connections in accordance with equipment manufacturers' instructions.

B. Make conduit connections to equipment using flexible conduit. Use liquid tight flexible conduit with watertight connectors in damp or wet locations.

C. Make wiring connections using conductors and cable with insulation suitable for temperatures encountered in heat producing equipment.

D. Provide receptacle outlet where connection with attachment plug is indicated. Provide cord and cap where field-supplied attachment plug is indicated on the Drawings.

E. Provide suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

F. Provide interconnecting conduit and wiring between devices and equipment where indicated on the Drawings.

### 3.4 EQUIPMENT

A. When equipment is delivered in separate parts and field assembled, internal wiring, indicated on Shop Drawings as field wiring, will be provided by the equipment supplier, unless otherwise noted.

B. Provide power connection to all equipment as required and as indicated in the equipment supplier's installation drawings.

C. Provide all control and interlock wiring for all equipment that is not included within the responsibility of Division 23.

**END OF SECTION 260502**

# SECTION 260519 – LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

A. Conductors, cables, and cords rated 600V and less.

B. Connectors and terminations rated 600V and less.

### 1.2 DEFINITIONS

A. The following abbreviations apply to this and other Sections of these specifications:

1. MC: Metal Clad
2. NBR: Acrylonitrile-butadiene rubber
3. NETA ATS: Acceptance Testing Specification.

B. The following definitions apply to this and other Sections of these Specifications:

1. HOMERUN: That portion of an electrical circuit beginning at a junction box, termination box, receptacle or switch with termination at an electrical panelboard.

a. Note: Where MC Cable is allowed to be utilized for receptacle and/or lighting branch circuiting loads, the originating point of the homerun shall be at the first load in the circuit or at a junction box in an accessible ceiling space immediately above the first (most upstream) load.

### 1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop and temperature deration.
2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
3. Coordinate electrical testing of electrical, mechanical, and architectural items, so equipment and systems that are functionally interdependent are tested to demonstrate successful interoperability.

B. Notify Contract Administrator of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

### 1.4 SUBMITTALS

A. General: Submit the following in accordance with Division 01 and Division 26 Section “General Electrical Requirements”:

1. Product data for the following products:

a. Conductors, cables, and cords rated 600V and less.

b. Metal Clad (MC) cable and fittings.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.

C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

D. Qualification Data: For testing agency.

E. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.

F. Operation and Maintenance Data: For cable and all accessories to include in operation and maintenance manuals.

G. Follow-up service reports.

## 1.5 QUALITY ASSURANCE

A. Materials shall be manufactured by companies that have been specializing in the products specified in this Section, for a minimum of 3 years.

B. Provide products listed and classified by Underwriters Laboratories, Inc (UL) as suitable for the purpose specified and indicated.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Comply with NFPA 70.

## 1.6 PROJECT CONDITIONS

A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Contract Administrator and obtain direction before proceeding with work.

B. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner, or others, unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

1. Notify Contract Administrator and the Owner no fewer than 7 days in advance of proposed interruption of electrical service.

2. Do not proceed with interruption of electrical service without Contract Administrator and the Owner’s written permission.

3. Owner reserves the right to require Contractor to cease work in any area Owner requires access to on an emergency basis.

C. Make every effort to schedule outages during non-business or off-peak business hours to minimize disruptions to business operations.

## 1.7 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

# PART 2 - PRODUCTS AND MATERIALS

## 2.1 CONDUCTORS AND CABLES - GENERAL

A. Conductor Material: Annealed (soft) copper complying with ICEA S-95-658/NEMA WC70 and UL Standards 44 or 83, as applicable.

1. Solid conductors for No. 10 AWG and smaller; concentric, compressed stranded for No. 8 AWG and larger
2. Stranded for all flexible cords, cables, and control wiring.
3. As noted otherwise below.

B. Aluminum conductors are not allowed.

C. Conductor Insulation: Type THHN/THWN-2 complying with ICEA S-95-658/NEMA WC70.

D. Sizes of conductors and cables indicated or specified are American Wire Gage (Brown and Sharpe).

E. Conductors shall not be smaller than No. 12 AWG, with the exception of wiring for signal and pilot control circuits; and pre-manufactured whips for light fixtures which may be No. 14 AWG.

F. Conductors installed for site electrical work shall be no smaller than No. 10 AWG CU. All site electrical branch circuit wiring shall be sized such that the maximum branch circuit voltage drop is less than 3 percent.

G. Unless indicated otherwise, special purpose conductors and cables, such as low voltage control and shielded instrument wiring, shall be as recommended by the system equipment manufacturer.

H. Refer to Part 3 "Conductor and Insulation Applications" Article for insulation type, cable construction, and ratings.

## 2.2 SINGLE CONDUCTORS

A. Manufacturers:

1. Alan Wire
2. Cerrowire
3. Colonial Wire & Cable Co., Inc.

4. Encore Wire Corporation
5. General Cable (Prysmian Group)
6. Northern Cables Inc.
7. Okonite Company
8. Southwire Company

B. 600V, insulated conductors as noted above shall be color-coded as follows, unless noted otherwise:

| PHASE | 120/240V | 240Δ/120V | 208Y/120V | 480Y/277V |
|---|---|---|---|---|
| A | Black | Black | Black | Brown |
| B | Red | Orange | Red | Orange |
| C | N/A | Red | Blue | Yellow |
| Neutral | White | White | White | Gray** |
| Equipment Ground | Green | Green | Green | Green |
| Isolated Ground | N/A | N/A | Green/Yellow Stripe | Green/Yellow Stripe |

**Except as provided in NFPA 70.

## 2.3 METAL CLAD CABLE; TYPE MC

A. MC Cable (with insulated green grounding conductor, no bonding conductor):

1. Manufacturers:
   a. Atkore/AFC Cable Systems
   b. Cerrowire
   c. Encore Wire Corporation (MC)
   d. Kaf-Tech
   e. Northern Cables, Inc.
   f. Southwire Company (Amorlite)
2. 600V, Unjacketed and/or PVC-jacketed UL Standard 83, UL Standard 1569 for Type MC, UL Standard 1685, Federal Specification A-A59544, IEEE 1202 Vertical Cable Tray Flame Test and NFPA 70. Type MC Cable shall be listed for use in UL 1, 2, and 3 Hour Through-Penetration Firestop Systems.
3. Armor Assembly: Aluminum interlocked armor (aluminum color).
4. Phase Conductors: Solid soft-drawn copper, THHN-insulated single conductors, color code: ICEA Method 1.
5. Grounding Conductor: Solid soft-drawn copper, THHN/THWN-2 green insulated grounding conductor sized per NFPA 70.
6. Marking: Cable markings shall comply with the requirements of NFPA 70.

B. MC Cable Fittings:

1. Manufacturers:

a. ABB/T&B

b. Arlington

c. Eaton/Crouse-Hinds

d. Emerson/O-Z Gedney

2. Fittings used for connecting Type MC cable to boxes, cabinets, or other equipment shall be UL listed and identified for such use with an MCI-A marking on the fitting carton or package.

3. Fittings shall be insulated type not requiring the use of anti-short bushings.

4. Romex style, clamp type fittings are not acceptable.

## 2.4 FLEXIBLE CORDS

A. Manufacturers:

1. Cerrowire

2. Southwire

B. 600V, multi-conductor (2, 3, or 4 as indicated on the Drawings), oil-resistant black jacket, extra-hard-usage; Type SEO or SO for indoor dry and damp locations; SEOW or SOW for damp, wet, and outdoor locations; or as required by the manufacturer of the equipment to which the cords are connected.

C. 300V, multi-conductor (2, 3, or 4 as indicated on the Drawings), oil-resistant black jacket, hard-usage; Type SJEO or SJO for indoor dry locations; SJEOW or SJOW for damp, wet, and outdoor locations; or as required by the manufacturer of the equipment to which the cords are connected.

## 2.5 CONTROL WIRING

A. Unless otherwise noted, all control wiring will be the responsibility of the Section or Division in which the control system is specified.

## 2.6 CONNECTORS

A. Manufacturers:

1. AMP; Tyco

2. FCI-Burndy

3. Gould

4. Ideal Industries, Inc.

5. Ilsco

6. NSi Industries, Inc.

7. O-Z/Gedney

8. Panduit

9. Thomas and Betts

10. 3-M Electrical Products Division

B. Compression connectors for conductors No. 8 AWG and larger: Long-barreled, UL 486-listed, circumferential compression type (Burndy "Hylug", or equal), insulated with clamp-on, cold-shrink, or molded covers, or wrapped with multiple over-lapping layers of 3-M Scotch electrical tape.

1. Termination fittings for copper conductors: Bare copper, 1-hole pad and inspection port.

C. Mechanical connections for conductors No. 8 AWG and larger: UL-listed, dual-rated, mechanical type, insulated with clamp-on, cold-shrink, or molded covers, or wrapped with multiple over-lapping layers of 3-M Scotch electrical tape.

1. Termination fittings: Bare copper, 1-hole pad and inspection port.

D. Connectors for solid conductors No. 10 AWG and smaller: Insulated winged wire nuts. Color-coded for size, except use green only for grounding connections.

E. Connectors for stranded conductors No. 10 AWG and smaller: Tinned copper, insulated-sleeve, compression type, UL-listed, with wire insulation grip. Terminations: ring-tongue type.

F. Connectors and terminations for aluminum conductors and cables No. 1 and larger: UL 486B listed and marked AL7CU for 75 deg C rated conductors and AL9CU for 90 deg C rated conductors.

G. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.

H. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.

## PART 3 - EXECUTION

### 3.1 PREPARATION

A. Coordinate seals with wall, ceiling, roof or floor materials and rating of the surface (sound, fire, waterproofing, etc.)

B. Electrical conductor and cable work is schematically represented on the Drawings. Unless otherwise indicated, conductor sizes shown on the Drawings are based on not more than three single current-carrying conductors in a raceway in free air. Current ratings are based on copper at 75 degrees C temperature rating for all power circuits. Modify raceway and conductor sizing as may be necessitated by any deviation from these conditions. Do not decrease the indicated conductor size due to the use of conductors having a temperature rating of 90 degrees C.

C. Conductor sizes shown are minimum based on code requirements, voltage drop, and/or other considerations. Where approved by the Engineer and at no extra cost to the Owner, larger conductor sizes may be installed at Contractor's option in order to utilize stock sizes, provided raceway sizes are increased where necessary to conform with NFPA 70 (determine the effect of the use of larger conductors on the short circuit current ratings of

the electrical equipment, and provide increased short circuit current rated equipment as required).

D. Where anticipated conductor installed lengths exceed the lengths indicated on the Drawings, notify Contract Administrator. Provide tabulated list of exceeded lengths for review. Increase conductor size, circuit ground size, and conduit size accordingly to meet maximum voltage drop indicated within the calculations.

## 3.2 INSTALLATION

A. General

1. Unless otherwise indicated on the Drawings on in other Sections, install all conductors in raceway. Install continuous conductors between outlets, devices and boxes without splices or taps. Do not pull connections into raceways. Leave at least 12 inches of conductor at outlets for fixture or device connections.

2. Install in accordance with manufacturer's instructions.

3. Use manufacturer-approved pulling compound or lubricant where necessary; compound used shall not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

4. Use pulling means, including fish tape, cable, rope, and basket weave conductor/cable grips that will not damage conductors/cables or raceway.

5. Where parallel conductors are shown, install each set of conductors in separate raceways of essentially the same length.

6. Wiring at Outlets: Install conductors at each outlet with at least 6 inches of slack.

7. Common or Shared Neutrals are not allowed unless shown on the plans or specifically noted to be allowed.

8. Multi-wire branch circuits are not allowed unless noted otherwise on the drawings.

9. Where multi-wire branch circuits are utilized (i.e., shared neutral), shall be provided with a means that will simultaneously disconnect all ungrounded conductors at the point the branch circuit originates. Multi-pole breakers or 3 single pole breakers with a handle tie are two examples.

10. When multiple home runs are combined into a single raceway such that the number of conductors exceeds four (conductor count is made up of any combination of phase and neutral conductors), the following restrictions apply, which are in addition to those in NFPA 70:

    a. Normal or Non-Essential circuits.

        1) Maximum of 16 conductors in a single raceway. For up to eight conductors in a raceway, minimum raceway size: 3/4 inch. For greater than eight conductors, minimum raceway size: 1 inch. Do not install any other type of circuit in this raceway.

        2) The minimum wire size for all conductors in this raceway: No. 10 AWG.

3) Only 15A and 20A branch circuit homeruns may be combined into one raceway.

b. GFCI-protected circuits.

1) Do not use multi-conductor circuits, with a shared neutral, for any GFCI circuit breaker or receptacle circuit.

11. Where the number of conductors for branch circuits is not shown on the Drawings, determine the number of conductors in accordance with NFPA 70. Provide adequate conductors so as to allow performance of all functions of the device.

12. Branch circuit conductors shall be copper.

13. Provide all conductors with 600V insulation of the following types, unless otherwise noted on the Drawings or in these Specifications:

a. Wet or dry locations, in raceways:

1) Feeders and branch circuits: Type THWN, THHN/THWN-2, or XHHW.

2) Conductors No. 6 AWG and smaller: Types THWN or THHN/THWN-2.

B. Metal Clad Type MC:

1. Securing and Supporting:

a. Support per NFPA 70 for MC cable

b. Secure cable within 12 inches of every box or fitting.

c. Secure/supporting intervals shall not exceed six (6) feet for MC cable.

d. Utilize steel cable hangers, Arlington SMC series or equivalent, for MC cable support wherever possible so as to provide for cable routing in a neat and workmanship like manner.

2. Type MC cable may only be used:

a. In lieu of flexible conduit and wiring from light fixtures in accessible ceilings to junction boxes (attached to building structure) above the ceiling. Provide cable whips of sufficient lengths to allow for relocating each light fixture within a 5-foot radius of its installed location, but not exceeding 6 feet in unsupported lengths.

b. For vertical drops and horizontal wiring in stud walls.

c. In lieu of metal raceway, only for 15A and 20A branch circuits with up to four (4) conductors, not including grounding and/or bonding conductor(s), and only in dry concealed locations above grade, except where specifically not permitted by NFPA 70.

C. Flexible Cords

1. Refer to Division 26 Section, “Equipment Wiring Systems”, for electrical connections to equipment.

D. Control Wiring

1. Unless otherwise indicated on the Drawings or in other sections, install all control wiring in raceway, regardless of voltage. A qualified Electrician shall install all control wire operating at 120V nominal and above. Control wiring operating at less than 120V (e.g., 12V and 24V) may be installed under the Division furnishing it.

2. Open wiring in air-handling plenums: UL listed and classified for use in air plenums without raceway. Where indicated on the Drawings or otherwise specified, and permitted by local codes, only cable for communication or fire alarm systems and low voltage control wiring may be installed without raceways.

    a. Low voltage wiring not routed in a race way shall be supported by cable tray or j-hooks secured independently of ceiling supports. Cabling shall not be supported directly by the ceiling system.

E. Connections:

1. Apply a zinc based, anti-oxidizing compound to connections.

2. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

3. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

4. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.

5. Use only resin pressure splices and splicing kits that totally encapsulate the splice for splices in underground junction boxes. Arrange the splicing kit to minimize the effects of moisture.

6. Use connectors as indicated in equipment schedules. Where not indicated use connections as noted below.

    a. Compression – Conductors No. 8 AWG and larger to panelboards, switchboards and apparatus

    b. Compression – splices, terminals

    c. Mechanical – where temporary removal is required

7. Do not use terminals on wiring devices to feed through to the next device.

## 3.3 IDENTIFICATION

A. General: Provide all identification per Division 26 “Identification for Electrical Systems”.

B. Single Conductors: Identify and color-code conductors to indicate voltage and phase according to Part 2 of this Section. Identification method shall be either:

1. Factory provided colored insulation

2. Color-Coding Conductor Tape.

C. Branch-Circuit Conductor Identification: Where there are conductors for more than three branch circuits in the same junction or pull box identify each ungrounded conductor according to voltage, source and circuit number.

D. Conductors to Be Extended in the Future: Attach identification device to conductors and list source and circuit number.

## 3.4 FIELD QUALITY CONTROL

A. Do not perform insulation resistance tests of the distribution wiring to equipment with the surge protective devices installed. Disconnect surge protective device before conducting insulation resistance tests and reconnect immediately after the testing is over.

B. Testing: Perform the following field quality-control testing:

1. After installing conductors and cables and before electrical circuitry has been energized, test for compliance with requirements. Test all wiring prior to energizing to ensure that it is free from unintentional grounds and shorts, is properly phased, and that all connectors are tight.

2. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.3. Certify compliance with test parameters.

**END OF SECTION 260519**

# SECTION 260526 – GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

A. This Section includes grounding of electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.

B. This Section includes:

1. Grounding Conductors
2. Connector Products
3. Miscellaneous Grounding Materials and Products

### 1.2 DEFINITIONS

A. The following apply to this and other Sections of these Specifications:

1. Ground ring: Bare underground grounding conductor encircling the building or structure.
2. NETA ATS: Acceptance Testing Specification.
3. PSF: Pounds per Square Foot
4. EMT: Electrical metallic tubing.
5. ENT: Electrical nonmetallic tubing.
6. FMC: Flexible metal conduit.
7. GRS: Galvanized Rigid Steel Conduit
8. IMC: Intermediate metal conduit.
9. LFMC: Liquidtight flexible metal conduit.
10. LFNC: Liquidtight flexible nonmetallic conduit.
11. RAC: Rigid Aluminum Conduit
12. RMC: Rigid Metal Conduit
13. RNC: Rigid nonmetallic conduit.

### 1.3 SUBMITTALS

A. General: Submit the following in accordance with Division 01 and Division 26 Section "General Electrical Requirements":

1. Product data for the following products:
    a. Mechanical and compression connectors.

## 1.4 QUALITY ASSURANCE

A. Materials shall be manufactured by companies that have been specializing in the products specified in this Section, for a minimum of 3 years.

B. Test Equipment Suitability and Calibration: Comply with NETA ATS, "Suitability of Test Equipment" and "Test Instrument Calibration."

C. Electrical Components, Devices, and Accessories:

1. Listed and labeled as defined in NFPA 70, by an NRTL as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
2. Marked for intended use.
3. Comply with UL 467.

D. Comply with NFPA 70.

# PART 2 - PRODUCTS AND MATERIALS

## 2.1 GROUNDING CONDUCTORS, CONNECTORS, AND ELECTRODES:

A. Manufacturers:

1. ABB, Inc.
2. Advanced Lightning Technology (ALT)
3. AFL Global
4. Boggs, Inc.
5. Burndy; Hubbell.
6. Cooper Power; Eaton.
7. Copperweld Corp.
8. ECN/Korns; Division of Robroy Industries.
9. Erico; nVent.
10. Galvan Industries, Inc.
11. Greaves Corp.
12. Harger.
13. Hastings Fiber Glass Products, Inc.
14. Heary Brothers Lightning Protection Co.
15. Ideal Industries, Inc.
16. ILSCO.
17. Lightning Master Corp.
18. Lyncole XIT Grounding; Division of VFC.

19. O-Z/Gedney Co.; Emerson.
20. Panduit, Inc
21. RACO; Hubbell, Inc.
22. Robbins Lightning, Inc.
23. Superior Grounding Systems, Inc.

## 2.2 GROUNDING CONDUCTORS

A. For insulated conductors, comply with Division 26 Section "Low-Voltage Electrical Power Conductors and Cables".

B. Material:

1. Copper.

C. Equipment Grounding Conductors: Insulated and identified as indicated in Part 3 of this section.

D. Bare Copper Conductors:

1. Solid Conductors: Comply with Conductors: ASTM B 8.
2. Tinned Conductors: Comply with ASTM B 33.

E. Copper Bonding Conductors:

1. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG copper conductor, 1/4 inch in diameter.
2. Bonding Conductor: No. 4 or No. 6 AWG, stranded copper conductor.
3. Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
4. Tinned Bonding Jumper: Tinned-copper tape, braided copper conductors, terminated with copper ferrules; 1-5/8 inches (wide and 1/16 inch thick.

## 2.3 CONNECTOR PRODUCTS

A. Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.

B. Bolted Connectors: Bolted-pressure-type connectors.

C. Cast connectors: copper base alloy according to ASTM B 30.

D. Welded Connectors: Exothermic-welded type, in kit form, and selected per manufacturer's written instructions.

## PART 3 - EXECUTION

### 3.1 PREPARATION

A. Examine areas and conditions under which electrical grounding connections are to be made and notify the Contract Administrator and the Engineer in writing of conditions detrimental to proper completion of the work. Do not proceed with Work until unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

A. General:

1. Provide all materials, labor and equipment for an electrical grounding system in accordance with applicable portions of NFPA 70 and NECA. Coordinate electrical work as necessary to interface installation of electrical grounding systems with other work.

2. Accomplish grounding and bonding of electrical installations and specific requirements for systems, circuits and equipment required to be grounded for both temporary and permanent construction.

3. Where the size of the grounding conductors are not shown, size in accordance with NFPA 70 Route along shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Application:

1. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.

C. Equipment Grounding Conductors:

1. Comply with NFPA 70, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated.

2. Install equipment grounding conductors in all feeders and branch circuits.

3. In branch circuit and feeder raceways, use insulated equipment grounding conductors.

D. Bonding: Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70:

1. Bonding Straps and Jumpers: Install so vibration by equipment mounted on vibration isolation hangers and supports is not transmitted to rigidly mounted equipment. Use exothermic-welded connectors for outdoor locations, unless a disconnect-type connection is required; then, use a bolted clamp. Bond straps

directly to the basic structure taking care not to penetrate any adjacent parts. Install straps only in locations accessible for maintenance.

## 3.3 CONNECTIONS

A. General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible. Provide electrical bonding plates, connectors, terminals, lugs and clamps as recommended by the manufacturers for indicated applications. Provide electrical insulating tape, heat-shrinkable insulating tubing, welding materials, and bonding straps as recommended by the manufacturers for types of service indicated.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.
2. Make connections with clean, bare metal at points of contact.
3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
4. Make aluminum-to-galvanized steel connections with tin-plated copper jumpers and mechanical clamps.
5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

B. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.

C. Noncontact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically noncontinuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.

## 3.4 IDENTIFICATION

A. Provide identification as specified in Division 26 “Low-Voltage Electrical Power Conductors and Cables” and “Identification for Electrical Systems”.

## 3.5 FIELD QUALITY CONTROL

A. Testing: Perform the following field quality-control testing:

1. Inspect and test in accordance with NETA ATS, except Section 4.
2. Perform inspections and tests listed in NETA ATS, Section 7.13.

## 3.6 EXISTING INSTALLATIONS

A. Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.

B. Where applicable, verify the neutral and ground are properly bonded at the point of service entrance. Notify the Owner and the Engineer of any existing deficiencies.

**END OF SECTION 260526**

# SECTION 260529 – HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

A. This Section includes the following:

1. Hangers and supports for electrical equipment and systems.

### 1.2 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. IMC: Intermediate metal conduit.

C. RMC: Rigid metal conduit.

### 1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.

2. Coordinate the work with other trades to provide additional framing and materials required for installation.

3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.

4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.

5. Notify Contract Administrator of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Structural members in path of conduit groups with supports.

2. HVAC items, plumbing items and architectural features in the paths of conduit groups with common supports.

C. Sequencing:

1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 30 00.

## 1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1.

B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

## 1.5 QUALITY ASSURANCE

A. Comply with NFPA 70 and applicable building code.

# PART 2 - PRODUCTS

## 2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. General:

1. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.

B. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly. Use corrosion resistant materials suitable for the environment where installed.

1. Manufacturers:

a. Allied Tube & Conduit; Atkore International.

b. Eaton

c. Erico; nVent.

d. GS Metals Corp.

e. Thomas & Betts Corporation.

f. Unistrut; Atkore International.

g. Wesanco, Inc.

C. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

D. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

1. Conduit Straps: One-hole or two-hole type.

2. Conduit Clamps: Bolted type unless otherwise indicated.

E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

F. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

G. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Mechanical-Expansion Anchors: Insert-wedge-type, steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.

a. Manufacturers:

1) Cooper B-Line, Inc.; a division of Cooper Industries.

2) Empire Tool and Manufacturing Co., Inc.

3) Hilti Inc.

4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.

5) MKT Fastening, LLC.

2. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.

3. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.

4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.

5. Toggle Bolts: All-steel springhead type.

6. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.

## PART 3 - EXECUTION

### 3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Unless specifically indicated or approved by the Contract Administrator and Structural Engineer, do not support from roof deck.

C. Where support wires are permitted, identify independent electrical component support wires above accessible ceilings with color distinguishable from ceiling support wires in accordance with NFPA 70.

D. Steel Components: Use corrosion resistant materials suitable for the environment where installed.

1. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.

E. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway:

1. Minimum rod size shall be 1/4 inch (6 mm) in diameter, unless otherwise indicated.

a. Equipment Supports: 1/2 inch diameter minimum.

b. Single Conduit larger than 1 inch (27 mm) trade size: 3/8 inch diameter minimum.

c. Trapeze Support for Multiple Conduits: 3/8 inch diameter minimum.

2. Space supports for EMT, IMC, and RMC as required by NFPA 70.

F. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with:

a. two-bolt conduit clamps

G. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

## 3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

B. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.

C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

D. Install in accordance with manufacturer’s instructions.

E. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.

F. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).

1. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported with a minimum safety factor of 1.5. Include consideration for vibration, equipment operation, and shock loads where applicable.

G. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.

H. Do not use products for applications other than as permitted by NFPA 70 and product listing.

I. Remove temporary supports when no longer required.

J. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.

K. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Steel:
    a. Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69
5. To Light Steel: Sheet metal screws.
6. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate

L. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

## 3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

D. Minimize overhanging materials and protrusions, and provide protective caps and fittings on exposed material ends where:

1. Accessible to untrained personnel.
2. Located within confined spaces.

## 3.4 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).

B. Comply with requirements in Division 09 "Finishes" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

D. Inspect support and attachment components for damage and defects. Correct deficiencies and replace damaged or defective support and attachment components.

**END OF SECTION 260529**

# SECTION 260533 – RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

## PART 1 - GENERAL REQUREMENTS

### 1.1 SECTION INCLUDES

A. This Section includes:

1. Raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

### 1.2 DEFINITIONS

A. Terminology used in this specification is as defined below:

1. EMT: Electrical Metallic Tubing
2. FMC: Flexible Metal Conduit
3. GRS: Galvanized Rigid Steel Conduit
4. LFMC: Liquidtight Flexible Metal Conduit
5. RMC: Rigid Metal Conduit

### 1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work with other trades to avoid placement of raceway, boxes, or other potential obstructions within the dedicated equipment spaces and working clearances for equipment installed by other trades in accordance with the codes and manufacturer requirements.
2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
6. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated. Coordinate the work with other trades to preserve insulation integrity.

### 1.4 QUALITY ASSURANCE

A. Materials shall be manufactured by companies that have been specializing in the products specified in this Section, for a minimum of 3 years.

B. Electrical Components, Devices, and Accessories:

1. Listed and labeled as defined in NFPA 70, Article 100, by an NRTL as defined by OSHA in 29 CFR 1910.7, and that is acceptable to AHJ.
2. Marked for intended use.

C. Comply with NFPA 70.

## PART 2 - PRODUCTS AND MATERIALS

### 2.1 CONDUITS, SURFACE MOUNTED RACEWAYS AND ACCESSORIES

A. Metal Conduit

1. Manufacturers:
    a. ABB, Inc.
    b. Atkore
    c. American Conduit
    d. Anamet Electrical, Inc.
    e. Electri-Flex Co.
    f. Hubbell (Fittings).
    g. Nucor Tubular Products.
    h. O-Z/Gedney Co.; Emerson.
    i. Southwire Company, LLC
    j. Western Tube and Conduit Corporation.
    k. Wheatland Tube Co.
2. RMC:
    a. GRS: Hot-dip galvanized: ANSI C80.1, UL 6.
3. EMT and Fittings: ANSI C80.3, UL 797. Only steel products allowed. Reduced wall EMT is not allowed.
    a. Fittings: Set-screw type.
4. FMC: Zinc-coated steel: UL 1. Reduced wall FMC is not allowed.
5. LFMC: Flexible steel raceway with PVC jacket: UL 360.
    a. Fittings: NEMA FB 1; compatible with raceway and tubing materials.

### 2.2 BOXES, ENCLOSURES AND CABINETS

A. General

1. Manufacturers:
    a. ABB, Inc.
    b. American Midwest Power
    c. Appleton/O-Z Gedney Co.; Emerson.

d. BEL Products, Inc.

e. Cooper Crouse-Hinds; Eaton.

f. Erickson Electrical Equipment Co.

g. FSR, Inc.

h. Hoffman.

i. Hubbell, Inc.

j. Legrand.

k. Molex; Koch Industries.

l. Robroy Industries, Inc.; Enclosure Division.

m. Spring City Electrical Manufacturing Co.

2. Provide products listed, classified, and labeled as suitable for the purpose intended. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.

3. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.

4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:

1. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.

2. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.

3. Boxes for Ganged Devices: Use multi-gang boxes of single-piece construction. Do not use field-connected gangable boxes.

4. Minimum Box Size, Unless Otherwise Indicated:

a. Wiring Devices (Other Than Communications Systems Outlets): 4 inch square by 1-1/2 inch deep (100 by 38 mm) trade size.

C. Junction and Pull Boxes Larger Than 100 cubic inches:

1. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1, and list and label as complying with UL 514A.

2. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.

## 2.3 FACTORY FINISHES

A. Interior Finish: All interior components shall be factory finished; manufacturer's standard grey unless otherwise noted.

B. Exterior Finish: For metal wireway and surface raceway, enclosure, or cabinet components, provide manufacturer's standard prime-coat finish ready for field painting.

C. Exterior Finish: For metal wireway and surface raceway, enclosure, or cabinet components, provide manufacturer's standard paint applied to factory-assembled metal wireway and surface raceways, enclosures, and cabinets before shipping.

# PART 3 - EXECUTION

## 3.1 INSTALLATION

A. General

1. Install in accordance with manufacturer's instructions.

## 3.2 RACEWAYS

A. General

1. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on drawings or in this article are stricter.
2. Provide sizes and types of raceways as indicated on the Drawings. Sizes are based on THWN insulated copper conductors, except where noted otherwise. Where sizes are not shown on the Drawings or in the Specifications, size raceways in accordance with NFPA 70 requirements for the number, size and type of conductors installed. Minimum raceway size: 1/2 inch (concealed and exposed); 1 inch (underground and under slab).
    a. 1/2-inch conduit shall contain maximum (5) #12AWG conductors or (3) #10AWG conductors.
    b. 3/8-inch flexible conduit may be used for light fixture whips.
3. Provide all raceways, fittings, supports, and miscellaneous hardware required for a complete electrical system as described by the Drawings and Specifications.
4. Install a green-insulated, equipment-grounding conductor, which is bonded to the electrical system ground, in all raceways, with the exception of Service Entrance raceways.
5. Install grounding bushings or other code compliant connections on all conduit terminations and bond to the enclosure, which connects to the equipment grounding conductor and electrical system ground.
6. Install raceways concealed in walls or above suspended ceilings in finished areas. When approved by the Contract Administrator, raceways may be installed

concealed in elevated floor slabs. Do not install raceways horizontally within slabs on grade.

7. Make bends and offsets so inside diameters are not reduced. Keep legs of bends in the same plane and keep straight legs of offsets parallel, unless otherwise indicated.

8. Install raceways:

   a. To meet the requirements of the structure and the requirements of all other Work on the Project.

   b. To clear all openings, depressions, ducts, pipes, reinforcing steel, and so on.

   c. Within or passing through the concrete structure in such a manner so as not to adversely affect the integrity of the structure. Become familiar with the Architectural and the Structural Drawings and their requirements affecting the raceway installation. If necessary, consult with the Contract Administrator.

   d. Parallel or perpendicular to building lines or column lines.

   e. Tight to structure.

   f. When concealed, with a minimum of bends in the shortest practical distance, considering type of building construction and obstructions, unless otherwise indicated.

9. Where masonry, brick, CMU or concrete walls are left unfinished, coordinate raceway installations with other trades so that the raceways and boxes are concealed and the wall will have a neat and smooth appearance.

10. Where masonry, brick, CMU or concrete walls in public spaces are left unfinished, coordinate raceway installations with other trades so that the raceways and boxes are concealed and the wall will have a neat and smooth appearance.

11. Support raceways from structural elements of the building as required by NFPA 70, Division 26 Section “Hangers and Supports for Electrical Systems”. Do not support raceways by hangers used for any other systems foreign to the electrical systems; and, do not attach to other foreign systems. Do not lay raceways on top of the ceiling system.

    a. Raceways on roof shall be supported from structure not from the roof deck.

12. Provide support spacing in accordance with NFPA 70 requirements, and at a minimum in accordance with NEMA standards. Support by the following methods:

    a. Attach single raceway directly to structural steel with beam clamps.

    b. Attach single raceway directly to concrete with one-hole clamps or clips and anchors. Outdoors and wherever subject to dampness or moisture, offset raceways from the surface by using galvanized clamps and clamp backs, to mitigate moisture entrapment between raceways and surfaces.

    c. Attach groups of raceways to structural steel with slotted support system attached with beam clamps. Attach raceway to slotted channel with approved raceway clamps.

d. Attach groups of raceways to concrete with cast-in-place steel slotted channel fabricated specifically for concrete embedment. Attach raceway to steel slotted channel with approved raceway clamps.

e. Hang plumb horizontally suspended single raceway using a threaded rod. Attach threaded rods to concrete with anchors and to structural steel with beam clamps. Attach raceway to threaded rod with approved raceway clamps.

f. Hang horizontally suspended groups of raceways using steel slotted support system suspended from threaded rods. Attach threaded rods to concrete with anchors and to structural steel with beam clamps. Attach raceway to steel slotted channel with approved raceway clamps.

g. Support conductors in vertical raceway in accordance with NFPA 70 requirements.

h. Cross-brace suspended raceway to prevent lateral movement during seismic activity.

i. Use pre-fabricated non-metallic spacers for parallel runs of underground or under-slab conduits, either direct buried or encased in concrete.

13. Install electrically and physically continuous raceways between connections to outlets, boxes, panelboards, cabinets, and other electrical equipment with a minimum possible number of bends and not more than the equivalent of four 90-degree bends between boxes. Make bends smooth and even, without flattening raceway or flaking the finish.

14. Protect all electrical Work against damage during construction. Repair all Work damaged or moved out of line after rough-in, to meet the Contract Administrator's approval, without additional cost to the Owner. Cover or temporarily plug openings in boxes or raceways to keep raceways clean during construction. Clean all raceways prior to pulling conductors or cables.

15. Align and install raceway terminations true and plumb.

16. Complete raceway installation before starting conductor installation.

17. Install a pull cord in each empty raceway that is left empty for installation of wires or cables by other trades or under separate contracts. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull cord.

18. Route raceway through roof openings for piping and ductwork or through roof seals approved by the Contract Administrator, the roofing contractor, or both. Obtain approval for all roof penetrations and seal types from the Contract Administrator, Owner, roofing contractor, or all three as required to maintain new or existing roofing warranties.

19. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:

    a. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces or from building exterior to building interior.

b. Where otherwise required by NFPA 70.

20. Maintain 2” minimum spacing from bottom of roof deck to prevent raceway penetrations from above.

21. Do not route conduits across skylights, access panels, hatched tiles, HVAC diffusers, or equipment working space.

22. Route conduits serving rooftop equipment concealed inside the equipment curb and minimize roof penetrations and exterior conduit runs where practicable.

23. Install all underground conduits/raceways a minimum of 24” below the bottom of slab/paving/grade, unless noted otherwise, where practicable.

B. RMC

1. Use GRS or IMC in the following areas:

a. Where indicated.

b. For Emergency Feeders.

c. Exterior applications where above grade and exposed.

d. Below grade when concrete-encased, plastic-coated, or provided with a corrosion resistant approved mastic coating.

e. All raceways penetrating slabs on grade (use plastic-coated raceway or provide with a corrosion resistant approved mastic coating). This shall include the 90-degree elbow below grade and the entire vertical transition to above grade.

f. Concealed within masonry walls.

g. Damp or wet locations.

2. Use RAC in the following areas:

a. Indoors above grade.

b. For circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in nonmetallic sleeve.

3. Do not use RAC:

a. Below grade.

C. EMT

1. Use EMT in the following areas:

a. Where indicated.

b. Interior concealed locations for:

1) Branch circuits.

2) Feeders.

3) Emergency branch circuits.

4) Low-voltage control, security, and fire alarm circuits

2. Do not use EMT:

a. Below grade.

D. FMC and LFMC

1. Use FMC or LFMC:

a. For the final 24 inches of raceway to all motors, transformers, and other equipment subject to vibration or movement.

b. Use FMC only in dry locations

c. Use LFMC in damp, wet, corrosive, outdoor locations.

2. Do not use FMC or LFMC:

a. For branch circuits, homeruns or feeders.

b. In lengths exceeding 6 feet.

## 3.3 RACEWAY FITTINGS:

A. Compatible with raceways and suitable for use and location.

B. RMC: Use threaded rigid steel conduit fittings, unless otherwise indicated.

C. Join raceways with fittings designed and approved for that purpose and make joints tight.

D. Use insulating bushings to protect conductors at raceway terminations:

1. Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against box. Use two locknuts, one inside and one outside box.

2. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.

## 3.4 BOXES:

A. General

1. Verify locations of device boxes prior to rough in.

2. Set boxes at elevations to accommodate mounting heights as specified or indicated on the Drawings.

3. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Adjust box locations to accommodate intended purpose.

4. Install boxes to preserve fire ratings of walls, floors, and ceilings.

5. Install flush wall-mounted boxes without damaging wall insulation or reducing its effectiveness.

6. Support boxes independently of raceway.

7. Clean the interior of boxes to remove dust, debris, and other material. Clean exposed surfaces and restore finish.

8. Adjust flush-mounted boxes to make front edges flush with finished wall material.

9. Provide boxes of the depth required for the service, device and the application, and with raised covers set flush with the finished wall surface for boxes concealed in plaster finishes. Select covers with the proper openings for the devices being installed in the boxes. Install boxes flush unless otherwise indicated.

10. Install outlet boxes in firewalls complying with UL requirements, with box surface area not exceeding 16 square inches; and, when installed on opposite sides of the wall, separate by a distance of at least 24 inches.

B. NEMA Enclosure ratings, Suitable for the environment in which it is installed. At a minimum, provide the following ratings:

1. NEMA 250, type 1

a. Provide at interior and dry locations

C. Outlet Boxes

1. Locations of outlets on Drawings are approximate; and, except where dimensions are shown, determine exact dimensions for locations of outlets from plans, details, sections, or elevations on Drawings, or as directed by Contract Administrator. Locate outlets generally from column centers and finish wall lines or to centers or joints of wall or ceiling panels.

2. Locate outlet boxes so they are not placed back-to-back in the same wall, and in metal stud walls, so they are separated by at least one stud space, to limit sound transmission from room to room. Install outlet boxes in accessible locations and do not install outlets above ducts or behind furring.

3. Install all electrical devices, such as plug receptacles, lamp receptacles, light switches, and light fixtures in or on outlet boxes Use sheet-steel boxes for dry locations unless otherwise indicated or required.

4. Use raised covers suitable for the type of wall construction and device configuration where required.

5. Use shallow boxes where required by the type of wall construction.

6. Install extension and plaster rings as required by NFPA 70.

7. Carefully set outlet boxes concealed in non-plastered block walls so as to line up with wall joints. Coordinate the box and raceway installation with the wall construction as required for a flush and neat appearing installation. Outlet box extensions may be used where necessary.

8. Do not exceed allowable fill per NFPA 70.

9. Where multiple devices are shown grouped together, gang mount with a common cover plate.

D. Junction and Pull Boxes

1. Install junction and pull boxes above accessible ceilings and in unfinished areas.

2. Provide boxes set flush in painted walls or ceilings with primer coated cover.

3. Where junction and pull boxes are installed above an inaccessible ceiling, locate so as to be easily accessible from a ceiling access panel.

## 3.5 CABINETS AND ENCLOSURES:

A. Unless otherwise indicated on the Drawings, provide

1. NEMA 1 construction for indoor, dry locations

B. Install flush mounted in the wall in finished spaces, with the top 78 inches above finished floor. The front shall be approximately 3/4-inch larger than the box all around.

C. Install surface mounted in unfinished spaces, with the top 78 inches above finished floor. The front shall be the same height and width as the box.

D. Electrically ground all metallic cabinets and enclosures. Where wiring to cabinet or enclosure includes a grounding conductor, provide a grounding lug in the interior of the cabinet or enclosure. Cabinets and enclosures specified in this Section are intended to house miscellaneous electrical components assembled in a custom arrangement, such as contactors and relays.

E. All components that are specified or indicated for assembly in cabinets and enclosures shall each be individually UL listed and labeled. Arrange wiring so that it can be readily identified. Support wiring no less than every 3 inches. Install gauges, meters, pilot lights and controls on the face of the door.

F. Do not provide cabinets and enclosures smaller than the sizes indicated. Where sizes and types are not indicated, provide cabinets and enclosures of the size, type and classes appropriate for the use and location per the guidelines of the NEC. Provide all items complete with covers and accessories required for the intended use.

## 3.6 IDENTIFICATION

A. Refer to Division 26 Section “Identification for Electrical Systems” for identification materials.

B. Raceway Identification:

1. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size. Use the following means of identification:

a. Snap-Around Labels

2. Color for Printed Legend:

a. Power Circuits: Black letters on an orange field.

b. Legend: Indicate system or service and voltage, if applicable

C. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A: Identification device shall be:

1. Snap around label

D. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Comply with 29 CFR 1910.145. Identify system voltage with black letters on an orange background. Apply to exterior of door, cover, or other access.

E. Junction Boxes and Pull Boxes:

1. The junction box where a homerun ends and the circuit is distributed shall be marked. Junction boxes shall be marked approximately every 100 feet along homerun path to panel.

**END OF SECTION 260533**

# SECTION 260553 – IDENTIFICATION FOR ELECTRICAL SYSTEMS

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

A. This Section includes the following:

1. Labels for raceways and metal-clad cable.
2. Labels for junction boxes and pull boxes.
3. Markers for conductors, and control cables.
4. Miscellaneous identification products.
5. Painted Identification.

### 1.2 ADMINISTRATIVE REQUIREMENTS

A. Where a facility identification standard already exists, that standard shall be continued. Where an identification standard does not exist, color-coding and identification shall be as described herein.

B. Coordinate identification names, abbreviations, colors, and other features with requirements in the Contract Documents, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual, and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

C. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.

D. Coordinate installation of identifying devices with location of access panels and doors.

E. Install identifying devices before installing acoustical ceilings and similar concealment.

### 1.3 QUALITY ASSURANCE

A. Electrical Equipment, Components, Devices, and Accessories:

1. Listed and labeled as defined in NFPA 70, by an NRTL as defined by OSHA in 29 CFR 1910.7 and that are acceptable to authorities having jurisdiction.
2. Marked for intended use.

B. Comply with ANSI A13.1 and ANSI C2.

C. Comply with requirements of NFPA 70.

D. Comply with 29 CFR 1910.145.

## PART 2 - PRODUCTS AND MATERIALS

### 2.1 GENERAL

A. Location, text, and method of identification to be used is noted in individual sections. Refer to other sections for additional identification requirements.

### 2.2 LABELS FOR RACEWAYS AND METAL-CLAD CABLE

A. Factory Painted Raceways:

1. Metal Raceways: Continuous, rust-inhibiting paint factory applied.

B. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

### 2.3 LABELS FOR JUNCTION BOXES AND PULL BOXES

A. Junction box and pull box covers shall be spray painted to identify the voltage and system. Circuit numbers and the panel they originate from shall be listed on the cover using permanent, waterproof, black ink marker.

### 2.4 MARKERS FOR CONDUCTOR AND CONTROL CABLES

A. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

B. Self-laminating Computer Printable Labels: Clear over-laminate to protect legend for permanent, clean identification. Self-laminating Polyester material with white print-on area.

C. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch (50 by 50 by 1.3 mm), with stamped legend, punched for use with self-locking nylon tie fastener.

### 2.5 TAGS

A. Write-On Tags: Polyester tag, 0.015 inch (0.38 mm) thick, with corrosion-resistant grommet and polyester or nylon tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

### 2.6 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Cable Ties: Fungus-inert, self-extinguishing, 1-piece, self-locking, Type 6/6 nylon cable ties.

1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength: 50 lb (22.6 kg), minimum.
3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
4. Color: Black, except where used for color-coding.

B. Fasteners for Nameplates, Labels and Signs

1. Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat lock washers unless otherwise noted.

## 2.7 PAINTED IDENTIFICATION

A. Paint materials and application requirements are specified in Division 09 painting Sections.

1. Exterior Concrete, Stucco, and Masonry (Other Than Concrete Unit Masonry):
   a. Semi-gloss Acrylic-Enamel Finish: Two finish coat(s) over a primer.
      1) Primer: Exterior concrete and masonry primer.
      2) Finish Coats: Exterior semi-gloss acrylic enamel.
2. Exterior Concrete Unit Masonry:
   a. Semi-gloss Acrylic-Enamel Finish: Two finish coat(s) over a block filler.
      1) Block Filler: Concrete unit masonry block filler.
      2) Finish Coats: Exterior semi-gloss acrylic enamel.
3. Exterior Ferrous Metal:
   a. Semi-gloss Alkyd-Enamel Finish: Two finish coat(s) over a primer.
      1) Primer: Exterior ferrous-metal primer.
      2) Finish Coats: Exterior semi-gloss alkyd enamel.
4. Exterior Zinc-Coated Metal (Except Raceways):
   a. Semi-gloss Alkyd-Enamel Finish: Two finish coat(s) over a primer.
      1) Primer: Exterior zinc-coated metal primer.
      2) Finish Coats: Exterior semi-gloss alkyd enamel.
5. Interior Concrete and Masonry (Other Than Concrete Unit Masonry):
   a. Semi-gloss Alkyd-Enamel Finish: Two finish coat(s) over a primer.
      1) Primer: Interior concrete and masonry primer.
      2) Finish Coats: Interior semi-gloss alkyd enamel.
6. Interior Concrete Unit Masonry:
   a. Semi-gloss Acrylic-Enamel Finish: Two finish coat(s) over a block filler.
      1) Block Filler: Concrete unit masonry block filler.
      2) Finish Coats: Interior semi-gloss acrylic enamel.
7. Interior Gypsum Board:
   a. Semi-gloss Acrylic-Enamel Finish: Two finish coat(s) over a primer.
      1) Primer: Interior gypsum board primer.
      2) Finish Coats: Interior semi-gloss acrylic enamel.
8. Interior Ferrous Metal:

a. Semi-gloss Acrylic-Enamel Finish: Two finish coat(s) over a primer.

1) Primer: Interior ferrous-metal primer.

2) Finish Coats: Interior semi-gloss acrylic enamel.

9. Interior Zinc-Coated Metal (Except Raceways):

a. Semi-gloss Acrylic-Enamel Finish: Two finish coat(s) over a primer.

1) Primer: Interior zinc-coated metal primer.

2) Finish Coats: Interior semi-gloss acrylic enamel.

## PART 3 - EXECUTION

### 3.1 PREPARATION

A. Verify identity of each item before installing identification products.

B. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

C. Provide identification product listed for the location in which it is to be installed.

D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

E. Painted Identification: Prepare surface and apply paint according to Division 09 painting sections.

### 3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. For surfaces that require finish work, apply identification devices after completing finish work. Do not install identification products until final surface finishes and painting are complete.

C. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed. Replace labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

D. Location: Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance without interference with operation and maintenance of equipment. Unless otherwise indicated, locate products as follows:

5. Branch Devices: Adjacent to device.
6. Interior Components: Legible from the point of access.
7. Conduits: Legible from the floor.
8. Boxes: Outside face of cover.
9. Conductors and Cables: Legible from the point of access.
10. Devices: Outside face of cover.

E. Attach non-adhesive signs and plastic labels with screws and auxiliary hardware appropriate to the location and substrate.

1. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.

F. Install identification products centered, level, and parallel with lines of item being identified.

G. Mark all handwritten text, where permitted, to be neat and legible.

**END OF SECTION 260553**

# SECTION 284600

# FIRE DETECTION AND ALARM

## 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.

B. Related Sections: The following sections contain requirements that relate to this Section:

1. Division 26 Section "Common Work Results for Electrical," for materials and methods for coordination, sleeves and common installation requirements.

### 1.2 DESCRIPTION OF WORK

A. This Section requires the Contractor to furnish all materials required to install the fire alarm system. The Contractor shall be responsible for installing, testing, and start-up of a complete functioning fire alarm system, and each element thereof, as specified or indicated on the Drawings or reasonably inferred, including every article, device or accessory (whether or not specifically called for by item) necessary to facilitate each system's function as indicated by the design and the equipment specified. Elements of the work include materials, labor, supervision, supplies, equipment, transportation and utilities.

B. Division 28 of the Specifications and Drawings numbered with prefixes FP generally describe these systems, but the scope of the Fire Alarm work includes all such work indicated in the Contract Documents: Instructions to Bidders; Proposal Form; General Conditions; Supplementary General Conditions; Architectural, Structural, Fire Suppression, Mechanical, Plumbing, Fire Alarm and Electrical Drawings and Specifications; and Addenda.

C. The Drawings have been prepared diagrammatically and are intended to convey the scope of work, indicating the general location and arrangement of the major equipment, devices, appliances, etc. without showing all the exact details as to elevations, circuits, routing, and other installation requirements. Use the Drawings as a guide when laying out the system and verify that materials and equipment will fit into the designated spaces, and which, when installed per manufacturers' requirements, will ensure a complete, coordinated, satisfactory and properly operating system.

D. The scope of work in this section includes:

1. Notification appliances
2. Sprinkler system waterflow and valve tamper alarms

### 1.3 QUALITY ASSURANCE

A. All work under this division shall be executed in a thorough professional manner by competent and experienced workmen licensed to perform the Work specified.

B. All work shall be installed in strict conformance with manufacturer's requirements and recommendations. Equipment and materials shall be installed in a neat and professional manner and shall be aligned, leveled, and adjusted for satisfactory operation.

C. Material and equipment shall be new, shall be of the best quality and design, shall be current model of the manufacturer, shall be free from defects and imperfections and shall have markings or a nameplate identifying the manufacturer and providing sufficient reference to establish quality, size and capacity. Material and equipment of the same type shall be made by the same manufacturer whenever practicable.

D. Installation of devices shall be performed or supervised by a National Institute for Certification of Engineering Technologies (NICET) Level 2 or higher Fire Alarm Technician. Submit copies of the certification for employees through shop drawing submittals.

## 1.4 APPLICABLE CODES AND STANDARDS

A. Execute Work in accordance with the National Fire Protection Association Standards and all Local, State, and National codes, ordinances and regulations in force governing the particular class of Work involved. Obtain timely inspections by the constituted authorities. Upon final completion of the Work obtain and deliver to the Owner executed final certificates of acceptance from the Authority Having Jurisdiction.

B. Any conflict between these Specifications and accompanying Drawings and the applicable Local, State and Federal codes, ordinances and regulations shall be reported to the Architect in sufficient time, prior to the opening of Bids, to prepare the Supplementary Drawings and Specification Addenda required to resolve the conflict.

C. The governing codes are minimum requirements. Where these Drawings and Specifications exceed the code requirements, these Drawings and Specification shall prevail.

D. All material, manufacturing methods, handling, dimensions, method or installation and test procedure shall conform to but not be limited to the following industry standards and codes.

1. NFPA 70, "National Electrical Code", 2016 Edition.
2. NFPA 72, "National Fire Alarm and Signaling Code", 2016 Edition.
3. Underwriters Laboratories, "Fire Protection Equipment Directory", Latest Edition.
4. International Building Code (IBC) 2018 Edition with local amendments.
5. International Fire Code (IFC) 218x Edition with local amendments.

E. Contractor shall comply with rules and regulations of public utilities and municipal departments affected by connections of services.

## 1.5 DEFINITIONS

A. General:

1. Furnish: The term "furnish" is used to mean "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation and similar operations."

2. Install: The term “install” is used to describe operations at the project site including the actual “unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.”

3. Provide: The term “provide” means “to furnish and install, complete and ready for the intended use.”

4. Furnished by Owner or Furnished by Others: The item will be furnished by the Owner or Others. It is to be installed and connected under the requirements of this Division, complete and ready for operation, including items incidental to the Work, including services necessary for proper installation and operation. The installation shall be included under the guarantee required by this Division.

5. AHJ: The local code and/or inspection agency (Authority) Having Jurisdiction over the Work.

6. NRTL: Nationally Recognized Testing Laboratory, as defined and listed by OSHA in 29 CFR 1910.7 (e.g., UL, ETL, CSA, etc.), and acceptable to the AHJ over this project. Nationally Recognized Testing Laboratories and standards listed are used only to represent the characteristics required and are not intended to restrict the use of other listed Manufacturers and models that meet the specified criteria.

7. FACP: Fire Alarm Control Panel.

8. NICET: National Institute for Certification in Engineering Technologies.

9. VESDA: Very Early Smoke-Detection Apparatus.

B. The terms "approved equal", “equivalent”, or "equal" are used synonymously and shall mean “accepted by or acceptable to the Engineer as equivalent to the item or manufacturer specified”. The term "approved" shall mean labeled, listed, or both, by an NRTL, and acceptable to the AHJ over this project.

## 1.6 COORDINATION

A. The Contractor shall visit the site and ascertain the conditions to be encountered while installing the Work under this Division, verify all dimensions and locations before purchasing equipment or commencing work, and make due provision for same in the bid. Failure to comply with this requirement shall not be considered justification for omission, alteration, incorrect or faulty installation of Work under this Division or for additional compensation for Work covered by this Division.

B. The Contractor shall refer to Drawings of the other disciplines and to relevant equipment drawings and shop drawings to determine the extent of clear spaces. The Contractor shall make offsets required to clear equipment, beams and other structural members; and to facilitate concealing piping in the manner anticipated in the design.

C. The Contractor shall maintain a foreman on the jobsite at all times to coordinate their work with other contractors and subcontractors so that various components of the Fire Alarm systems will be installed at the proper time, will fit the available space, and will allow proper service access to the equipment. Carry on the work in such a manner that the work of the other contractors and trades will not be handicapped, hindered, or delayed at any time.

D. Work of this Division shall progress according to the "Construction Schedule" as established by the Prime Contractor and their subcontractors and as approved by the Architect. Cooperate in establishing these schedules and perform the Work under this Division, in a timely manner in conformance with the construction schedule so as to ensure successful achievement of schedule dates.

E. Where coordination and interfacing with other systems or equipment is required, it shall be the responsibility of the fire alarm system installer (contractor) to either provide the relays, contacts, power supplies and other necessary hardware or see to it that such hardware is provided with the other systems or equipment.

F. The contractor shall coordinate work in this section with all related trades. Work and/or equipment provided in other sections and related to the fire alarm system shall include, but not be limited to:

1. Sprinkler waterflow and valve tamper switches shall be provided by the fire sprinkler installer, but wired and connected by the fire alarm installer.

2. Conduit shall be by Division 26 “Common Work Results for Electrical”.

G. System shall be complete and operational with power and control wiring provided to meet the design intent shown on the drawings and specified within the specification sections.

## 1.7 MEASUREMENTS AND LAYOUTS

A. The drawings are schematic in nature, but show the various components of the systems approximately to scale and attempt to indicate how they are to be integrated with other parts of the building. Figured dimensions shall be taken in preference to scale dimensions. Determine exact locations by job measurements, by checking the requirements of other trades, and by reviewing the Contract Documents. The Contractor will be held responsible for errors which could have been avoided by proper checking and inspection.

## 1.8 SUBMITTALS

A. Refer to Division 1 and General Conditions for submittal requirements, in addition to requirements specified herein. Submittals not complying fully with the submittal requirements will be rejected.

B. Contractor shall prepare installation drawings (working shop drawings) based upon this design. Requests for deviations from the approved design shall be submitted in writing to the Engineer of Record for approval.

C. Shop drawings shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that it will conform to the provisions of this code and relevant laws, ordinances, rules and regulations. Drawings that are not legible, or that do not contain sufficient detail to verify compliance with applicable codes and standards, will be rejected without further review.

D. Submittals and shop drawings shall not contain HEI’s firm name or logo, nor shall it contain the HEI’s engineers’ seal and signature. They shall not be copies of HEI’s work product. If the contractor desires to use elements of such product, the license agreement for transfer of information at the end of this section must be used.

E. Submit Shop Drawings as early as required to support the project schedule. Allow for two weeks Engineer review time plus mailing time plus a duplication of this time for resubmittal if required. Submit Shop Drawings as soon as possible before construction starts.

F. Before submitting Shop Drawings and material lists, the Contractor shall verify that the equipment submitted is mutually compatible and suitable for the intended use. Contractor shall verify that the equipment will fit the available space and allow ample room for maintenance. If the size of equipment furnished makes necessary any change in location, or configuration, submit a shop drawing showing the proposed layout.

G. Refer to Division 1 for acceptance of electronic submittals for this project. For electronic submittals, Contractor shall submit the documents in accordance with the procedures specified in Division 1. Contractor shall notify the Architect and Engineer that the shop drawings have been posted. If electronic submittal procedures are not defined in Division 1, Contractor shall include the website, user name and password information needed to access the submittals. For submittals sent by e-mail, Contractor shall copy the Architect and Engineer's designated representatives. Contractor shall allow the Engineer review time as specified above in the construction schedule. Contractor shall submit only the documents required to purchase the materials and/or equipment in the electronic submittal and shall clearly indicate the materials, performance criteria and accessories being proposed. General product catalog data not specifically noted to be part of the specified product will be rejected and returned without review.

H. The Engineer's checking and subsequent acceptance of such submittals shall not relieve the Contractor from responsibility for deviations from Drawings or Specifications unless the Contractor has, in writing, called the Engineer's and Architect's attention to such deviations at the time of submission, and secured written acceptance; nor shall it relieve the Contractor from responsibility for errors in dimensions, details, sizes of members, or quantities; or for omissions of components or fittings; or for not coordinating items with actual building conditions and adjacent work.

I. Product Data: Provide a bill of materials and product cutsheets showing material specifications, electrical characteristics and connection requirements. Highlight or indicate specific product options and accessories as applicable to the project.

J. Shop Drawings:

1. Comply with recommendations and requirements in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.

2. Shop drawings shall be prepared by a NICET Level 3 or higher certified technician. Submit copies of the certification for the designer with submittal.

3. The fire alarm system equipment vendor shall provide shop drawings showing fire alarm floor plans and a full building riser diagram. Fire alarm floor plans and riser diagram shall show fire alarm control panel, annunciator, all fire alarm initiating devices and notification appliances. Show typical wiring diagrams of control panel/s, annunciator and each device and wiring connections required. Show all interfaces to other systems, such as temperature control systems, and security systems.

4. The fire alarm floor plans and riser diagram shall show wiring to all fire alarm devices/appliances, indicating wire sizes and quantities as well as conduit/raceway sizes and locations of end-of-line (EOL) resistors. The fire alarm floor plans and riser diagram shall clearly show the routing of all fire alarm system wiring, including all horizontal routing and vertical routing (in chases).

5. Routing of all fire alarm wiring shall comply with the "Survivability" requirements of NFPA 72.

6. Provide a Sequence of Operations Matrix that explains how the submitted fire alarm system functions.

7. Include voltage drop calculations for notification-appliance circuits.

8. Include battery-size calculations.

9. Shop drawing scale shall match the Engineer's drawings where possible. Scale shall not be less than 3/32" = 1'-0".

10. Shop drawings shall be produced using computer-aided design. Hand drawn documents will not be reviewed or approved.

K. Indicate within the submittal all applicable UL listings and all applicable approvals or certifications.

L. Qualification Data: Submit copies of the certification for the Installer.

M. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of products.

## 1.9 OPERATION AND MAINTENANCE DATA

A. Refer to Division 1 and General Conditions for Operational and Maintenance Manuals.

## 1.10 RECORD DRAWINGS

A. Refer to Division 1 and General Conditions for Record Drawings

## 1.11 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products indicated in this section with minimum three years documented experience.

B. Installer: Company specializing in installing the products indicated in this section with minimum three years documented experience. Shall be bondable and licensed Contractor and employ full-time factory-trained and certified installers and technicians. Installers shall provide with the fire alarm submittal proof of factory training for each installer.

C. Final checkout and verification: Shall be conducted by a technician certified by the National Institute for Certification in Engineering Technologies (NICET) registered as level 2 or higher in the fire protection technology certification program. Provide certification information with fire alarm submittal.

D. The equipment manufacturer's service department shall be fully stocked in standard parts and components and engaged in the maintenance of fire alarm systems. On-the-premises service shall be available within 4 hours of notification, 7 days a week, 24 hours a day.

## 1.12 GUARANTEES AND WARRANTIES

A. Refer to Division 1 and General Conditions for Guarantees and Warranties.

## 1.13 PROJECT CONDITIONS

A. Conditions Affecting Work In Existing Buildings: The following project conditions apply:

1. The Drawings describe the general nature of remodeling to the existing building. However, the Contractor shall visit the Site prior to submitting a bid to determine the nature and extent of work involved.
2. Work in the existing building shall be scheduled with the Owner.
3. Certain demolition work must be performed prior to the remodeling. The Fire Alarm Contractor shall perform the demolition which involves fire alarm system equipment and materials.
4. Fire Alarm Contractor shall remove articles which are not required for the new work. Unless otherwise indicated, each item removed by the Contractor during this demolition shall be removed from the premises and disposed of in accordance with applicable federal, state and local regulations.
5. Fire Alarm Contractor shall relocate and reconnect fire alarm equipment that must be relocated in order to accomplish the remodeling shown in the Drawings or indicated in the Specifications. General Contractor shall install finish material.
6. Obtain permission from the Architect for channeling of floors or walls not specifically noted on the Drawings.
7. Protect adjacent materials indicated to remain. Install and maintain dust and noise barriers to keep dirt, dust, and noise from being transmitted to adjacent areas. Remove protection and barriers after demolition operations are complete.
8. Locate, identify, and protect Fire alarm services passing through demolition area and serving other areas outside the demolition limits. Maintain services to areas outside demolition limits. When services must be interrupted, install temporary services for affected areas.

B. Perform a full test of the existing system prior to starting work. Document any equipment or components not functioning as designed.

C. Interruption of Existing Fire alarm Service: Do not interrupt fire alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary fire watch service according to local Fire Department requirements:

1. Notify Construction Manager no fewer than seven days in advance of proposed interruption of fire alarm service.
2. Do not proceed with interruption of fire alarm service without Construction Manager'swritten permission.

D. Use of Devices during Construction: Protect devices during construction unless devices are placed in service to protect the facility during construction.

## 1.14 SEQUENCING AND SCHEDULING

A. Existing Fire alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service, and label existing fire alarm equipment "NOT IN SERVICE" until removed from the building.

B. Equipment Removal: After acceptance of new fire alarm system, remove all unused fire alarm equipment, wiring and installation materials not necessary for system functionality or spare parts.

# PART 2 - PRODUCTS AND MATERIALS

## 2.1 SYSTEM DESCRIPTION

A. Noncoded, UL-listedaddressable system, with multiplexed signal transmission and horn/strobe evacuation.

B. All components provided shall be listed for use with the selected system.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Source Limitations for Fire alarm System and Components: Components shall be compatible with, and operate as an extension of, existing system. Provide system manufacturer's certification that all components provided have been tested, and will operate, as a system.

## 2.2 MANUFACTURER

A. Subject to compliance with requirements, provide products manufactured by the following manufacturers as indicated on the Drawings:

1. SimplexGrinnell to Match Existing System

## 2.3 SYSTEMS OPERATIONAL DESCRIPTION

A. Fire alarm signal initiation shall be by one or more of the following devices:

1. Automatic sprinkler system water flow.

B. Fire alarm signal shall initiate the following actions:

1. Identify alarm and specific initiating device at fire alarm control unit and remote annunciators (if provided).

a. A pulsing alarm tone shall occur within the control panel until acknowledged.

b. The alarm LED shall flash on the control panel and remote annunciator panel until the alarm has been acknowledged at the control panel/remote annunciator panel. Once

acknowledged, this same LED shall latch on and the custom label for the address in alarm shall be displayed on the alphanumeric LCD readout. A subsequent alarm received from another address after acknowledged shall flash the alarm LED on the control panel showing the new alarm information.

2. Transmit an alarm signal to the alarm supervising station.

3. The audible and visible alarm signal shall operate until it is manually silenced or acknowledged.

4. Record events in the system memory.

5. Unlock electric door locks in designated egress paths.

6. Release fire and smoke doors held open by magnetic door holders.

7. Activate voice/alarm communication system.

8. All fan-powered air-handling equipment shall shutdown and remain down until the fire alarm control panel is reset.

9. Close smoke dampers in air ducts of designated air-conditioning duct systems.

C. Supervisory signal initiation shall be by one or more of the following devices and actions:

1. Valve supervisory switch.

D. System Supervisory Signal Actions:

1. Identify specific device causing supervisory signal fire alarm control unit and remote annunciators (if provided).

a. Visible and audible supervisory alarm indicated by address at fire alarm control panel.

b. Manual acknowledge function at fire alarm control panel and remote annunciator panel silences audible supervisory alarm; visible alarm is displayed until device is returned to its normal position/supervisory condition is cleared.

2. Record events in the system memory.

3. After a time delay of 90 seconds transmit a supervisory signal to the alarm supervising station.

E. System trouble signal initiation shall be by one or more of the following devices and actions:

1. Open circuits, shorts, and grounds in designated circuits.

2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.

3. Loss of communication with any addressable sensor, input module, relay, control module, remote annunciator, printer interface, or Ethernet module.

4. Loss of primary power at fire alarm control unit.

5. Ground or a single break in internal circuits of fire alarm control unit.

6. Abnormal ac voltage at fire alarm control unit.

7. Break in standby battery circuitry.

8. Failure of battery charging.

9. Abnormal position of any switch at fire alarm control unit or annunciator.

F. System Trouble Signal Actions:

1. Identify specific device causing trouble signal fire alarm control unit and remote annunciators (if provided).

a. Visible and audible trouble alarm indicated by address at fire alarm control panel.

b. Manual acknowledge function at fire alarm control panel and remote annunciator panel silences audible trouble alarm; visible alarm is displayed until device is returned to its normal position/trouble condition is cleared.

2. Record events in the system memory.

3. After a time delay of 90 seconds, transmit a trouble signal to the alarm supervising station.

## 2.4 NOTIFICATION APPLIANCES

A. General Requirements for Notification Appliances: Connected to notification appliance signal circuits, zoned as indicated, equipped for mounting as indicated, and with screw terminals for system connections.

1. Combination Devices: Factory integrated audible and visible devices in a single mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections. Minimum audible level and strobe intensity shall meet all requirements for separate appliances.

2. Provide strobe synchronization as required per NFPA 72.

3. Wall mounted notification appliances shall match existing..

4. Ceiling mounted notification appliances shall match existing.

B. Exterior Alarm Bells: Electric vibrating, 10-inch bell with operating mechanism behind dome and weatherproof bell kit. Sound Rating: 90 dB at 10 feet.

C. Alarm Horns: Comply with UL 464. Electric vibrating polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet (3 m) from the horn, using the coded signal prescribed in UL 464 test protocol.

D. Visible Alarm Notification Appliances (Strobes): Xenon strobe lights complying with UL 1971, unfiltered or clear filtered white light, with candela ratings as indicated on drawings. Strobes shall meet all requirements of the Americans with Disabilities Act.

## 2.5 AUXILIARY DEVICES

A. Waterflow Alarm Switches: Shall be provided by the Fire Sprinkler Installer and shall be wired complete and ready for use by the Fire Alarm System Installer. Switch shall have an adjustable delay to minimize false alarms due to fluctuations in water pressure.

B. Valve (Tamper) Switches: Shall be provided by the Fire Sprinkler Installer and shall be wired complete and ready for use by the Fire Alarm System Installer.

## 2.6 DEVICE GUARDS

A. Description: Welded wire mesh of size and shape for smoke detectors, notification appliances, or other device requiring protection as indicated on the plans.

1. Factory fabricated and furnished by device manufacturer.

2. Finish: Factory finished to match the color of the protected appliance or device.

## 2.7 FIRE ALARM WIRE AND CABLE

A. Fire Alarm Power Branch Circuits: Building wire as specified in Division 26.

B. Fire alarm Wire and Cable: NRTL listed and labeled as complying with NFPA 70 (NEC) Article 760. All wiring, including wiring to existing modified devices and appliances shall be new.

C. Signaling Line, Initiating Device and Notification Appliance Circuits: Power limited fire protective signaling cable, solid copper conductor, 300 volts insulation, suitable for temperature, conditions and location installed. Minimum wire size for initiating device circuits, control circuits and notification appliance circuits shall be determined by calculations and manufacturer's requirements or recommendations. Wire and cable shall be twisted and shielded if recommended by the system manufacturer.

D. The type of cable chosen should be based on fire alarm system requirements, specification requirements and applicable code requirements. Consideration should also be given to the length of cable runs and potential interference.

E. Initiating, notification, and control circuits shall be sized based on 20% additional power consuming devices.

F. Multiconductor Armored Cable: NFPA 70, Type MC, copper conductors, Type TFN/THHN conductor insulation, copper drain wire, copper armor with outer jacket and red identifier stripe, NTRL listed for fire alarm and cable tray installation, plenum rated.

G. Initiating-Device, Notification-Appliance, and Signaling-Line Circuits: Provide circuitry, which meets the performance requirements during abnormal conditions, based upon the class of the circuitry selected.

1. Initiating Device Circuits: Match existing circuits>.

a. Pathway Survivability: <Level 0>.

2. Notification Appliance Circuits: Match existing circuits.

b. Pathway Survivability: Level 0

3. Signaling Line Circuits: Match existing circuits.

c. Pathway Survivability: Level 0

4. Any circuits interconnecting fire alarm control panels between separate buildings shall be provided with surge protection.

## 2.8 ACCESS TO EQUIPMENT

A. All detectors, modules, equipment, etc. shall be located so as to provide easy access for operation, service inspection and maintenance.

# PART 3 - EXECUTION

## 3.1 GENERAL

A. The Contractor shall install, program and test all new equipment identified in this contract and revise existing equipment as noted in accordance with the applicable codes, standards, and manufacturer's instructions.

B. The installation supervisor shall be on the job site during the entire installation. The installation supervisor shall maintain marked up copies of the drawings at the job site showing as-built conditions. These drawings shall be updated daily and available for Owner review.

C. The Contractor shall provide all required conduit and all associated hardware, and shall install (pull), connect, and test all cable for a complete fire alarm system. All wiring shall be installed in accordance with the guidelines of these specifications and documents as well as the NFPA codes and standards listed in these specifications.

## 3.2 EXAMINATION

A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.

1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.

B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.3 EQUIPMENT INSTALLATION

A. Comply with NFPA 72 and requirements of authorities having jurisdiction for installation and testing of fire alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."

1. Devices placed in service before all other trades have completed cleanup shall be replaced.

2. Devices installed but not yet placed in service shall be protected from construction dust, debris, dirt, moisture, and damage according to manufacturer's written storage instructions.

B. Connecting to Existing Equipment: Verify that existing fire alarm system is operational before making changes or connections.

1. Connect new equipment to existing control panel.

2. Expand, modify, and supplement existing control/monitoring equipment as necessary to extend existing functions to the new points. New components shall be capable of merging with existing configuration without degrading the performance of either system.

C. Install wall-mounted equipment, with tops of cabinets not more than 72 inches above the finished floor.

D. Install wall mounted visible and audible/visible notification appliances with visible element (strobe) between 80 inches and 96 inches above finished floor unless noted otherwise on drawings.

E. Install wall mounted audible devices with the top of the device at least 90 inches above finished floor or 6 inches below the ceiling, whichever is lower, unless noted otherwise on Drawings. If combination devices are installed, they shall be installed per the visible signal device requirements.

## 3.4 PATHWAYS

A. Pathways above suspended ceilings and in nonaccessible locations may be routed exposed where permitted by NFPA 70 & 72.

1. Exposed pathways located less than 96 inches above the floor shall be installed in conduit.

## 3.5 CONNECTIONS

A. All wiring shall be terminated at devices or panels using terminal connectors for screw type terminals. All terminal connectors for conductors shall be pre-insulated ring type or pre-insulated spade type. Pre-insulated terminal connectors shall include a vinyl sleeve, color coded to indicate conductor size. Pre-insulated terminal connectors shall include a metallic support sleeve bonded to the vinyl-insulating sleeve and designed to grip the conductor insulation.

B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 36 inches (910 mm) from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.

1. Supervisory connections at valve supervisory switches.

## 3.6 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

B. All conduits and junction boxes shall be labeled as specified in Division 26 (red).

C. The location of end-of-line resistors shall be identified with a label indicating “EOL.”

## 3.7 GROUNDING

A. Ground fire alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire alarm control unit.

B. Ground shielded cables at the control panel location only. Insulate shield at device location.

## 3.8 FIELD QUALITY CONTROL

A. Systems shall be checked and tested in accordance with the instructions provided by the manufacturer to insure that the system functions as required and is free of grounds, opens, and shorts. Each device shall be tested.

B. Upon completion of the system installation and before the Date of Final Acceptance, a factory-trained technician shall perform all necessary tests and adjustments and shall then file a Letter of Certification and a Certificate of Completion (NFPA 72) with the Owner indicating that the system functions and conforms to the Fire Alarm System Specifications.

C. Upon completion of the system installation, a factory-trained technician shall perform all necessary tests and adjustments in the presence of the Owner’s designated personnel. Test in accordance with NFPA 72 and requirements of the authority having jurisdiction. Perform the following tests at a minimum:

1. Visual Inspection: Conduct visual inspection prior to testing. Inspection shall be based on completed record Drawings and system documentation that is required by the "Completion Documents, Preparation" table in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
2. System Testing: Comply with the "Test Methods" table in the "Testing" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
    a. Test audible appliances for the public operating mode according to manufacturer's written instructions.
    b. Test visible appliances for the public operating mode according to manufacturer's written instructions.

D. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.

E. Fire alarm system will be considered defective if it does not pass tests and inspections.

## 3.9 DEMONSTRATION

A. The equipment supplier's factory trained technician shall train the Owner's personnel in the proper use and maintenance of the system. Training sessions shall be conducted as needed, not to exceed a total of 2 sessions, with each session lasting a maximum of 4 hours each.

B. Demonstrate normal and abnormal modes of operation, and required responses to each.

**END OF SECTION 284600**