PROJECT MANUAL

Upgrade HVAC

Ozark Correctional Center

Fordland, Missouri

Designed By: True Engineering Group
1200 E. Woodhurst Drive, Building P
Springfield, MO 65804

Date Issued: February 4, 2025

Project No.: C2324-01

STATE *of* MISSOURI

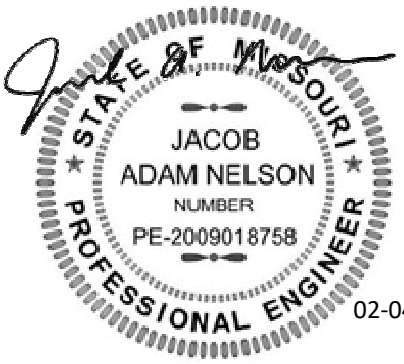
OFFICE *of* ADMINISTRATION

Facilities Management, Design and Construction

SECTION 000107 - PROFESSIONAL SEALS AND CERTIFICATIONS

PROJECT NUMBER: ({Projects.Number} "C2324-01")

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:



02-04-2025

Jacob Nelson, PE
MO# PE-2009018758

MEP ENGINEER OF RECORD

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Missouri State Certificate of Authority # E-2016000752

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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.	Title Sheet	Sheet G-001	02/04/2025	G-TIT-001
2.	General Scope Plan	Sheet G-101	02/04/2025	G-SIT-101
3.	MEP Coordination Plan - North	Sheet MEP-101	02/04/2025	M-SIT-101
4.	MEP Coordination Plan - South	Sheet MEP-102	02/04/2025	M-SIT-102
5.	Demo Mechanical Site Plan - North	Sheet M-001	02/04/2025	M-HVC-001
6.	Demo Mechanical Site Plan - South	Sheet M-002	02/04/2025	M-HVC-002
7.	Demo Mechanical Plan	Sheet M-003	02/04/2025	M-HVC-003
8.	Demo Mechanical Plan	Sheet M-004	02/04/2025	M-HVC-004
9.	Demo Mechanical Plan	Sheet M-005	02/04/2025	M-HVC-005
10.	Demo Mechanical Plan	Sheet M-006	02/04/2025	M-HVC-006
11.	Mechanical Site Plan - North	Sheet M-101	02/04/2025	M-HVC-101
12.	Mechanical Site Plan - South	Sheet M-102	02/04/2025	M-HVC-102
13.	Mechanical Piping Plan	Sheet M-103	02/04/2025	M-HVC-103
14.	Mechanical Piping Plan	Sheet M-104	02/04/2025	M-HVC-104
15.	Mechanical Piping Plan	Sheet M-105	02/04/2025	M-HVC-105
16.	Mechanical Piping Plan	Sheet M-106	02/04/2025	M-HVC-106
17.	Mechanical Plan	Sheet M-201	02/04/2025	M-HVC-201
18.	Mechanical Plan	Sheet M-202	02/04/2025	M-HVC-202
19.	Mechanical Plan	Sheet M-203	02/04/2025	M-HVC-203
20.	Mechanical Plan	Sheet M-204	02/04/2025	M-HVC-204

21.	Mechanical Details	Sheet M-301	02/04/2025	M-HVC-301
22.	Mechanical Schedules	Sheet M-302	02/04/2025	M-HVC-302
23.	Demo Electrical Plan	Sheet E-001	02/04/2025	E-ELC-001
24.	Demo Electrical Plan	Sheet E-002	02/04/2025	E-ELC-002
25.	Demo Electrical Plan	Sheet E-003	02/04/2025	E-ELC-003
26.	Demo Electrical Plan	Sheet E-004	02/04/2025	E-ELC-004
27.	Electrical Plan	Sheet E-101	02/04/2025	E-ELC-101
28.	Electrical Plan	Sheet E-102	02/04/2025	E-ELC-102
29.	Electrical Plan	Sheet E-103	02/04/2025	E-ELC-103
30.	Electrical Plan	Sheet E-104	02/04/2025	E-ELC-104
31.	Electrical Details	Sheet E-201	02/04/2025	E-ELC-201

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. Upgrade HVAC
Ozark Correctional Center
Fordland, Missouri
Project No.: C2324-01

3.0 BIDS WILL BE RECEIVED:

A. Until: 1:30 PM, June 26, 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 converting the existing facilities central steam heating system to a localized natural gas heating system. New natural gas piping will be run underground to all of the existing buildings currently served by the steam system. From there, the heating system will be converted to localized gas-fired forced air furnaces, packaged outdoor rooftop units, gas-fired unit heaters, and electric duct/unit heaters. New air distribution systems will be installed for a few buildings. The domestic hot water systems in Housing Unit One, Housing Unit Two, Cafeteria, and Laundry will also be converted from steam heat exchangers to gas-fired tank-type water heaters and master mixing valves.

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, June 11, 2025, at Ozark Correctional Center Maintenance Building, 929 Honor Camp Lane, Fordland, MO.

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 plan holder.

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 plan holders 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: True Engineering Group, Jon Kamies, (417) 708-7025, email: kamies@true-mep.com

B. Project Manager: Shannon Thompson, (573) 257-7137, email: shannon.thompson@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.

C. This is a federally funded/assisted construction project that requires compliance by the awarded Bidder with applicable federal laws and regulations. The Bidder should review Section 007333, Supplementary General Conditions for Federally Funded/Assisted Construction Projects and Section 007334, Terms and Conditions for Contractor Receipt of Federal ARPA SLFRF Funds, which are made part of this Invitation to Bid and will be made part of the resulting contract by reference.

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: **Upgrade HVAC**
Ozark Correctional Center
Fordland, Missouri

Project Number: **C2324-01**

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 Bidder agrees to complete the work by **September 30, 2026.** 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 $1,000** 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.

SAMPLE

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)

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: The requirements of the Davis-Bacon Act are not applicable to this project, which is funded solely by Coronavirus State and Local Fiscal Recover Funds (SLFRF) under the American Rescue Plan Act (ARPA).

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)

SAMPLE

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

SAMPLE

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 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:
Jon Kamies
True Engineering Group
1200 E. Woodhurst Drive, Building P
Springfield, MO 65804
Telephone: 417-708-7025
Email: kamies@true-mep.com

Construction Representative:
David Burkett
Division of Facilities Management, Design and Construction
730 S Wall Street
Joplin, MO 64801
Telephone: 573-644-2442
Email: david.burkett@oa.mo.gov

Project Manager:
Shannon Thompson
Division of Facilities Management, Design and Construction
301 West High Street, Room 730
Jefferson City, Missouri 65101
Telephone: 573-257-7137
Email: shannon.thompson@oa.mo.gov

Contract Specialist:
Paul Girouard
Division of Facilities Management, Design and Construction
301 West High Street, Room 730
Jefferson City, Missouri 65101
Telephone: (573) 751-4797
Email: paul.girouard@oa.mo.gov

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

4.0 FURNISHING CONSTRUCTION DOCUMENTS:

A. The Owner will furnish the Contractor with approximately 5 complete sets of drawings and specifications at no charge.

B. The Owner will furnish the Contractor with approximately 5 sets of explanatory or change drawings at no charge.

C. The Contractor may make copies of the documents as needed with no additional cost to the Owner.

5.0 SAFETY REQUIREMENTS

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

6.0 OFF-SITE BORROW & SPOIL DEPOSIT SITES FOR FEDERALLY FUNDED PROJECTS:

All Federally funded projects which involve off-site borrow and/or off-site spoil deposit sites will require written certification that the site(s) are in compliance with the National Environmental Protection Act and all related applicable Federal and State laws and regulations. If the need for off-site borrow and/or spoil sites is stipulated in the Contract Documents, the following applies:

A. The Contractor is required to use only the designated site described in the Contract Documents. If another off-site area is proposed by the Contractor, the Contractor must provide written certification to

the Division of Facilities Management, Design and Construction Project Representative that the proposed borrow or spoil site has been cleared of environmental concerns in accordance with all applicable Federal and State laws and regulations. These include but are not limited to the following: Clean Water Act; the Endangered Species Act; the National Historic Preservation Act (NHPA) (The site must have Section 106 Clearance); the Farmland Protection Act; Resource Conservation and Recovery Act; Comprehensive Environmental Response; Compensation and Liability Act; and RSMo Chapter 194, Section 194.400, Unmarked Human Burial Sites. Certifications shall include clearance letters and other evidence of coordination with the appropriate regulatory agencies. The Missouri Historic Preservation Office, PO Box 176 Jefferson City, MO 65102, may be contacted to provide assistance with the NHPA and cultural resource issues pertaining to the borrow and spoil site regulations. The Missouri State Historic Preservation Office can provide a list of qualified and certified archaeologists to assist in borrow and spoil site investigations.

B. If project conditions require off-site borrow or off-site deposit of spoils, the Contractor will be required to provide written certification to the Division of Facilities Management, Design and Construction Project Representative that the proposed borrow or spoil site has been cleared of environmental concerns in accordance with all applicable Federal and State laws and regulations. These include but are not limited to the following: Clean Water Act; the Endangered Species Act; the National Historic Preservation Act (NHPA) (The site must have Section 106 Clearance); the Farmland Protection Act; Resource Conservation and Recovery Act; Comprehensive Environmental Response; Compensation and Liability Act; and RSMo Chapter 194, Section 194.400, Unmarked Human Burial Sites. Certifications shall include clearance letters and other evidence of coordination with the appropriate regulatory agencies. The Missouri Historic Preservation Office, PO Box 176 Jefferson City, MO 65102, may be contacted to provide assistance with the NHPA and cultural resource issues pertaining to the borrow and spoil site regulations. The Missouri State Historic Preservation Office can provide a list of qualified and certified archaeologists to assist in borrow and spoil site investigations.

D. The Owner recognizes that additional time (beyond what is allowed in the Construction Contract) may be required in order to secure the aforementioned certifications and approvals. Should more time be required, the Owner will consider approval of a no-cost time extension contract change. The Contractor will be required to provide documentation that substantiates the need for the time extension.

SECTION 007333 - SUPPLEMENTARY GENERAL CONDITIONS FOR FEDERALLY FUNDED/ASSISTED CONSTRUCTION PROJECTS (American Rescue Plan Act (ARPA) Projects)

1.0 Notice of Federal Funding

This project is being performed in whole or in part using federal funds. Therefore, all work or services performed by the Contractor and its subcontractors shall be subject to the terms and conditions set forth below in addition to all terms and conditions in the Construction Contract, General Conditions, and other contract documents. The concepts, rules, and guidelines set forth in 2 C.F.R. 200 describing allowable costs and administrative requirements apply.

2.0 Definitions

As used herein, "Federal Government" means the government of the United States of America. "Federal Agency" means an agency, entity, department or division of the Federal Government that is providing funding for this project. All other terms shall have the meanings established in the Construction Contract, General Conditions, and/or Project Manual, unless such definitions conflict with a definition provided in an applicable statute or regulation.

3.0 Conflicting Terms or Conditions

To the extent that any terms or conditions set forth herein conflict with the Construction Contract or its General Conditions, the more stringent of the two terms and conditions shall govern.

4.0 No Obligation by Federal Government

The Federal Government is not a party to this contract and is not subject to any obligations or liabilities to the non-Federal entity, Contractor, or any other party pertaining to any matter resulting from the contract.

5.0 Compliance with Federal Laws, Regulations and Executive Orders

The Contractor and its subcontractors and suppliers are required to comply with all applicable Federal laws, regulations, and executive orders, regardless of whether set forth herein. The Contractor shall assist and enable the State of Missouri in complying with any requirements imposed by the Federal Agency as a condition of funding.

6.0 Compliance with Civil Rights Provisions

The Contractor shall comply with all Federal statutes, executive orders, and regulations relating to nondiscrimination. These include, but are not limited to the following:

Title VI of the Civil Rights Act of 1964 (P.L. 88-352) which prohibits discrimination on the basis of race, color or national origin;

Title IX of the Education Amendments of 1972, as amended (20 U.S.C. §§1681-1683, and 1685-1686), which prohibits discrimination on the basis of sex;

Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. §794), which prohibits discrimination on the basis of handicaps;

The Age Discrimination Act of 1975, as amended (42 U.S.C. §§6101-6107), which prohibits discrimination on the basis of age;

Title VIII of the Civil Rights Act of 1968 (42 U.S.C. §§3601 et seq.), as amended, relating to nondiscrimination in the sale, rental or financing of housing;

Title VII of the Civil Rights Act of 1964 (42 U.S.C. part 2000(e), which prohibits discrimination against employees on the basis of religion;

Any other nondiscrimination provisions in the specific statute(s) under which application for Federal assistance is being made; and

The requirements of any other nondiscrimination statute(s) that may apply to the application.

7.0 Equal Employment Opportunity (41 C.F.R. 60-1.4(b)).

During the performance of this contract, the Contractor agrees as follows:

(1) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following:

Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

(2) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

(3) The Contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicants or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the Contractor's legal duty to furnish information.

(4) The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the Contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(5) The Contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (4) in every subcontract or purchase order. The Contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance:

Provided, however, that in the event a Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

The applicant further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally assisted construction work: *Provided,* That if the applicant so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract.

The applicant agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of contractors and sub-contractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.

8.0 Prohibition of Segregated Facilities

(1) The Contractor agrees that it does not and will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not and will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. The Contractor agrees that a breach of this clause is a violation of the Equal Employment Opportunity clause in this contract.

(2) "Segregated facilities," as used in this clause, means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees that are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, sex, or national origin because of written or oral policies or employee custom. The term does not include separate or single-user rest rooms or necessary dressing or sleeping areas provided to assure privacy between the sexes.

(3) The Contractor shall include this clause in every subcontract and purchase order that is subject to the Equal Employment Opportunity clause of this contract.

9.0 Davis-Bacon Act (40 U.S.C. §§ 3141-3144, and §§ 3146-3148, and 29 C.F.R. pt. 5)

The requirements of the Davis-Bacon Act and this section are not applicable to this project, which is funded by Coronavirus State and Local Fiscal Recover Funds (SLFRF) under the American Rescue Plan Act (ARPA).

~~(1) Minimum wages.~~

~~(i) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 C.F.R. pt. 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis–Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided*, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis–Bacon poster (WH–1321) shall be posted at all times by the Contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.~~

~~(ii)(A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination, and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:~~

~~(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and~~

~~(2) The classification is utilized in the area by the construction industry; and~~

~~(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.~~

~~(B) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve,~~

modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the Contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii)(B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *Provided*, That the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(2) Withholding. The (write in name of Federal Agency or the loan or grant recipient) shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the Contractor under this contract or any other Federal contract with the same prime Contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime Contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract, the (Agency) may, after written notice to the Contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) Payrolls and basic records.

(i) Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid

(including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis–Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 C.F.R. 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis–Bacon Act, the Contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The Contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the (write in name of appropriate federal agency) if the agency is a party to the contract, but if the agency is not such a party, the Contractor will submit the payrolls to the applicant, sponsor, or owner, as the case may be, for transmission to the (write in name of agency). The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 C.F.R. 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead, the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH–347 is available for this purpose from the Wage and Hour Division Web site at http://www.dol.gov/esa/whd/forms/wh347instr.htm or its successor site. The prime Contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the (write in name of appropriate federal agency) if the agency is a party to the contract, but if the agency is not such a party, the Contractor will submit them to the applicant, sponsor, or owner, as the case may be, for transmission to the (write in name of agency), the Contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime Contractor to require a subcontractor to provide addresses and social security numbers to the prime Contractor for its own records, without weekly submission to the sponsoring government agency (or the applicant, sponsor, or owner).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under § 5.5 (a)(3)(ii) of Regulations, 29 C.F.R. pt. 5, the appropriate information is being maintained under § 5.5 (a)(3)(i) of Regulations, 29 C.F.R. pt. 5, and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 C.F.R. pt. 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH–347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the Contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The Contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the (write the name of the agency) or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit the required records or to make them available, the Federal Agency may, after written notice to the Contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 C.F.R. 5.12.

(4) Apprentices and trainees –

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a Contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the

Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 C.F.R. 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of 29 C.F.R. pt. 30.

(5) Compliance with Copeland Act requirements. The Contractor shall comply with the requirements of 29 C.F.R. pt. 3, which are incorporated by reference in this contract.

(6) Subcontracts. The Contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 C.F.R. 5.5(a)(1) through (10) and such other clauses as the (write in the name of the Federal Agency) may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime Contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 C.F.R. 5.5.

(7) Contract termination: debarment. A breach of the contract clauses in 29 C.F.R. 5.5 may be grounds for termination of the contract, and for debarment as a Contractor and a subcontractor as provided in 29 C.F.R. 5.12.

(8) Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 C.F.R. pts. 1, 3, and 5 are herein incorporated by reference in this contract.

(9) Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be

~~resolved in accordance with the procedures of the Department of Labor set forth in 29 C.F.R. pt.s 5, 6, and 7. Disputes within the meaning of this clause include disputes between the Contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.~~

~~(10) Certification of eligibility.~~

~~(i) By entering into this contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis–Bacon Act or 29 C.F.R. 5.12(a)(1).~~

~~(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis–Bacon Act or 29 C.F.R. 5.12(a)(1).~~

~~(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. § 1001.~~

10.0 Copeland "Anti-Kickback" Act

(1) The Contractor shall comply with 18 U.S.C. § 874, 40 U.S.C. § 3145, and the requirements of 29 C.F.R. pt. 3 as may be applicable, which are incorporated by reference into this contract. The Contractor and subcontractors are prohibited from inducing, by any means, any person employed on the project to give up any part of the compensation to which the employee is entitled.

(2) The Contractor or subcontractor shall insert in any subcontracts the clause above, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime Contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all of these contract clauses.

(3) A breach of the contract clauses above may be grounds for termination of the contract, and for debarment as a Contractor and subcontractor as provided in 29 C.F.R. 5.12.

11.0 Contract Work Hours and Safety Standards Act (40 U.S.C. 3701 to 3708, 29 C.F.R. 5.5)

(1) Overtime requirements. No Contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (1) of this section the Contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such Contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this section, in the sum of $27 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours

without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.

(3) Withholding for unpaid wages and liquidated damages. The Owner shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the Contractor or subcontractor under any such contract or any other Federal contract with the same prime Contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime Contractor, such sums as may be determined to be necessary to satisfy any liabilities of such Contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2) of this section.

(4) Subcontracts. The Contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime Contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1) through (4) of this section.

12.0 Suspension and Debarment (Executive Orders 12549 and 12689, 2 C.F.R. pt. 180)

(1) A contract award (see 2 C.F.R. 180.220) must not be made to parties listed on the government-wide exclusions in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 C.F.R. 180 that implement Executive Orders 12549 (3 C.F.R. pt. 1986 Comp., p. 189) and 12689 (3 C.F.R. pt. 1989 Comp., p. 235), "Debarment and Suspension." SAM Exclusions contains the names of parties debarred, suspended, or otherwise excluded by agencies, as well as parties declared ineligible under statutory or regulatory authority other than Executive Order 12549.

(2) The contractor is required to verify that none of the contractor's principals (defined at 2 C.F.R. 180.995) or its affiliates (defined at 2 C.F.R. 180.905) are excluded (defined at 2 C.F.R. 180.940) or disqualified (defined at 2 C.F.R. 180.935).

(3) The contractor must comply with 2 C.F.R. pt. 180, subpart C and the regulations of the granting Federal Agency regarding suspension and debarment and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into.

(4) This certification is a material representation of fact relied upon by the Owner. If it is later determined that the Contractor did not comply with 2 C.F.R. pt. 180, subpart C in addition to remedies available to the Owner, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment.

(5) By submitting a bid, the bidder or proposer agrees to comply with the requirements of 2 C.F.R. pt. 180, subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions.

13.0 Byrd Anti-Lobbying Amendment (31 U.S.C. § 1352)

(1) Contractors that apply or bid for an award exceeding $100,000 agree to file the required certification (set forth below), in compliance with 31 U.S.C. § 1352 (as amended).

(2) Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, officer or employee of Congress, or an employee of a Member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 U.S.C. § 1352.

(3) Each tier shall also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the recipient who in turn will forward the certification(s) to the awarding agency.

CERTIFICATION REGARDING LOBBYING

The Bidder or Offeror certifies by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form–LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

14.0 Procurement of Recovered Materials

The Contractor shall comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (42 U.S.C. § 6962). The requirements of Section 6002 include procuring only items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds $10,000 or the value of the quantity acquired during the preceding fiscal year exceeded $10,000; procuring solid waste management services in a manner that maximizes energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines.

Information about this requirement, along with the list of EPA designated items, is available at EPA's Comprehensive Procurement Guidelines web site, https://www.epa.gov/smm/comprehensive-procurement-guideline-cpg-program.

15.0 Fair Labor Standards Act

All contracts and subcontracts that result from this solicitation incorporate by reference the provisions of 29 C.F.R. pt. 201, the Federal Fair Labor Standards Act (FLSA), with the same force and effect as if given in full text. The FLSA sets minimum wage, overtime pay, recordkeeping, and child labor standards for full and part-time workers. The Contractor has full responsibility to monitor compliance to the referenced statute or regulation. The Contractor must address any claims or disputes that arise from this requirement directly with the U.S. Department of Labor – Wage and Hour Division.

16.0 Access to Records and Reports

The Contractor must maintain an acceptable cost accounting system. The Contractor agrees to provide the Owner, the Federal Agency and the Comptroller General of the United States or any of their duly authorized representatives access to any books, documents, papers and records of the Contractor which are directly pertinent to the specific contract for the purpose of making audit, examination, excerpts and transcriptions. The Contractor agrees to maintain all books, records and reports required under this contract for a period of not less than three years after final payment is made and all pending matters are closed.

17.0 Occupational Health and Safety Act

All contracts and subcontracts that result from this solicitation incorporate by reference the requirements of 29 C.F.R. pt. 1910 with the same force and effect as if given in full text. The employer must provide a work environment that is free from recognized hazards that may cause death or serious physical harm to the employee. The employer retains full responsibility to monitor its compliance and their subcontractor's compliance with the applicable requirements of the Occupational Safety and Health Act of 1970 (20 C.F.R. pt. 1910). The employer must address any claims or disputes that pertain to a referenced requirement directly with the U.S. Department of Labor – Occupational Safety and Health Administration.

18.0 Rights to Inventions

Contracts or agreements that include the performance of experimental, developmental, or research work must provide for the rights of the Federal Government and the Owner in any resulting invention as established by 37 C.F.R. pt. 401, Rights to Inventions Made by Non-profit Organizations and Small Business Firms under Government Grants, Contracts, and Cooperative Agreements. This contract incorporates by reference the patent and inventions rights as specified within 37 C.F.R. 401.14. Contractor must include this requirement in all sub-tier contracts involving experimental, developmental, or research work.

19.0 Energy Conservation

The Contractor agrees to comply with mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act (42 U.S.C. § 6201et seq.).

20.0 Clean Air Act and Federal Water Pollution Control Act

(1) If the amount of the Contract exceeds $150,000, the Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. § 7401 et seq. and the Federal Water Pollution Control Act, as amended, 33 U.S.C. § 1251 et seq.

(2) The Contractor agrees to report each violation to the Owner, and understands and agrees that the Owner will, in turn, report each violation as required to assure notification to the Federal Agency and the appropriate Environmental Protection Agency Regional Office.

(3) The Contractor agrees to include these requirements in each subcontract exceeding $150,000 financed in whole or in part with Federal assistance.

21.0 Contractor Employee Whistleblower Rights and Requirement to Inform Employees of Whistleblower Rights

(1) This contract and employees working on this contract will be subject to the whistleblower rights and remedies in the pilot program on contractor employee whistleblower protections established at 41 U.S.C. § 4712 by section 828 of the National Defense Authorization Act for Fiscal Year 2013 (Pub. L. 112-239) and FAR 3.908.

(2) The Contractor shall inform its employees in writing, in the predominant language of the workforce, of employee whistleblower rights and protections under 41 U.S.C. § 4712, as described in section 3.908 of the Federal Acquisition Regulation.

(3) The Contractor shall insert the substance of this clause, including this paragraph (c), in all subcontracts over the simplified acquisition threshold.

22.0 Veteran's Preference

In the employment of labor (excluding executive, administrative, and supervisory positions), the Contractor and all sub-tier contractors must give preference to covered veterans as defined within Title 49 United States Code Section 47112. Covered veterans include Vietnam-era veterans, Persian Gulf veterans, Afghanistan-Iraq war veterans, disabled veterans, and small business concerns (as defined by 15 U.S.C. § 632) owned and controlled by disabled veterans. This preference only applies when there are covered veterans readily available and qualified to perform the work to which the employment relates.

23.0 Drug Free Workplace Act

The Contractor shall provide a drug free workplace in accordance with the Drug Free Workplace Act of 1988, 41 U.S.C. Chapter 81, and all applicable regulations. The Contractor shall report any conviction of the Contractor's personnel under a criminal drug statute for violations occurring on the Contractor's premises or off the Contractor's premises while conducting official business. A report of a conviction shall be made to the state agency within five (5) working days after the conviction.

24.0 Access Requirements for Persons with Disabilities

Contractor shall comply with 49 U.S.C. § 5301(d), stating Federal policy that the elderly and persons with disabilities have the same rights as other persons to use mass transportation services and facilities and that

special efforts shall be made in planning and designing those services and facilities to implement that policy. Contractor shall also comply with all applicable requirements of Sec. 504 of the Rehabilitation Act (1973), as amended, 29 U.S.C. § 794, which prohibits discrimination on the basis of handicaps, and the Americans with Disabilities Act of 1990 (ADA), as amended, 42 U.S.C. § 12101 et seq., which requires that accessible facilities and services be made available to persons with disabilities, including any subsequent amendments thereto.

25.0 Seismic Safety

The Contractor agrees to ensure that all work performed under this contract, including work performed by subcontractors, conforms to a building code standard that provides a level of seismic safety substantially equivalent to standards established by the National Earthquake Hazards Reduction Guidelines for Contract Provisions for Obligated Sponsors and Airport Improvement Program Projects Issued on June 19, 2018 Page 61 Program (NEHRP). Local building codes that model their code after the current version of the International Building Code (IBC) meet the NEHRP equivalency level for seismic safety.

26.0 Required Use of American Iron, Steel, Manufactured Products, and Construction Materials – Build America, Buy America (Pub. L. No. 117-58, §§ 70901-52)

The Owner is the recipient of an award of Federal financial assistance from a program for infrastructure for this project. Pursuant to the Build America, Buy America Act of the Infrastructure Investment and Jobs Act ("IIJA"), Pub. L. No. 117-58, none of the funds provided under the Federal award may be used unless the requirements of the domestic content procurement preference outlined below are met. Therefore, the Contractor shall ensure the following:

> (1) all iron and steel used in the project are produced in the United States--this means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States;
>
> (2) all manufactured products used in the project are produced in the United States—this means the manufactured product was manufactured in the United States; and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 65 percent of the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of the manufactured product has been established under applicable law or regulation; and
>
> (3) all construction materials are manufactured in the United States—this means that all manufacturing processes for the construction material occurred in the United States.

The Buy America preference only applies to articles, materials, and supplies that are consumed in, incorporated into, or affixed to an infrastructure project. As such, it does not apply to tools, equipment, and supplies, such as temporary scaffolding, brought to the construction site and removed at or before the completion of the infrastructure project. Nor does a Buy America preference apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project, but are not an integral part of the structure or permanently affixed to the infrastructure project.

Waivers

When necessary, recipients of Federal financial assistance may apply for, and the awarding agency may grant, a waiver from the domestic content procurement preference.

When the Federal agency has made a determination that one of the following exceptions applies, the awarding official may waive the application of the domestic content procurement preference in any case in which the agency determines that:

> (1) applying the domestic content procurement preference would be inconsistent with the public interest;
>
> (2) the types of iron, steel, manufactured products, or construction materials are not produced in the United States in sufficient and reasonably available quantities or of a satisfactory quality; or
>
> (3) the inclusion of iron, steel, manufactured products, or construction materials produced in the United States will increase the cost of the overall project by more than 25 percent. A request to waive the application of the domestic content procurement preference must be in writing. The agency will provide instructions on the format, contents, and supporting materials required for any waiver request. Waiver requests are subject to public comment periods of no less than 15 days and must be reviewed by the Made in America Office.

There may be instances where an award qualifies, in whole or in part, for an existing waiver described on the awarding agency web site.

If the Contractor determines that an application for a waiver is necessary or an existing waiver is applicable to this project, the Contractor shall timely notify the Owner. The Owner will make a determination if a waiver is applicable or if a waiver application is necessary. The Contractor shall not submit any waiver application or information directly to the Federal agency without prior approval by the Owner.

Definitions

"Construction materials" includes an article, material, or supply—other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives—that is or consists primarily of: • non-ferrous metals; • plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables); • glass (including optic glass); • lumber; or • drywall.

"Domestic content procurement preference'' means all iron and steel used in the project are produced in the United States; the manufactured products used in the project are produced in the United States; or the construction materials used in the project are produced in the United States.

"Infrastructure" includes, at a minimum, the structures, facilities, and equipment for, in the United States, roads, highways, and bridges; public transportation; dams, ports, harbors, and other maritime facilities; intercity passenger and freight railroads; freight and intermodal facilities; airports; water systems, including drinking water and wastewater systems; electrical transmission facilities and systems; utilities; broadband infrastructure; and buildings and real property. Infrastructure includes facilities that generate, transport, and distribute energy.

"Project" means the construction, alteration, maintenance, or repair of infrastructure in the United States.

27.0 Prohibition on Certain Telecommunication and Video Surveillances Services or Equipment (Pub. L. 115-232, Section 889)

Section 889(b) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019, Pub. L. No. 115-232, and 2 C.F.R. § 200.216 prohibit the head of a Federal executive agency and recipients or subrecipients of funds from such agencies from obligating or expending grant, cooperative agreement, loan, or loan guarantee funds on certain telecommunications products or from certain entities for national security reasons. Pursuant to such provisions, the Contractor understands and agrees that the Contractor and its subcontractors shall not obligate or expend loan or grant funds from the Federal Agency under this Contract to:

(1) Procure or obtain;

(2) Extend or renew a contract to procure or obtain; or

(3) Enter into a contract (or extend or renew a contract) to procure or obtain equipment, services, or systems that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. As described in Public Law 115–232, section 889, covered telecommunications equipment is telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).

(i) For the purpose of public safety, security of government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities).

(ii) Telecommunications or video surveillance services provided by such entities or using such equipment.

(iii) Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

TERMS AND CONDITIONS FOR CONTRACTOR RECEIPT OF FEDERAL ARPA SLFRF FUNDS

I. Use of Funds: _____ ("Contractor") understands and agrees that the State of Missouri has received funds for this project under section 602(c) of the Social Security Act ("Act"), as added by Section 9901 of the American Rescue Plan Act ("ARPA"), Pub. L. No. 117-2 (March 11, 2021), 135 Stat. 4, 223–26, and the funds disbursed under such grant may only be used in compliance with the ARPA and the U.S. Department of the Treasury ("Treasury")'s regulations implementing that section and guidance, and in compliance with all other restrictions and specifications on use set forth in or applicable through this agreement.

Period of Performance: The period of performance for the award begins on the date hereof and ends no later than December 31, 2026. Contractor may use funds granted under this agreement to cover eligible costs incurred during the period of performance, but no later than December 31, 2026.

Reporting: Contractor agrees to comply with any reporting obligations established by Treasury or the State of Missouri ("State"), as it relates to this agreement.

Maintenance of and Access to Records: Contractor shall maintain records and financial documents sufficient to evidence compliance with section 602(c) of the Act and Treasury's regulations implementing that section and guidance regarding the eligible uses of funds. Contractor shall also maintain records and financial documents: 1. sufficient for the State, with respect to Contractor's participation in this grant agreement, to evidence compliance with section 602(c) of the Act and Treasury's regulations implementing that section and guidance regarding the eligible uses of funds; and 2. necessary for the State, with respect to Contractor's participation in this agreement, to comply with obligations under 2 C.F.R. Part 200 and any other applicable law. The Treasury Office of Inspector General, the Government Accountability Office, their authorized representatives, the State, or its authorized representatives, shall have the right of access to records and documents (electronic and otherwise) of Contractor in order to conduct audits or other investigations or reviews. Records shall be maintained by Contractor for a period of five (5) years after the end of the period of performance. Wherever practicable, records should be collected, transmitted, and stored in open and machine-readable formats. Contractor's obligations under this section shall include, without limitation, maintenance of the following specified types of records and financial documents: contracts, invoices, receipts, payrolls, and financial statements.

Pre-award Costs: Pre-award costs, as defined at 2 C.F.R. § 200.458, may not be paid with funding from this agreement.

Compliance with Applicable Law and Regulations: Contractor agrees to comply with the requirements of section 602 of the Act, regulations adopted by Treasury pursuant to section 602(f) of the Act, guidance issued by Treasury regarding the foregoing, and all other restrictions and specifications set forth in or applicable through this agreement. Contractor also agrees to comply with all other applicable state and federal statutes, regulations, and executive orders, and

Contractor shall provide for such compliance by other parties in any agreements it enters into with other parties relating to this grant.

Federal regulations applicable to this agreement include, without limitation, the following:

i. If the amount of this agreement is expected to equal or exceed $25,000, or if this agreement is for federally-required audit services, OMB Guidelines to Agencies on Governmentwide Debarment and Suspension (Nonprocurement), 2 C.F.R. Part 180, and Treasury's implementing regulation at 31 C.F.R. Part 19, including both the requirement to comply with that part's Subpart C as a condition of participation in this transaction, and the requirement to pass the requirement to comply with that subpart to each person with whom the participant enters into a covered transaction at the next lower tier;

ii. Recipient Integrity and Performance Matters, pursuant to which the award term set forth at 2 C.F.R. Part 200, Appendix XII, is hereby incorporated by reference;

iii. Uniform Relocation Assistance and Real Property Acquisitions Act of 1970 (42 U.S.C. §§ 4601–4655) and implementing regulations; and

iv. Generally applicable federal environmental laws and regulations.

Federal statutes and regulations prohibiting discrimination applicable to this agreement include, without limitation, the following:

i. Title VI of the Civil Rights Act of 1964 (42 U.S.C. §§ 2000d *et seq*.) and Treasury's implementing regulations at 31 C.F.R. Part 22, which prohibit discrimination on the basis of race, color, or national origin under programs or activities receiving federal financial assistance;

ii. the Fair Housing Act, Title VIII of the Civil Rights Act of 1968 (42 U.S.C. §§ 3601 *et seq*.) which prohibits discrimination in housing on the basis of race, color, religion, national origin, sex, familial status, or disability;

iii. Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. § 794), which prohibits discrimination on the basis of disability under any program or activity receiving federal financial assistance;

iv. the Age Discrimination Act of 1975, as amended (42 U.S.C. §§ 6101 *et seq*.) and Treasury's implementing regulations at 31 C.F.R. Part 23, which prohibit discrimination on the basis of age in programs or activities receiving federal financial assistance; and

v. For local governments only, Title II of the Americans with Disabilities Act of 1990, as amended (42 U.S.C. §§ 12101 *et seq*.), which prohibits discrimination on the basis of disability under programs, activities, and services provided or made available by state and local governments or instrumentalities or agencies thereto.

Remedial Actions: The State reserves the right to impose additional conditions or requirements on Contractor's receipt of this funds under this agreement, as the State deems necessary or advisable, in order to facilitate compliance with any existing or additional conditions or requirements imposed upon the State by Treasury for the State's receipt of ARPA funds. The State also reserves the right to seek recoupment or repayment of funds under this agreement in whole or in part, in the event that Treasury seeks recoupment or repayment of payments made to the State, for reasons relating to Contractor's acts or omissions respecting this agreement. These reservations are expressed without limitation to any other rights the State may hold, either to impose additional conditions or requirements on Contractor's receipt of funds under this agreement or to recoup such funds in whole or in part, under this agreement or other applicable law.

Hatch Act: Contractor agrees to comply, as applicable, with requirements of the Hatch Act (5 U.S.C. §§ 1501–1508 and 7324–7328), which limit certain political activities of State or local government employees whose principal employment is in connection with an activity financed in whole or in part by this federal assistance.

False Statements: Contractor understands that making false statements or claims in connection with this award is a violation of federal law and may result in criminal, civil, or administrative sanctions, including fines, imprisonment, civil damages and penalties, debarment from participating in federal awards or contracts, and/or any other remedy available by law.

Publications: Any publications produced with funds from this agreement must display the following language: "This product [is being] [was] supported, in whole or in part, by federal award number [enter project FAIN] awarded to State of Missouri by the U.S. Department of the Treasury."

Debts Owed State and Federal Government: Any funds paid to Contractor (1) in excess of the amount to which Contractor is finally determined to be authorized to retain under the terms of this agreement; (2) that are determined by the Treasury Office of Inspector General to have been misused; or (3) that are determined by Treasury to be subject to a repayment obligation pursuant to sections 602(e) and 603(b)(2)(D) of the Act and have not been repaid by Contractor shall constitute a debt owed by the State to the federal government. In such instance, the funds constituting the State's debt to the federal government shall also constitute Contractor's debt to the State. Debts owed by Contractor to the State must be paid promptly by Contractor. A debt owed the State by Contractor under this agreement is delinquent if it has not been paid by the date specified in the State's initial demand for payment, unless other satisfactory arrangements have been made or if Contractor knowingly or improperly retains funds that are a debt as defined in this paragraph. The State will take any actions available to it to collect such a debt, including but not limited to actions available to it under the "Remedial Actions" paragraph found in this same section (I) above. The rights of the State as expressed in this paragraph are in addition to, and do not imply the exclusion of, any other rights the State may have under applicable law to collect a debt or seek damages from Contractor.

Disclaimer: In its award of federal financial assistance to the State, Treasury provides that the United States expressly disclaims any and all responsibility or liability to the State or third

persons for the actions of the State or third persons resulting in death, bodily injury, property damages, or any other losses resulting in any way from the performance of this award or any other losses resulting in any way from the performance of this award or any contract or subcontract under this award. Furthermore, in its award of federal financial assistance to the State, Treasury also states that the acceptance of this award by the State does not in any way establish an agency relationship between the United States and the State. This disclaimer applies with equal force to this agreement.

Increasing Seat Belt Use in the United States: Pursuant to Executive Order 13043, 62 FR 19217 (Apr. 18, 1997), Contractor is hereby encouraged to adopt and enforce on-the-job seat belt policies and programs for its employees when operating company-owned, rented or personally owned vehicles, and to encourage any subcontractors to do the same.

Reducing Text Messaging While Driving: Pursuant to federal Executive Order 13513, 74 FR 51225 (Oct. 6, 2009), the State hereby encourages Contractor to adopt and enforce policies that ban text messaging while driving, and to encourage any subcontractors to do the same.[1]

II. By entering into this agreement, Contractor ensures its current and future compliance with Title VI of the Civil Rights Act of 1964, as amended, which prohibits exclusion from participation, denial of the benefits of, or subjection to discrimination under programs and activities receiving federal funds, of any person in the United States on the ground of race, color, or national origin (42 U.S.C. § 2000d et seq.), as implemented by Treasury Title VI regulations at 31 C.F.R. Part 22 and other pertinent executive orders such as federal Executive Order 13166; directives; circulars; policies; memoranda and/or guidance documents.

Contractor acknowledges that federal Executive Order 13166, "Improving Access to Services for Persons with Limited English Proficiency," seeks to improve access to federally assisted programs and activities for individuals who, because of national origin, have Limited English Proficiency ("LEP"). Contractor understands that denying a person access to its programs, services, and activities because of LEP is a form of national origin discrimination prohibited under Title VI of the Civil Rights Act of 1964 and Treasury's implementing regulations. Accordingly, Contractor shall initiate reasonable steps, or comply with Treasury's directives, to ensure that LEP persons have meaningful access to its programs, services, and activities. Contractor understands and agrees that meaningful access may entail providing language assistance services, including oral interpretation and written translation where necessary, to ensure effective communication in Contractor's programs, services, and activities.

Contractor agrees to consider the need for language services for LEP persons during development of applicable budgets and when conducting programs, services, and activities. As a resource, Treasury has published its LEP guidance at 70 FR 6067. For more information on LEP, please visit http://www.lep.gov.

[1] Section I is based on requirements set forth in Treasury's Coronavirus State Fiscal Recovery Fund Award Terms and Conditions document, executed by the State on July 26, 2021.

ontractor acknowledges and agrees that compliance with this assurance constitutes a condition of continued receipt of federal financial assistance and is binding upon Contractor and Contractor's successors, transferees, and assignees for the period in which such assistance is provided.

Contractor shall comply with Title VI of the Civil Rights Act of 1964, which prohibits recipients of federal financial assistance from excluding from a program or activity, denying benefits of, or otherwise discriminating against a person on the basis of race, color, or national origin (42 U.S.C. § 2000d et seq.*), as implemented by the Department of the Treasury's Title VI regulations, 31 C.F.R. Part 22, which are herein incorporated by reference and made a part of this agreement. Title VI also includes protection to persons with "Limited English Proficiency" in any program or activity receiving federal financial assistance, 42 U.S.C. § 2000d* et seq.*, as implemented by the Department of the Treasury's Title VI regulations 31 C.F.R. Part 22, and herein incorporated by reference and made a part of this agreement.*

Contractor shall cooperate in any enforcement or compliance review activities by Treasury or the State of the aforementioned obligations. Enforcement may include investigation, arbitration, mediation, litigation, and monitoring of any settlement agreements that may result from these actions. That is, Contractor shall comply with information requests, on-site compliance review, and reporting requirements.

Contractor shall maintain and provide to applicants, beneficiaries, their representatives, or any other party requesting the same, information on how to file a Title VI complaint of discrimination with the State of Missouri.

Contractor shall provide to the State documentation of an administrative agency's or court's findings of non-compliance of Title VI and efforts to address the non-compliance, including any voluntary compliance or other agreements between Contractor and the administrative agency that makes any such finding. If Contractor settles a case or matter alleging such discrimination, Contractor must provide to the State documentation of the settlement. If Contractor has not been the subject of any court or administrative agency finding of discrimination, Contractor shall so state.

The United States of America has the right to seek judicial enforcement of the terms of this assurances section and nothing in this section alters or limits the federal enforcement measures that the United States may take in order to address violations of this section or applicable federal law.

Under penalty of perjury, the undersigned certifies that he/she has read and understood this section's obligations as herein described, that any information submitted in conjunction with this assurance document is accurate and complete, and that Contractor is in compliance with the aforementioned nondiscrimination requirements.

By signing this certification, the undersigned represents his or her intention, and legal authorization, to do so on behalf of Contractor.[2]

_____
Company Name

_____ Date: _____
Signature of Contractor's Authorized Representative

_____
Printed Name of Contractor's Authorized Representative

Contractor's Unique Entity Identifier: _____
(*Name associated with the Unique Entity Identifier must match the Contractor's name on contract documents)

III. This agreement shall be conducted in accordance with the standards set forth at 2 C.F.R. §§ 200.317 through 200.327, as applicable. Pursuant to 2 C.F.R. § 200.327 and Appendix II to Part 200 of Title 2 of the C.F.R.:

i. Contracts for more than $250,000 must address administrative, contractual, or legal remedies in instances where contractors violate or breach contract terms, and provide for such sanctions and penalties as appropriate.

ii. All contracts in excess of $10,000 must address termination for cause and for convenience by the State, including the manner by which it will be effected and the basis for settlement.

iii. When required by federal program legislation, all prime construction contracts in excess of $2,000 awarded by non-federal entities must include a provision for compliance with the Davis-Bacon Act (40 U.S.C. 3141-3144, and 3146-3148) as supplemented by Department of Labor regulations (29 C.F.R. Part 5, "Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction"). In accordance with the statute, contractors must be required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. In addition, contractors must be required to pay wages not less than once a week. The non-federal entity must place a copy of the current prevailing wage determination issued by the Department of Labor in each solicitation. The decision to award a contract must be conditioned upon the acceptance of the wage determination. The non-federal entity must report all suspected or reported violations to the federal awarding agency. The contracts must also include a provision for compliance with the

[2] Section II is based on requirements set forth in Treasury's Assurance of Compliance with Civil Rights Requirements document, executed by the State on July 26, 2021.

Copeland "Anti-Kickback" Act (40 U.S.C. 3145), as supplemented by Department of Labor regulations (29 C.F.R. Part 3, "Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States"). The Act provides that each contractor must be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled. The non-federal entity must report all suspected or reported violations to the federal awarding agency.

v. Where applicable, all contracts awarded by the non-federal entity in excess of $100,000 that involve the employment of mechanics or laborers must include a provision for compliance with 40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5). Under 40 U.S.C. 3702 of the Contract Work Hours and Safety Standards Act, each contractor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.C. 3704 are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.[3]

vi. If the State or Contractor wishes to enter into a contract or subcontract with a small business firm or nonprofit organization regarding the substitution of parties, assignment or performance of experimental, developmental, or research work under the State's award of ARPA funds or this agreement, the State and/or Contractor must comply with the requirements of 37 C.F.R. Part 401, "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements," and any implementing regulations issued by the awarding agency.

vii. Contracts and subgrants of amounts in excess of $150,000 must contain a provision that requires the non-federal award to agree to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. 1251-1387). Violations must be reported to the Federal awarding agency and the Regional Office of the Environmental Protection Agency (EPA). [

viii. A contract award (see 2 CFR 180.220) must not be made to parties listed on the governmentwide exclusions in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 C.F.R. 180 that implement Executive Orders 12549 (3 C.F.R. Part 1986 Comp., p. 189) and 12689 (3 C.F.R. Part 1989 Comp., p. 235), "Debarment and Suspension." SAM Exclusions contains the names of parties debarred, suspended, or otherwise excluded by

[3] Additionally, "in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in [29 C.F.R.] § 5.1," 29 C.F.R. § 5.5(c) requires that another clause be included "in any such contract," *id*. For language appropriate to construction of this additional clause, see 29 C.F.R. § 5.5(c).

agencies, as well as parties declared ineligible under statutory or regulatory authority other than Executive Order 12549. This requirement applies when the amount of the agreement is expected to equal or exceed $25,000, or if the agreement is for federally-required audit services. 2 C.F.R. § 180.220.]

ix. Contractors that apply or bid for an award exceeding $100,000 must file the certification required by 31 U.S.C. § 1352, the Byrd Anti-Lobbying Amendment. Under that law, each tier certifies to the tier above that it will not and has not used federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any federal contract, grant or any other award covered by 31 U.S.C. § 1352. Each tier must also disclose any lobbying with non-federal funds that takes place in connection with obtaining any federal award. Such disclosures are forwarded from tier to tier up to the non-federal award.

x. A non-federal entity that is a state agency or agency of a political subdivision of a state and its contractors must comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act. The requirements of Section 6002 include procuring only items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR Part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds $10,000 or the value of the quantity acquired during the preceding fiscal year exceeded $10,000; procuring solid waste management services in a manner that maximizes energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines. In the performance of this agreement, Contractor shall make maximum use of products containing recovered materials that are EPA-designated items unless the product cannot be acquired: 1. competitively within a timeframe providing for compliance with this agreement's performance schedule; 2. meeting this agreement's performance requirements; or 3. at a reasonable price. Information about this requirement, along with the list of EPA-designated items, is available at EPA's Comprehensive Procurement Guidelines webpage: http://www.epa.gov/smm/comprehensive-procurement-guideline-cpg-program. Contractor also agrees to comply with all other applicable requirements of Section 6002 of the Solid Waste Disposal Act.

xi. Pursuant to Pub. L. No. 115-232, H.R. 5515 (115th Congress, 2018), and 2 C.F.R. § 200.216, funds provided by this agreement shall not be obligated or expended to: 1. Procure or obtain; 2. Extend or renew a contract to procure or obtain; or 3. Enter into a contract (or extend or renew a contract) to procure or obtain equipment, services, or systems that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. For purposes of this prohibition, "covered telecommunications equipment or services" has the meaning as set forth at Sec. 889(f)(3) of Pub. L. No. 115-232. *See also* 2 C.F.R. § 200.216.

xii. Pursuant to 2 C.F.R. § 200.322, as appropriate and to the extent consistent with law, Contractor should, to the greatest extent practicable under this agreement, provide a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United

States (including but not limited to iron, aluminum, steel, cement, and other manufactured products). For purposes of this provision: 1. “produced in the United States” means, for iron and steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States. 2. “manufactured products” means items and construction materials composed in whole or in part of non-ferrous metals such as aluminum; plastics and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber.

Missouri
Division of Labor Standards
WAGE AND HOUR SECTION

MICHAEL L. PARSON, Governor

Annual Wage Order No. 31

Section 116
WEBSTER 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	$25.03*
Boilermaker	$25.03*
Bricklayer-Stone Mason	$52.71
Carpenter	$49.19
Lather	
Linoleum Layer	
Millwright	
Pile Driver	
Cement Mason	$25.03*
Plasterer	
Communication Technician	$25.03*
Electrician (Inside Wireman)	$25.03*
Electrician Outside Lineman	$25.03*
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Elevator Constructor	$25.03*
Glazier	$43.53
Ironworker	$67.09
Laborer	$43.32
General Laborer	
First Semi-Skilled	
Second Semi-Skilled	
Mason	$25.03*
Marble Mason	
Marble Finisher	
Terrazzo Worker	
Terrazzo Finisher	
Tile Setter	
Tile Finisher	
Operating Engineer	$25.03*
Group I	
Group II	
Group III	
Group III-A	
Group IV	
Group V	
Painter	$25.03*
Plumber	$25.03*
Pipe Fitter	
Roofer	$42.29
Sheet Metal Worker	$49.69
Sprinkler Fitter	$25.03*
Truck Driver	$25.03*
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
WEBSTER County

Section 116

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Carpenter	$25.03*
Millwright	
Pile Driver	
Electrician (Outside Lineman)	$25.03*
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Laborer	$44.25
General Laborer	
Skilled Laborer	
Operating Engineer	$54.56
Group I	
Group II	
Group III	
Group IV	
Truck Driver	$25.03*
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 **Upgrade HVAC**.

1. Project Location: **Ozark Correctional Center (929 Honor Camp Lane, Fordland, Missouri 65652)**.

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.

3. New heating systems shall be installed and fully operational by September 30th, 2026.

B. Contract Documents, dated **02/04/2025** were prepared for the Project by **True Engineering Group LLC (1200 E. Woodhurst Drive, Suite P, Springfield, Missouri 65804)**.

C. The Work consists of converting the existing facilities central steam heating system to a localized natural gas heating system. New natural gas piping will be run underground to all of the existing buildings currently served by the steam system. From there, the heating system will be converted to localized gas-fired forced air furnaces, packaged outdoor rooftop units, gas-fired unit heaters, and electric duct/unit heaters. New air distribution systems will be installed for a few buildings. The domestic hot water systems in Housing Unit One, Housing Unit Two, Cafeteria, and Laundry will also be converted from steam heat exchangers to gas-fired tank-type water heaters and master mixing valves.

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

E. Contractor is responsible for locating any underground utility services in the facility prior to excavation. Any damages to utility services while performing work for the project shall be the contractors responsibility to repair prior to the projects completion.

F. Temporary domestic hot water system and associated utility hookups for Housing Unit One and Housing Unit Two are the responsibility of the contractor. The temporary hot water system shall be able to provide a 600 MBH heating output and equipped with a 500-gallon hot water storage tank.

1.3 WORK SEQUENCE

A. The work for the project shall be sequenced to limit building heating and domestic hot water heating outages.

B. Temporary domestic hot water heating shall be utilized for Housing Unit One and Housing Unit Two. Housing units shall not be without domestic hot water for longer than 24 hours.

C. Buildings shall be equipped with permanent heat, either with the existing steam system or new systems as designed, by October 31st, 2025.

D. All work completed throughout the heating season, November 1st, 2025 to April 30th, 2026, shall not impact the building heating system. Temporary outages throughout the heating season must be coordinated and confirmed by the owner.

E. The steam system shall not be decommissioned until permitted by the owner.

1.4 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.

1.5 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 (Not Applicable)

END OF SECTION 011000

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.

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. 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.

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.

B. Prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate Contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities 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.

D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.4 SUBMITTALS

A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.

B. Key Personnel Names: Within fifteen (15) work days of starting construction operations, submit a list of key personnel assignments including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1.5 PROJECT MEETINGS

A. The Owner’s Construction Representative will schedule a Pre-Construction Meeting prior to beginning of construction. The date, time, and exact place of this meeting will be determined after Contract Award and notification of all interested parties. The Contractor shall arrange to have the Job Superintendent and all prime Subcontractors present at the meeting. During the Pre-Construction Meeting, the construction procedures and information necessary for submitting payment requests will be discussed and materials distributed along with any other pertinent information.

1. Minutes: Designer will record and distribute meeting minutes.

B. Progress Meetings: The Owner's Construction Representative will conduct Monthly Progress Meetings as stated in Articles 1.8.B and 1.8.C of Section 007213 "General Conditions".

1. Minutes: Designer will record and distribute to Contractor the meeting minutes.

C. Preinstallation Conferences: Contractor shall conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of Manufacturers and Fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Designer and Construction Representative of scheduled meeting dates.

2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration including requirements for the following:

a. Contract Documents

b. Options

c. Related RFIs

d. Related 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

z. Utility interruptions and/or shutdowns

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.

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.

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 – SCHEDULES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

PART 2 - PRODUCTS – (Not Applicable)

PART 3 - EXECUTION

3.1 SUBMITTAL PROCEDURES

A. The Contractor shall submit to the Designer, within ten (10) working days following the Notice to Proceed, a Progress Schedule including Schedule of Values showing the rate of progress the Contractor agrees to maintain and the order in which he proposed to carry out the various phases of Work. No payments shall be made to the Contractor until the Progress Schedule has been approved by the Owner.

1. The Schedule of Values must have the following line items included with the value of the item as indicated below:
    a. Plumbing Equipment
    b. Piping Material and Insulation
    c. Testing, Adjusting, and Balancing for HVAC
    d. Direct Digital Control System for HVAC
    e. HVAC Ducts and Insulation
    f. Air Outlets and Inlets
    g. Mechanical Equipment
    h. Panelboards
    i. 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
    j. 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

k. 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.

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. Generator, Switchgear, and Transformer lead times

4. Un-interruptible services

5. Site restrictions

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. Deliveries

5. Installation

6. 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. Completion of site work

b. Completion of the electrical portion of the Work

c. Substantial Completion

3.3 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. Quality Assurance Submittals
4. Operating and Maintenance Manuals
5. 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 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.

1.7 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
133200	Schedules	Construction Schedule
133200	Schedules	Schedule of Values
133200	Schedules	List of Subcontractors
133200	Schedules	Major Material Suppliers
220517	Sleeves and Sleeve Seals for Plumbing Piping	Product Data
220523	General Duty Valves for Plumbing Piping	Product Data
220529	Hangers and Supports for Plumbing Piping and Equipment	Product Data
220553	Identification for Plumbing Piping and Equipment	Product Data
220719	Plumbing Piping Insulation	Product Data
221005	Plumbing Piping	Product Data
221006	Plumbing Piping Specialties	Product Data
223000	Plumbing Equipment	Product Data
223000	Plumbing Equipment	Shop Drawings
223000	Plumbing Equipment	Operation / Maintenance Manual
223000	Plumbing Equipment	Warranty
230529	Hangers and Supports for HVAC Piping and Equipment	Product Data
230553	Identification for HVAC Piping and Equip-ment	Product Data
230593	Testing, Adjusting, and Balancing for HVAC	Product Data
230593	Testing, Adjusting, and Balancing for HVAC	Certification
230593	Testing, Adjusting, and Balancing for	Test Report

	HVAC	
230713	Duct Insulation	Product Data
230923	Direct Digital Control System for HVAC	Product Data
230923	Direct Digital Control System for HVAC	Shop Drawings
230923	Direct Digital Control System for HVAC	Operation / Maintenance Manual
230993	Sequence of Operations for HVAC Controls	Product Data
233100	HVAC Ducts and Casings	Product Data
233300	Air Duct Accessories	Product Data
233700	Air Outlets and Inlets	Product Data
233700	Air Outlets and Inlets	Shop Drawings
235400	Furnaces	Product Data
235400	Furnaces	Shop Drawings
235400	Furnaces	Operation / Maintenance Manual
235400	Furnaces	Warranty
235533	Fuel Fired Unit Heaters	Product Data
235533	Fuel Fired Unit Heaters	Shop Drawings
235533	Fuel Fired Unit Heaters	Operation / Maintenance Manual
235533	Fuel Fired Unit Heaters	Warranty
237413	Packaged Outdoor Central Station Air Handling Units	Product Data
237413	Packaged Outdoor Central Station Air Handling Units	Shop Drawings
237413	Packaged Outdoor Central Station Air Handling Units	Operation / Maintenance Manual
237413	Packaged Outdoor Central Station Air Handling Units	Warranty
238239	Unit Heaters	Product Data
238239	Unit Heaters	Shop Drawings
238239	Unit Heaters	Operation / Maintenance Manual
238239	Unit Heaters	Warranty
260519	Low-Voltage Electrical Power Conductors and Cables	Product Data
260526	Grounding and Bonding for Electrical Systems	Product Data
260529	Hangers and Supports for Electrical Systems	Product Data
260533.13	Conduit for Electrical Systems	Product Data
260533.13	Conduit for Electrical Systems	Shop Drawings
260533.16	Boxes for Electrical Systems	Product Data
260553	Identification for Electrical Systems	Product Data
262416	Panelboards	Product Data
262416	Panelboards	Shop Drawings
262726	Wiring Devices	Product Data

END OF SECTION 013300

SECTION 013513.16 - SITE SECURITY AND HEALTH REQUIREMENTS (DOC)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUBMITTALS

A. List of required submittals:

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

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 ACCESS TO THE SITE

A. The Contractor shall arrange with Facility Representatives to establish procedures for the controlled entry of workers and materials into the work areas at the Facility.

B. The Contractor shall establish regular working hours with Facility Representatives. The Contractor must report changes in working hours or overtime to Facility Representatives and obtain approval twenty-four (24) hours ahead of time. The Contractor shall report emergency overtime to Facility Representatives as soon as it is evident that overtime is needed. The Contractor must obtain approval from Facility Representatives for all work performed after dark.

C. The Contractor shall provide the name and phone number of the Contractor’s employee or agent who is in charge onsite; this individual must be able to be contacted in case of emergency. The Contractor must be able to furnish names and address of all employees upon request.

D. The Contractor shall provide Facility Representatives notice twenty-four (24) hours prior to any possible vehicle entry and/or required escort. The Contractor shall maintain a time log of any delays in gaining entrance to the Facility due to lack of an escort, which is to be submitted monthly with the Contractor’s pay request materials. The purpose of this log is to establish a basis for a contract change, if required. The log shall contain the date and time of delay, date and time of request of entry, workers delayed (name and occupation), and name of the Facility Representative to whom the request was made, if possible. Any delay in entry must be

validated by sallyport and pass office personnel at the Facility. Only delays greater than thirty (30) minutes will be considered for a contract change. A 30-minute delay upon arrival with a vehicle to enter the sallyport should be expected.

3.2 RULES OF THE FACILITY

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

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

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

3.3 SECURITY CLEARANCES AND RESTRICTIONS

A. DOC SECURITY CLEARANCE REQUIREMENTS

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

3.4 FIRE PROTECTION, SAFETY, AND HEALTH CONTROLS

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

1. Onsite burning is prohibited.
2. The Contractor shall store all flammable or hazardous materials in proper containers

located outside the buildings or offsite, if possible.

3. The Contractor shall provide and maintain, in good order, during construction fire extinguishers as required by the National Fire Protection Association. In areas of flammable liquids, asphalt, or electrical hazards, 15-pound carbon dioxide or 20-pound dry chemical extinguishers shall be provided.

B. The Contractor shall not obstruct streets or walks without permission from the Owner's Construction Representative and Facility Representatives.

C. The Contractor's personnel shall not exceed the speed limit of 15 mph while at the Facility unless otherwise posted.

D. The Contractor shall take all necessary, reasonable measures to reduce air and water pollution by any material or equipment used during construction. The Contractor shall keep volatile wastes in covered containers, and shall not dispose of volatile wastes or oils in storm or sanitary drains.

E. The Contractor shall keep the project site neat, orderly, and in a safe condition at all times. The Contractor shall immediately remove all hazardous waste, and shall not allow rubbish to accumulate. The Contractor shall provide onsite containers for collection of rubbish and shall dispose of it at frequent intervals during the progress of the Work.

F. Fire exits, alarm systems, and sprinkler systems shall remain fully operational at all times, unless written approval is received from the Owner's Construction Representative and the appropriate Facility Representative at least twenty-four (24) hours in advance. The Contractor shall submit a written time schedule for any proposed shutdowns.

G. For all hazardous materials brought onsite, Material Safety Data Sheets shall be on site and readily available upon request at least a day before delivery.

H. The Contractor's workers shall not be under the influence of any intoxicating substances while on the Facility premises.

3.5 TUBERCULOSIS TESTING REQUIREMENTS

A. All workers who will be in the confines of the Facility for more than ten (10) consecutive working days must provide proof of a negative tuberculin skin test. The test results must be no more than six (6) months old at the commencement of construction. The Contractor or the worker, not the Owner, shall pay the cost of the test.

B. The Contractor shall submit to Facility Representatives current tuberculin skin test results for all workers who are required to have such a test in accordance with paragraph A above. If the contract period extends for more than twelve (12) months, the Contractor must provide new test results for all workers prior to the anniversary of the contract commencement date.

C. Any worker required to have a tuberculin skin test under paragraph A above who fails or refuses to do so will be denied admission to the facility until such time as proof of the test results are provided.

D. If any worker has a tuberculin skin test with positive results, the worker shall be denied access

to the facility until the worker produces a certification from a physician licensed to practice in the State of Missouri that the worker does not have infectious tuberculosis.

E. The Contractor shall not be entitled to any additional time or compensation if any of its workers are denied access to the facility because of failure to produce negative tuberculin skin test results.

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

3.6 PREA FOR CONTRACTORS AND EMPLOYEES

A. The contractor and all of the contractor's employees and agents providing services in any Department of Corrections institution must be at least 18 years of age. A Missouri Uniform Law Enforcement System (MULES) check or other background investigation may be required on the contractor, the contractor's employees and agents before they are allowed entry into the institution. The contractor, its employees and agents understand and agree that the Department may complete criminal background records checks annually for the contractor and the contractor's employees and agents that have the potential to have contact with inmates.

B. The institution shall have the right to deny access into the institution for the contractor and any of the contractor's employees and agents for any reason, at the discretion of the institution.

C. The contractor, its employees and agents under active federal or state felony or misdemeanor supervision must receive written division director approval prior to providing services pursuant to a Department contract. Similarly, contractors/employees/agents with prior felony convictions and not under active supervision must receive written division director approval in advance.

D. The contractor, its employees and agents shall at all times observe and comply with all applicable state statutes, Department rules, regulations, guidelines, internal management policies and procedures, and general orders of the Department that are applicable, regarding operations and activities in and about all Department property. Furthermore, the contractor, its employees and agents, shall not obstruct the Department or any of its designated officials from performing their duties in response to court orders or in the maintenance of a secure and safe correctional environment. The contractor shall comply with the Department's policies and procedures relating to employee conduct.

1. The Department has a zero tolerance policy for any form of sexual misconduct to include staff/contractor/volunteer on offender, or offender on offender, sexual harassment, sexual assault, sexual abuse and consensual sex.

    a. Any contractor or contractor's employee or agent who witnesses any form of sexual misconduct must immediately report it to the warden of the institution. If a contractor or contractor's employee or agent fails to report or knowingly condones sexual harassment or sexual contact with or between offenders, the Department may cancel the contract, or at the Department's sole discretion, require the contractor to remove the employee/agent from providing services under the contract.
    b. Any contractor or contractor's employee or agent who engages in sexual abuse

shall be prohibited from entering the institution and shall be reported to law enforcement agencies and licensing bodies, as appropriate.

E. The contractor, its employees and agents shall not interact with the offenders except as is necessary to perform the requirements of the contract. The contractor, its employees and agents shall not give anything to nor accept anything from the offenders except in the normal performance of the contract.

F. If any contractor or contractor's employee or agent is denied access into the institution for any reason or is denied approval to provide service to the Department for any reason stated herein, it shall not relieve the contractor of any requirements of the contract. If the contractor is unable to perform the requirements of the contract for any reason, the contractor shall be considered in breach.

3.7 DISRUPTION OF UTILITIES

A. The Contractor shall give a minimum of seventy-two (72) hours written notice to the Construction Representative and the Facility Representative before disconnecting electric, gas, water, fire protection, or sewer service to any building.

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

3.8 CELL PHONES AND ELECTRONIC DEVICES

A. Cell Phones, pagers, smart watches (that can send/receive messages), fitness wrist bands (that can send/receive messages) or other electronic devices are not permitted.

1. Contractors, repairpersons, or information technology services department staff may be permitted to bring in a cell phone and portable wireless router (Wi-Fi, MiFi, etc.) if approved by the Chief Administrative Officer (CAO) when the phone is necessary to complete job duties relating to repairs on a case by case basis.
2. Tables (IPad, etc.) are not allowed with the exception of for re-entry purposes approved via the division of adult institutions (DAI) director and the re-entry manager.
3. Laptop computers may be permitted by the CAO on a case by case basis.

3.9 PROTECTION OF PERSONS AND PROPERTY

A. SAFETY PRECAUTIONS AND PROGRAMS

1. The Contractor shall at all times conduct operations under this Contract in a manner to avoid the risk of bodily harm to persons or risk of damage to any property. The Contractor shall promptly take precautions which are necessary and adequate against conditions created during the progress of the Contractor's activities hereunder which involve a risk of bodily harm to persons or a risk of damage to property. The Contractor shall continuously inspect Work, materials, and equipment to discover and determine any

such conditions and shall be solely responsible for discovery, determination, and correction of any such conditions. The Contractor shall comply with applicable safety laws, standards, codes, and regulations in the jurisdiction where the Work is being performed, specifically, but without limiting the generality of the foregoing, with rules regulations, and standards adopted pursuant to the Williams-Steiger Occupational Safety and Health Act of 1970 and applicable amendments.

2. All contractors, subcontractors and workers on this project are subject to the Construction Safety Training provisions 292.675 RSMo.
3. In the event the Contractor encounters on the site, material reasonably believed to be asbestos, polychlorinated biphenyl (PCB), lead, mercury, or other material known to be hazardous, which has not been rendered harmless, the Contractor shall immediately stop Work in the area affected and report the condition to the Owner's Representative and the Architect in writing. The Work in the affected area shall not thereafter be resumed except by written agreement of the Owner's Representative and Contractor if in fact the material is asbestos or polychlorinated biphenyl (PCB) and has not been rendered harmless. The Work in the affected area shall be resumed in the absence of asbestos or polychlorinated biphenyl (PCB), or when it has been rendered harmless by written agreement of the Owner's Representative and the Contractor. “Rendered Harmless” shall mean that levels of such materials are less than any applicable exposure standards, including but limited to OSHA regulations.

B. SAFETY OF PERSONS AND PROPERTY

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

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

2. The Contractor shall give notices and comply with applicable laws, standards, codes, ordinances, rules, regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury, or loss.
3. The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, safeguards for safety and protection, including, but not limited to, posting danger signs and other warnings against hazards, promulgating safety regulations, and notifying owners and users of adjacent sites and utilities.
4. When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise the highest degree of care and carry on such activities under supervision of properly qualified personnel.
5. The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in this Section caused in whole or in part by the Contractor, a Subcontractor of any tier, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable, and for which the Contractor is responsible under this

Section, except damage or loss attributable solely to acts or omissions of Owner or the Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's other obligations stated elsewhere in the Contract.

6. The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents, and the maintaining, enforcing and supervising of safety precautions and programs. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner's Representative and Architect. The Contractor shall hold regularly scheduled safety meetings to instruct Contractor personnel on safety practices, accident avoidance and prevention, and the Project Safety Program. The Contractor shall furnish safety equipment and enforce the use of such equipment by its employees and its subcontractors of any tier.
7. The Contractor shall not load or permit any part of the construction or site to be loaded so as to endanger its safety.
8. The Contractor shall promptly report in writing to the Owner all accidents arising out of or in connection with the Work which cause death, lost time injury, personal injury, or property damage, giving full details and statements of any witnesses. In addition, if death, serious personal injuries, or serious property damages are caused, the accident shall be reported immediately.
9. The Contractor shall promptly notify in writing to the Owner of any claims for injury or damage to personal property related to the work, either by or against the Contractor.
10. The Owner assumes no responsibility or liability for the physical condition or safety of the Work site or any improvements located on the Work site. The Contractor shall be solely responsible for providing a safe place for the performance of the Work. The Owner shall not be required to make any adjustment in either the Contract Sum or Contract Time concerning any failure by the Contractor or any Subcontractor to comply with the requirements of this Paragraph.
11. In no event shall the Owner have control over, charge of, or any responsibility for construction means, methods, techniques, sequences or procedures or for safety precautions and programs in connection with the Work, notwithstanding any of the rights and authority granted the Owner in the Contract Documents.
12. The Contractor shall maintain at his own cost and expense, adequate, safe and sufficient walkways, platforms, scaffolds, ladders, hoists and all necessary, proper, and adequate equipment, apparatus, and appliances useful in carrying on the Work and which are necessary to make the place of Work safe and free from avoidable danger for clients, staff, the public and construction personnel, and as may be required by safety provisions of applicable laws, ordinances, rules regulations and building and construction codes.

END OF SECTION 013513.16

SECTION 015000 – CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes requirements for construction facilities and temporary controls including temporary utilities, support facilities, security, and protection.

B. Temporary utilities include, but are not limited to, the following:

1. Water service and distribution
2. Temporary electric power and light
3. Sanitary facilities, including drinking water
4. Ventilation
5. Temporary Heat

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

1. Field offices and storage sheds
2. Temporary enclosures
3. Temporary project identification signs and bulletin boards
4. Waste disposal services
5. 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 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. Police, fire department, and rescue squad rules

4. 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.

1.4 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. 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. Temporary Offices: Provide prefabricated or mobile units or similar job-built construction with lockable entrances, operable windows, and serviceable finishes. Provide heated and air-conditioned units on foundations adequate for normal loading.

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. 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 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.

F. 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.

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.

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. Storage Facilities: Limited areas for storage of building materials are available onsite. The Contractor shall provide his own security. Specific locations for storage and craning operations will be discussed at the Pre-Bid Meeting and the Pre-Construction Meeting.

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

D. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities.

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

F. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than seven (7) days during normal weather or three (3) days when the temperature is expected to rise above 80°F (27°C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material lawfully.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

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

B. 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.

C. 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.

D. 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.

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.

3.6 TEMPORARY HOT WATER SYSTEM

A. General: Contractor shall provide temporary hot water systems for Housing Units One and Two while the hot water system is being upgraded. Facilities shall not be without domestic hot water for longer than 24-hours.

B. Contractor shall furnish and install all utility hookups for temporary hot water system including but not limited to: Domestic water piping extensions, natural gas piping extension, electrical power connections. All temporary hot water infrastructure shall be removed after new hot water system is installed and operating.

C. Temporary hot water system shall be installed in secure location as deemed by owner.

D. Temporary hot water system shall be capable of producing 600 MBH of hot water heat and equipped with 500 gallons of storage. Temporary hot water system shall tie into the existing hot water system seamlessly.

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 once 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.

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 labels that are not permanent labels.
6. 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.
7. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
8. 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.

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 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.

1.5 COORDINATION

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

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

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

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

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

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

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

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

2. Documentation: Review the following items in detail:

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

3. Emergencies: Include the following, as applicable:

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

4. Operations: Include the following, as applicable:

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

5. Adjustments: Include the following:

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

6. Troubleshooting: Include the following:

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

7. Maintenance: Include the following:

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

8. Repairs: Include the following:

a. Diagnosis instructions.
b. Repair instructions.

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

PART 3 - EXECUTION

3.1 PREPARATION

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

END OF SECTION 017900

SECTION 033000
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete formwork.

B. Floors and slabs on grade.

C. Concrete reinforcement.

D. Joint devices associated with concrete work.

E. Miscellaneous concrete elements, including equipment pads and light pole bases.

F. Concrete curing.

1.02 RELATED REQUIREMENTS

A. Section 079200 - Joint Sealants: Products and installation for sealants and joint fillers for saw cut joints and isolation joints in slabs.

1.03 REFERENCE STANDARDS

A. ACI PRC-302.1 - Guide to Concrete Floor and Slab Construction; 2015.

B. ACI PRC-304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000 (Reapproved 2009).

C. ACI PRC-308 - Guide to External Curing of Concrete; 2016.

D. ACI SPEC-301 - Specifications for Concrete Construction; 2020.

E. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.

F. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2023.

G. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2023.

H. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.

I. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2022.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.

C. Mix Design: Submit proposed concrete mix design.

PART 2 PRODUCTS

2.01 FORMWORK

A. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
   1. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.

2.02 REINFORCEMENT MATERIALS

2.03 CONCRETE MATERIALS

A. Cement: ASTM C150/C150M, Type I - Normal Portland type.

B. Fine and Coarse Aggregates: ASTM C33/C33M.

C. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

2.04 BONDING AND JOINTING PRODUCTS

A. Slab Isolation Joint Filler: 1/2-inch (13 mm) thick, height equal to slab thickness, with removable top section forming 1/2-inch (13 mm) deep sealant pocket after removal.

B. Slab Construction Joint Devices: Combination keyed joint form and screed, galvanized steel, with rectangular or round knockout holes for conduit or rebar to pass through joint form at 6 inches (150 mm) on center; ribbed steel stakes for setting.

2.05 CONCRETE MIX DESIGN

A. Normal Weight Concrete:
   1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 3,000 pounds per square inch (20.7 MPa).

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

A. Formwork: Comply with requirements of ACI SPEC-301. Design and fabricate forms to support all applied loads until concrete is cured and for easy removal without damage to concrete.

B. Verify that forms are clean and free of rust before applying release agent.

C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

D. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in according to bonding agent manufacturer's instructions.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

A. Comply with requirements of ACI SPEC-301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

B. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.

C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

3.04 PLACING CONCRETE

A. Place concrete in accordance with ACI PRC-304.

B. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

3.05 SLAB JOINTING

A. Locate joints as indicated on drawings.

B. Anchor joint fillers and devices to prevent movement during concrete placement.

C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.

D. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 3/16 inch (5 mm) thick blade and cut at least 1 inch (25 mm) deep but not less than one quarter (1/4) the depth of the slab.

E. Construction Joints: Where not otherwise indicated, use metal combination screed and key form, with removable top section for joint sealant.

3.06 CONCRETE FINISHING

A. Concrete Slabs: Finish to requirements of ACI PRC-302.1 and as follows:

1. Other Surfaces to Be Left Exposed: Trowel as described in ACI PRC-302.1, minimizing burnish marks and other appearance defects.

3.07 CURING AND PROTECTION

A. Comply with requirements of ACI PRC-308. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

END OF SECTION

SECTION 075000
EXISTING ROOFING WARRANTY

PART 1 GENERAL

1.01 WARRANTY

A. The contractor shall maintain the existing warranty for all new roof penetrations. Attached is the current roofing warranties for the facilities roofs applicable to this project.

1. Powerhouse
2. Segregation
3. Cafeteria

ELEVATE

CONTRACT SUMMARY

Warranty No: 700458840
Project No: 4502899
Start Date: 03/20/2024
Issue Date: 05/10/2024

Building Identification: Ozark Correctional Center - Power Plant Building
Building Address: 929 Honor Camp Ln, Fordland, MO 65652-7200
Building Owner: STATE OF MISSOURI, OA-FMDC
Roofing Contractor: WATKINS ROOFING INC, 40000286

Power Plant Bldg

Red Shield - TPO - 20 Year - 72 mph	**Square Footage: 1,852**
Metal Paint Finish - TPO - 35 Year	**Square Footage: 1,852**

THIS WARRANTY INSTRUMENT CONSISTS OF MULTIPLE PAGES, ALL OF WHICH ARE PART OF THIS DOCUMENT.
ADDITIONAL REQUIREMENTS ARE DEFINED ON SUBSEQUENT PAGES.

ELEVATE

GENERAL TERMS, CONDITIONS, AND LIMITATIONS

Warranty No: 700458840
Project No: 4502899
Start Date: 03/20/2024
Issue Date: 05/10/2024

Building Identification: Ozark Correctional Center - Power Plant Building
Building Address: 929 Honor Camp Ln, Fordland, MO 65652-7200
Building Owner: STATE OF MISSOURI, OA-FMDC
Installing Contractor: WATKINS ROOFING INC, 40000286

Subject to the terms, conditions, and limitations set forth herein, Holcim Solutions and Products US, LLC, an Indiana limited liability company ("Holcim"), provides the Building Owner ("Owner") named above with this Limited Warranty for the Holcim provided Elevate System(s) or Material(s) set forth herein. This Warranty consists of multiple pages, all of which comprise the express terms and conditions of the warranty herein. Additional requirements, terms, conditions, exceptions, and limitations are defined in subsequent pages. In the event that any inconsistencies exist between the General Terms, Conditions, and Limitations listed below and the Terms, Conditions, and Limitations in subsequent pages, the subsequent pages will prevail.

GENERAL TERMS, CONDITIONS, AND LIMITATIONS

Payment Required. Holcim shall have no obligation under this Limited Warranty unless and until Holcim and the licensed Elevate applicator have been paid in full for all materials, supplies, services, approved written change orders, warranty costs, and other costs which are included in, or incidental to, the System or Materials. In the event that repairs not covered by this Limited Warranty are necessary, Holcim reserves the right to suspend this Limited Warranty until such repairs have been completed and the licensed Elevate applicator and/or Holcim has been paid in full for such repairs.
Exclusions. Holcim shall have no obligation under this Limited Warranty, or any other liability, now or in the future, if a claim or damage is caused by: Natural forces, disasters, or acts of God including, but not limited to, fires, hurricanes, tornadoes, downbursts, wind-blown debris, lightning, earthquakes, volcanic activity, atomic radiation, insects or animals; Act(s), conduct or omission(s) by any person, or act(s) of war, terrorism or vandalism, which damage the System or Material or which impair the System or Material's ability to perform properly; Failure by the Owner to use reasonable care in maintaining the System or Material, said maintenance to include, but not be limited to, those items listed in the current version of the Elevate Building Owner's Manual available at www.holcimelevate.com in the Building Owner's Toolbox; Deterioration, defects or failure of building components, including, but not limited to, the substrates, structural elements, walls, mortar, HVAC units, skylights, foundation settlement, etc.; Construction generated moisture, condensation or infiltration of moisture in, from, through, or around the walls, copings, rooftop hardware or equipment, skylights, building structure or underlying or surrounding materials; Acid, oil, harmful chemicals, or the reaction between them; Alterations or repairs to the System or Materials that are not completed in accordance with Holcim's published specifications, not completed by a licensed Elevate applicator and/or completed without proper notice to Holcim; The design of the System: Holcim does not undertake any analysis of the architecture or engineering required to evaluate what type of System, Installation or Material is appropriate for a building and makes no warranty express or implied as to the suitability of its Products for any particular structure; such a determination is the responsibility of the architect, engineer or design professional; Improper selection of materials for the assembly or the failure to accurately calculate wind uplift and/or applicable design loads; Deterioration to metal materials and accessories caused by marine salt water, atmosphere, or by regular spray of either salt or fresh water; Failure of any materials not manufactured or provided by Holcim used in the Elevate System or Installation not specifically accepted in writing by Holcim to be included in coverage; Change in building use or purpose; Failure by the licensed Elevate applicator or any additional contractor or subcontractor to follow Holcim's recommended installation instructions or approved specifications or drawings for the layout, design and installation of the System or Materials. It shall be the licensed Elevate applicator's sole and exclusive responsibility to strictly follow Holcim's recommended installation instructions or approved specifications or drawings for the layout, design and installation of the System or Materials; or, Failure to correct all installation deficiencies listed in any Holcim inspection report.
Overburden. Owner shall be responsible for the costs associated with the removal and replacement, as well as any damage caused by the removal and replacement, of any overburden, superstrata or overlays, either permanent or temporary, which include but are not limited to: structures or assemblies added after installation, fixtures or utilities on or through the System or Material, support platforms or bases for Photovoltaic (PV) Arrays (aka - Solar Panels), Garden Roofs, Decks, Patios or any other obstacles that impede access, clear observation, investigation, and repair of the System or Materials, excluding ballast or pavers accepted by Holcim or overburden specifically included in subsequent pages of this Limited Warranty.
Term. The term of this Limited Warranty shall be for the period set forth above and in subsequent pages of this document and shall not be extended under any circumstances without Holcim's written approval.
Access. During the term of this Limited Warranty, Holcim's employees or designees shall have free access to the building for inspection, audit, or repair purposes during regular business hours with reasonable advance notice. In the event that access is limited due to security, tenant concerns or other restrictions, Owner shall reimburse Holcim for all reasonable costs incurred during inspection and/or repair of the System or Material that are due to delays associated with said restrictions.
Waiver & Severability. Holcim's failure to enforce any of the terms or conditions stated herein shall not be construed as a waiver of such provision or of any other terms and conditions of this Limited Warranty. If any portion of this Limited Warranty is held by a court of competent jurisdiction to be invalid, void, or unenforceable, the remaining provisions shall nevertheless continue in full force to the fullest extent permitted by law.
Disputes. Any dispute, controversy, or claim between Owner and Holcim concerning this Limited Warranty or relating to any material(s) supplied by or required by Holcim shall be submitted to mediation in Davidson County, Tennessee. In the event that Owner and Holcim do not resolve the dispute, controversy, or claim in mediation, Owner and Holcim agree that neither party will commence or prosecute any suit, proceeding, or claim other than in the state and federal courts in Davidson County, Tennessee. Each party irrevocably consents to the jurisdiction and venue of the above-identified courts. Owner hereby releases Holcim from all liability to Owner's insurance carrier or to anyone claiming under or through Owner by reason of subrogation or otherwise.
Governing Law. This Limited Warranty shall be governed by and construed in accordance with the laws of the state of Tennessee without regard to its rules on conflicts of laws.

HOLCIM DOES NOT WARRANT PRODUCTS INCORPORATED OR UTILIZED IN THIS INSTALLATION THAT WERE NOT FURNISHED BY HOLCIM. HOLCIM SPECIFICALLY DISCLAIMS LIABILITY UNDER ANY THEORY OF LAW ARISING OUT OF THE INSTALLATION OF, PERFORMANCE OF, OR DAMAGES SUSTAINED BY OR CAUSED BY, PRODUCTS NOT FURNISHED BY HOLCIM. THIS LIMITED WARRANTY SUPERSEDES AND IS IN LIEU OF ALL OTHER WARRANTIES EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND HOLCIM HEREBY DISCLAIMS ALL SUCH WARRANTIES. THIS LIMITED WARRANTY SHALL BE OWNER'S SOLE AND EXCLUSIVE REMEDY AGAINST HOLCIM AND HOLCIM SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL, SPECIAL, INCIDENTAL OR OTHER DAMAGES INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS OR DAMAGES TO THE BUILDING OR ITS CONTENTS, SUBSTRATES, OR THE ROOF DECK. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU. THIS LIMITED WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE. THIS LIMITED WARRANTY CANNOT BE AMENDED, ALTERED OR MODIFIED IN ANY WAY EXCEPT IN WRITING SIGNED BY AN AUTHORIZED OFFICER OF HOLCIM. NO OTHER PERSON HAS ANY AUTHORITY TO BIND HOLCIM WITH ANY REPRESENTATION OR WARRANTY WHETHER ORAL OR WRITTEN.

THIS WARRANTY INSTRUMENT CONSISTS OF MULTIPLE PAGES, ALL OF WHICH ARE PART OF THIS DOCUMENT.
ADDITIONAL REQUIREMENTS ARE DEFINED ON SUBSEQUENT PAGES.

26 Century Blvd., Suite 205, Nashville, Tennessee 37214
800-428-4442 www.holcimelevate.com

ELEVATE

RED SHIELD™ ROOFING SYSTEM LIMITED WARRANTY

Warranty No: 700458840
Project No: 4502899
Start Date: 03/20/2024
Issue Date: 05/10/2024

Building Identification: Ozark Correctional Center - Power Plant Building
Building Address: 929 Honor Camp Ln, Fordland, MO 65652-7200
Building Owner: STATE OF MISSOURI, OA-FMDC
Roofing Contractor: WATKINS ROOFING INC, 40000286

Power Plant Bldg

Red Shield - TPO - 20 Year - 72 mph **Square Footage: 1,852**

Holcim Solutions and Products US, LLC, an Indiana limited liability company ("Holcim"), warrants to the Building Owner ("Owner") named above that Holcim will, subject to the Terms, Conditions, and Limitations set forth herein, provide labor and material during the Warranty Period to repair any leak in the Elevate Roofing System ("System") caused by: normal weathering, manufacturing defects, or workmanship in the application of the System.

TERMS, CONDITIONS, AND LIMITATIONS

Products Covered. The System shall mean only the Elevate branded roofing membranes, Elevate branded roofing insulations, Elevate branded roofing metal, and other Elevate branded roofing accessories when installed in accordance with Holcim's technical specifications by a licensed Elevate applicator. Any materials not manufactured or supplied by Holcim are not covered under this Limited Warranty.
Notice. In the event any leak occurs in the System, Owner must give notice in writing or by telephone to Holcim Warranty Services ("Warranty Services") within thirty (30) days of the occurrence of the leak. By so notifying Holcim, Owner authorizes Holcim or its designee to investigate the cause of the leak at its option.
Investigation. Should the investigation reveal that the leak is excluded under the Terms, Conditions, and Limitations set forth herein, Owner shall be responsible for payment of the investigation costs. Failure by Owner to pay for these costs shall render this Limited Warranty null and void. Owner is responsible for completing repairs not covered by this Limited Warranty. Failure by Owner to repair unwarranted leaks in a reasonable manner using a licensed Elevate applicator and within 60 days shall render this Limited Warranty null and void.
No Dollar Limit (NDL). If upon investigation, Holcim determines that the leak is not excluded under the Terms, Conditions, and Limitations set forth herein, Owner's sole and exclusive remedy and Holcim's total liability shall be limited to the repair of the leak. There is no dollar limit placed on the cost to repair a warranted leak.
Exclusions. Holcim shall have no obligation to repair a leak or damage caused by: Hail; Winds of peak gust speed at or in excess of 72 mph calculated at ten (10) meters above ground using available meteorological data (all associated building components, including but not limited to the deck substrate, joists, columns and foundation, must also meet wind speed design requirements); Roof traffic or storage of materials or equipment on the roof not specifically accepted in writing by Holcim; Any leak caused by the breach, rupture, or failure of any building envelope component not covered under this Limited Warranty; or, Failure to properly notify Holcim Warranty Services as set forth herein.
Transfer. This Limited Warranty shall be transferable and assignable subject to Owner's payment of the current transfer fee set by Holcim.
Alteration. Owner shall notify Holcim in writing upon making any alterations to the System, or installing any structures, fixtures, or utilities on or through the System after installation, including, but not limited to: Photovoltaic (PV) Arrays, Garden Roofs, Decks, Patios, and areas intended for public access. Failure to obtain Holcim's approval for a roof alteration, or failure to provide required documentation, shall render this Limited Warranty null and void.

HOLCIM SOLUTIONS AND PRODUCTS US, LLC
By: Michael Huber

Authorized Signature: Michael Huber

Title: Director of Warranty Services

ELEVATE

UNA-CLAD™ METAL PAINT FINISH LIMITED WARRANTY

Warranty No: 700458840
Project No: 4502899
Start Date: 03/20/2024
Issue Date: 05/10/2024

Building Identification: Ozark Correctional Center - Power Plant Building
Building Address: 929 Honor Camp Ln, Fordland, MO 65652-7200
Building Owner: STATE OF MISSOURI, OA-FMDC
Installing Contractor: WATKINS ROOFING INC, 40000286

Power Plant Bldg

Metal Paint Finish **Square Footage: 1,852**

Holcim Solutions and Products US, LLC, an Indiana limited liability company ("Holcim"), warrants to the Building Owner ("Owner") named above that Holcim will, subject to the Terms, Conditions, and Limitations set forth herein, refinish any exterior paint finish ("Finish") during the Warranty Period on the UNA-CLAD™ branded coil-coated metal ("UNA-CLAD Metal") supplied by Holcim as part of the project named above that exhibits any of the following exterior surface conditions measured at the values listed below by group:

1) Loss of Adhesion, including, but not limited to peeling, checking, or cracking, except for crazing or cracking that may occur on formed edges or bends of metal roofing panels and trim, for a term not to exceed thirty-five (35) years.
2) Chalking in excess of the numerical rating listed below, Vertical and Non-Vertical, when measured in accordance with ASTM D 4214 "Standard Methods of Evaluating Degree of Chalking of Exterior Paints," for a term not to exceed thirty (30) years.
3) Fade or change in color in excess of the Vertical rating listed below in color difference units as measured on exposed surfaces that have been cleaned of external deposits and chalk and the corresponding values measured on the original or unexposed painted surfaces when tested in accordance with ASTM D 2244 3.7.1 and 3.8.4, "Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates," for a term not to exceed thirty (30) years.

TERMS, CONDITIONS, AND LIMITATIONS

Group 1: Adhesion - 35 years, Chalk - 30 years at 8, Fade - 30 years at 5:
Almond, Bone White, Cityscape, Colonial Red, Hartford Green, Hemlock Green, Mansard Brown, Medium Bronze, Patina Green, Regal Blue, Sandstone, Sherwood Green, Sierra Tan, Sky Blue, Slate Gray, Stone White, Terra Cotta, Tropical Patina, Burnished Slate, Champagne Metallic, Silver Metallic, Classic Copper

Group 2: Adhesion - 35 years, Chalk - 30 years at 8, Fade - 30 years at 7:
Charcoal Gray, Dark Bronze, Dark Ivy, Extra Dark Bronze, Teal

Group 3: Adhesion - 35 years, Chalk - 20 years at 8, Fade - 20 years at 9:
Brandywine, Matte Black, Regal Red, Electric Blue, Award Blue

Group 4: Adhesion - 30 years, Fade - 30 years at 8:
Premium Pattern Colors

Group 5: Adhesion - 20 years, Chalk - 20 years at 8:
Champagne Metallic, Classic Copper, Silver Metallic, Aged Zinc, *Vintage
*__Note__: ***Vintage finish not warranted in industrial or marine applications.***

Group 6: Adhesion - 20 years, Chalk - 20 years at 8, Fade - 20 years at 5:
*Flurothane® Coastal (all colors)
*__Note:__ ***Flurothane Coastal finish is the only paint finish warrantable within 1,500 feet of a saltwater environment.***

__Products Covered.__ This Metal Paint Finish Limited Warranty ("Limited Warranty") is limited exclusively to metal roofing panels and wall panel or metal trim fabricated from UNA-CLAD Metal and installed in accordance with Holcim's technical specifications by a licensed Elevate applicator. Any materials not manufactured or supplied by Holcim are not covered under this Limited Warranty.
__Notice.__ In the event that any peeling, checking, cracking, chalking, fading, or color change of the Finish occurs, Owner must give notice to Holcim Warranty Services ("Warranty Services") in writing or by telephone within thirty (30) days of such occurrence. By so notifying Holcim , Owner authorizes Holcim or its designee to investigate the condition of the Finish at its option. Holcim will have no obligation to refinish any area(s) of the UNA-CLAD Metal if Owner fails to give proper notice to Holcim Warranty Services as set forth herein. Notifying Installing Contractor, a local contractor, or and Elevate Sales Representative does not constitute notice to Holcim Warranty Services as required by this section. Owner agrees to retain original proof of purchase of the UNA-CLAD Metal and Elevate packing slip, and to supply the originals upon submitting a claim.
__Investigation.__ Should the investigation reveal that the surface condition of the Finish is excluded under the Terms, Conditions, and Limitations set forth herein, Owner shall be responsible for payment of the investigation costs and shall repair or refinish the UNA-CLAD Metal at Owner's expense within a reasonable time but no more than sixty (60) days from the date of the investigation. Failure by Owner to pay for these costs or to have unwarranted conditions repaired by a licensed Elevate applicator shall render this Limited Warranty null and void.
__Limitations.__ Should the investigation reveal that the surface condition of the Finish is not excluded under the Terms, Conditions, and Limitations set forth herein, Owner's sole and exclusive remedy and Holcim's total liability shall be limited to refinishing of the affected area of the UNA-CLAD Metal determined by Holcim to require refinishing. Any and all refinishing work so performed by Holcim under the Terms of this Limited Warranty shall be performed using any standard finishing practices and materials. Holcim's obligation over the life of this Limited Warranty is limited to Owner's original purchase price of the UNA-CLAD Metal.
__Exclusions.__ Holcim shall have no obligation under this Limited Warranty, or any other liability, for any damage to or deterioration of or failure of the Finish caused by hail; winds; roof traffic or storage of materials or equipment on the roof not specifically accepted in writing by Holcim; standing water or the continuous spray of

***Flurothane is a registered trademark of The Sherwin-Williams Company**

ELEVATE

UNA-CLAD™ METAL PAINT FINISH LIMITED WARRANTY

Warranty No: 700458840
Project No: 4502899
Start Date: 03/20/2024
Issue Date: 05/10/2024

Building Identification: Ozark Correctional Center - Power Plant Building
Building Address: 929 Honor Camp Ln, Fordland, MO 65652-7200
Building Owner: STATE OF MISSOURI, OA-FMDC
Installing Contractor: WATKINS ROOFING INC, 40000286

either salt or fresh water; any installation within 1,500 feet (457 meters) of a saltwater environment (Flurothane Coastal Finish excepted); airborne sand abrasion; metal shavings; surface temperatures that exceed 200 °F (93 °C); any failure caused by the attachment or mounting of any item or device to or near the UNA-CLAD Metal; improper handling during transportation and/or installation, including but not limited to improper storage or placement, surface damage, or failure to remove strippable protective film; or, failure of Owner to perform regular inspections and maintenance of the Metal Panels (see the Elevate Owner's Manual in the Building Owner's Toolbox at ww.holcimelevate.com).

Transfer. This Limited Warranty shall be transferable and assignable subject to Owner's payment of the current transfer fee set by Holcim.

Alteration. Owner shall notify Holcim in writing upon making any alterations to the UNA-CLAD Metal, or installing any structures, fixtures, or utilities on or through the UNA-CLAD Metal after installation, including, but not limited to: Photovoltaic (PV) Arrays, Garden Roofs, Decks, Patios, and areas intended for public access. Failure to obtain Holcim's approval for an alteration to the UNA-CLAD Metal, or failure to provide required documentation, shall render this Limited Warranty null and void.

HOLCIM SOLUTIONS AND PRODUCTS US, LLC
By: Michael Huber

Authorized Signature: Michael Huber

THIS WARRANTY INSTRUMENT CONSISTS OF MULTIPLE PAGES, ALL OF WHICH ARE PART OF THIS DOCUMENT. ADDITIONAL REQUIREMENTS ARE DEFINED ON SUBSEQUENT PAGES.

***Flurothane is a registered trademark of The Sherwin-Williams Company**

WATKINS ROOFING
SINCE 1935

4401 I-70 Drive S.E.
Columbia, MO 65201
Phone: 573-449-2951
Fax: 573-874-0201
watkinsroofing@socket.net

Letter of Transmittal

Date: 07-01-2024

Attn:

Re: Ozark Correctional Center

To:
State of Missouri

We are sending you... ☒ **Attached** ☐ **Under separate cover**

☐ **Plans** ☐ **Specification** ☐ **Addendum**

☐ **Shop Drawings** ☐ **Samples** ☐ **Other**

Qty.	Date	No.	Description
1			DMI Warranty

These are being transmitted to you for the following action(s):

☐ **For Approval** ☐ **Approved as Submitted** ☐ **Revise and Resubmit**
☐ **For Your Use** ☐ **Approved as Noted** ☐ **Resubmit** **Copies**
☒ **Return as Requested** ☐ **For Review & Comment** ☐ **For BIDS due**

REMARKS:

Enclosed are DMI Metal Roofing System Warranties. The Dynaclad System Warranty needs to be signed by the Owner and returned to DMI for final signature. They will send us a fully executed warranty. Please sign and return for us to complete the process.

Thank you.

Signed:

Charlotte Washburn
Office Administrator

June 25, 2024

Watkins Roofing, Inc
4401 I70 Dr SE
Columbia, MO 65201

Reference: Ozark Correctional Center

To whom it may concern,

Enclosed you will find the original copy of the watertight warranty required for the above referenced project. Please take time to read the terms and conditions thoroughly.

Once you have reviewed the terms and conditions your signature is required in the area labeled "Installing Corporation". After you have signed the allotted area forward the warranty to the building owner for their signature in the area labeled "Owner". When both parties have signed in their respective areas return the warranty to DMI for our final signature. DMI will then send the executed warranty back to the installing contractor. This completes the warranty procedure.

All invoices, including final warranty fee, must be paid prior to Dimensional Metals, Inc. executing the Watertight Warranty.

If you have any questions, do not hesitate to call.

Sincerely,

JoEllen Byrne

© GOES 6810

DYNACLAD® KYNAR 500® COATING
25 Year Limited Warranty

Dimensional Metals, Inc. (DMI) warrants for a period of twenty-five (25) years after Customer's shipment of painted products that Dimensional Metal's standard color, Medium Gloss DynaClad coil coatings (Coatings) when applied on Galvalume, HDG-90 steel and aluminum substrate will not:

A. Peel, flake or otherwise lose adhesion to an extent that is apparent on ordinary outdoor visual observation.
B. Change color more than 5 Delta E Units when measured per ASTM D-2244 on clean surface.
C. Chalk more than a number eight (8) rating when measured per ASTMD-4214.

TERMS AND CONDITIONS

1. It is acknowledged that fading or color change may not be uniform if the surfaces are not equally exposed to the sun and elements. DMI recommends that there be a systematic fresh water rinse maintenance program in effect in areas of high salt concentration (such as adjacent to the seashore and/or industrial atmospheres) so as to prevent the accumulation of concentrated mineral deposits.

2. This Limited Warranty covers DMI Coatings exposed to normal atmospheric conditions and specifically excludes corrosive or aggressive atmospheres including direct salt spray. This Limited Warranty shall not apply where coating failure is the result of physical damage resulting from fabrication or embossing operations, corrosion due to cut edge exposure, salt spray, acts of God, vandalism, any negligent acts of the Customer including, but not limited to, improper packaging, storage, shipping, or, installation which prohibit proper drainage of standing water or other such occurrences beyond DMI's control.

3. DMI's liability shall not exceed the Customer's liability and the Customer's exclusive remedy for any breach of this Limited Warranty or failure of the Coatings is strictly limited to the direct cost of refinishing or replacing the failed coated metal. Refinishing of the failed coated metal shall be performed by using standard finishing practices and materials. DMI will, in all instances, be the sole judge as to whether refinishing or replacement of the failed areas is required to fulfill its obligation under this Limited Warranty and reserves the right to approve and negotiate the contract.

4. This Limited Warranty shall not be extended by the refinishing or replacement of the coated material, but the remaining warranty period shall continue in effect and be applicable to the refinished or replaced areas under the terms and conditions of the Limited Warranty.

5. Claims under this Limited Warranty must be presented in writing during the warranty period and within sixty (60) days after Customer becomes aware that any warranted condition has occurred. Time is of the essence and failure to give notice within the specified time shall discharge DMI from any obligations under this Limited Warranty. DMI must be given a reasonable opportunity to an on-site inspection to determine the cause and the corrective action to be taken if it is determined to be a Coating failure.

6. THIS LIMITED WARRANTY IS GIVEN AS THE EXCLUSIVE WARRANTY AND REMEDY, AND DMI DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, DMI SHALL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES. THE CUSTOMER'S EXCLUSIVE REMEDY SHALL BE THAT SET FORTH IN PARAGRAPH 3 FOR ANY CLAIM OF LIABILITY RELATING TO THE COATINGS UNDER NEGLIGENCE, STRICT LIABILITY, BREACH OF WARRANTY, OR ANY OTHER LEGAL THEORY.

7. This Limited Warranty is extended to Customer alone, is nontransferable and non-assignable, and may not be modified or enlarged in its scope by any representative, salesman, agent, or other employee of DMI. Customer shall not permit anyone to claim or imply that this Limited Warranty extends to anyone other than Customer. This condition is a material term of this Limited Warranty and its violation by Customer or its agents or representatives shall release DMI from its obligations hereunder.

8. This Limited Warranty shall be governed by and interpreted in accordance with the laws of the State of Ohio. Jurisdiction and venue for any dispute concerning the roof or this Limited Warranty are fixed in Franklin County, Ohio.

Replace Roofs Multiple Assets – Ozark Correctional Center	**Watkins Roofing, Inc.**	
Project Name	**Sold To**	
929 Honor Camp Lane	**4401 I70 Dr SE**	
Address	**Address**	
Fordland **MO** **65652**	**Columbia** **MO** **65201**	
City **State** **Zip**	**City** **State** **Zip**	
DMI SL2016 system in Dynaclad 24ga Sandstone	**23005267, 5928, 5980, 7992, 24001251**	**03/20/2024**
Material Description	**Invoice/ (Order Number)**	**Effective Date**

Dimensional Metals, Inc.
58 Kleman Drive North - Reynoldsburg, OH 43068 - (740) 927-3633

Signature	**Title**	**Date**
	DPO	6/25/24

Kynar 500® is a registered trademark of Atochem of North America. Hylar 5000® is a registered trademark of Ausimont USA, Inc. DYNACLAD® is a registered trademark of Dimensional Metals, Inc.

LITHO IN U.S.A.

© GOES 6810

GALVALUME SHEET
20 YEAR–6 MONTH
LIMITED WARRANTY

EXCLUSIVE WARRANTY

Dimensional Metals, Inc, 58 Klema Drive North, Reynoldsburg, Oh 43068 ("seller") hereby provides the LIMITED WARRANTY to: Watkins Roofing, Inc. RE: Replace Roofs Multiple Assets – Ozark Correction Center – 03/20/2024 ("Buyer"). Dimensional Metals, Inc. Warrants that, subject to the following provisions, Seller's hot dipped aluminum-zinc alloy- coated Galvalume sheet steel sold for use as steel building, roofing and siding panels, if erected within the Continental United States, WILL NOT rupture, fail structurally, or perforate within a period of 20 years and 6 months after shipment from our facility due to exposure to normal atmospheric conditions.

EXCLUDED ATMOSPHERIC CONDITIONS

This limited warranty DOES NOT APPLY to sheets exposed at any time to corrosive or aggressive atmospheric conditions, including but not limited to:

1. Areas subject to salt-water marine atmospheres or to constant spraying of either salt or fresh water.
2. Areas subject to fallout or exposure to corrosive chemicals, fumes, ash, cement dust or animal waste.
3. Areas subject to water run-off from lead or copper flashings or areas in metallic contact with lead or copper.
4. Conditions/circumstances where corrosive fumes or condensates are generated or released inside the building,

OTHER EXCLUDED SITUATIONS

This warranty DOES NOT APPLY in the event of:

1. Bends less than 2T for sheet thickness 0.030" and thinner and less than 4T for sheet thickness 0.031" and thicker.
2. Slopes of the roof or sections of the roof flatter than 1/4:12.
3. Mechanical, chemical, or other damage sustained during shipment, storage, forming, fabrication, or during or after erection.
4. Forming which incorporates severe reverse bending or which subjects coating to alternate compression and tension.
5. Failure to provide free drainage of water, including internal condensation, from overlaps and all other surfaces of the sheets or panels.
6. Failure to remove debris from overlaps and all other surfaces of the sheets or panels.
7. Damage caused to the metallic coating by improper roll forming, scouring or cleaning procedures.
8. Deterioration of the panels caused by contact with green or wet lumber or wet storage stain caused by water damage or condensation.
9. Presence of damp insulation or other corrosive materials in contact with or close proximity to the panel.
10. This warranty does not apply in the event of deterioration to the panels caused directly or indirectly by panel contact with fasteners. Selection of suitable long-lasting fasteners to be used with Galvalume roofing and siding panels rests solely with the Buyer.

EXCLUSIVE REMEDIES

Buyer's exclusive remedy and Seller's sole liability for breach of this limited warranty shall be limited exclusively to the cost of either repairing nonconforming panels, or at Seller's sole option, of furnishing FOB buyer's plant sufficient sheet product to enable Buyer to fabricate replacement panels for the nonconforming panels.

LIMITATION OF DAMAGES

THE LIABILITY OF THE SELL SHALL NOT EXTEND TO PERSONAL INJURY, PROPERTY DAMAGE, LOSS OF PROFIT, DELAY OR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM THE FAILURE OF ANY SHEET TO CONFORM WITH THE PROVISIONS OF THIS LIMITED WARRANTY.

OTHER WARRANTIES, INCLUDING MERCHANTABILITY

THERE ARE NO WARRANTIES, PROMISES OR AFFIRMATIONS OF FACT, INCLUDING WARRANTIES OF MERCHANTABILITY AND OF FITNESS FOR A PARTICULAR PURPOSE OTHER THAN THOSE EXPRESSLY SET FORT HEREIN. THE CONDITIONS OF LIABILITY, RIGHTS, OBLIGATIONS AND REMEDIES OF THE PARTIES RELATING TO CLAIMS ARISING FROM ANY NONCONFORMING SHEET SHALL BE GOVERNED EXCLUSIVELY BY THE TERMS SET FORTH HEREIN.

INSPECTIONS AND NOTICE OF CLAIM

Buyer shall exercise diligence in inspection of material as received from Seller prior to utilization so as to mitigate expense involved in repairing, repainting, or replacing nonconforming sheets. Claims for any breach of warranty must be made within the period of this limited warranty and within 30 days after Buyer discovered the nonconforming sheet, and Buyer must give Seller a reasonable opportunity to inspect the material.

DUTIES OF BUYER IN PRESENTING CLAIMS

As a condition precedent to Seller's liability hereunder, Buyer must present with his claim such records so to enable Seller and the date of installation in the form of building panels for the claimed nonconforming sheet. Buyer shall also present such evidence that establishes any claimed nonconformance was due to a breach of the limited warranty stated herein.

TRANSFERS REPRESENTATIONS AND ASSIGNMENTS

UNLESS EXPRESSLY AGREED IN WRITING BY AND BETWEEN BUYER AND SELLER, THIS LIMITED WARRANTY IS EXTENDED TO BUYER AS THE ORIGINAL PURCHASER FROM SELLER AND IS NON-TRANSFERABLE AND BY ANY PURPORTED TRANSFER OR ASSIGNMENT, NOR SHALL ANY RIGHT AGAINST SELLER SURVIVE ANY TRANSFER OR ASSIGNMENT. BUYER OR ITS AGENTS OR REPRESENTATIVES SHALL NOT CLAIM, REPRESENT OR IMPLY NOR PERMIT ITS CUSTOMERS, DISTTRIBUTORS, APPLICATORS, OR CONTRACTORS TO CLAIM, REPRESENT OR IMPLY THAT THIS LIMITED WARRANTY EXTENDS OR IS AVAILABLE TO PARTIES OTHER SHALL CAUSE ANY PARTY TO CEASE AND DESIST IN ANY SUCH MISREPRESENTATIONS. THIS CONDITION SHALL CONSTITUTE A MATERIAL TERM OF THIS LIMITED WARRANTY AND ITS VIOLATION BY BUYER SHALL EXCUSE SELLER FROM ITS OBLIGATIONS HEREUNDER.

WAIVER OR MODIFICATIONS OF SELLER'S RIGHTS

No terms or conditions, other than those stated herein, and no agreement or understanding, oral or written, and no course of conduct or performance, in any way purporting to modify this limited warranty or to waive Seller's rights hereunder, shall be binding on Seller unless the same be clearly set forth in a writing that expressly refers to this limited warranty and expressly refers to having such effect upon this limited warranty is signed by the authorized representative of Seller.

TERMINATION

Seller reserves the right to terminate this limited warranty, except with respect to orders, which it has already accepted, upon the giving of written notice thereof.

GOVERNING LAW

The substantive law of the State of Ohio shall of exclusively govern the rights and duties of the parties under this agreement.

ENTIRE AGREEMENT

The provisions set forth herein are in lieu of and expressly supersede any other provisions irrespective of where contained. All proposals, negotiations and representations, if any, made prior to or with reference hereto are merged herein.

Signature	Title	Date
	PM	5/28/24

Dimensional Metals, Inc.

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DynaClad® Metal Roofing System
25 Year Limited Warranty

Dimensional Metals, Inc. (hereinafter referred to as "DMI") warrants to the named building owner (hereinafter referred to as "owner") that subject to all term(s), condition(s), limitation(s), allocation(s) of warranty, and responsibility(ies) stated herein, the installers workmanship on the named building will be adequate to prevent leaks for 25 years from the date of completion of the metal roof system installation. This includes all materials supplied by DMI including but not limited to insulation, felt underlayment, ice and water underlayment, vapor barrier and fasteners. The installer is solely responsible for any leaks arising during the first two years after completion of the installation and DMI is responsible for any leaks first arising after the second anniversary of successful completion of the installation of the subject roof but arising not later than 25th anniversary of such completion. This warranty will be fully satisfied by repair of the roof and any such repairs shall carry a warranty against leaks only for any then remaining balance of the original 25 year warranty period.

DMI's aggregate total cumulative liability under this warranty is limited to the dollar amount of the original materials furnished by DMI only and the installation of those materials only.

DMI MAKES NO OTHER WARRANTY EITHER EXPRESS OR IMPLIED. ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PURPOSE WHICH EXCEED OR DIFFER FROM THE WARRANTIES HEREIN EXPRESSED ARE DISCLAIMED AND EXCLUDED FROM THIS WARRANTY. DMI DOES NOT IN ANY WAY WARRANT THE MERCHANTABILITY OF THE GOODS SOLD HEREBY. NO WARRANTIES EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF INCLUDING TERMS, CONDITIONS, AND LIMITATIONS LISTED.

Roof Completion Date – March 20, 2024

Replace Roofs Multiple Assets – Ozark Correctional Center			State of Missouri		
Building/Project Name			Building Owners Name		
929 Honor Camp Lane	Fordland	MO	301 W High Street	Jefferson City	MO
Building Address	City	State	Owners Address	City	State

1. Owner shall provide DMI with written notice within thirty (30) days of the discovery of any leaks in the roof. Failure of the owner to do so shall relieve both DMI of any and all responsibility and/or liability under this warranty.

2. DMI shall not have any liability or responsibility under or in connection with either this warranty or the roof, if any one or more of the following shall occur:
   a. Deterioration caused by marine atmosphere or regular spray of salt water.
   b. Corrosion caused by heavy fallout or exposure to any corrosive chemicals, ash or fumes from any type of manufacturing facility.
   c. Deterioration caused by any corrosive substance or any condensation of any harmful substance contained, generated or released inside the building.
   d. Damage caused by owner's agents, employees or any other third party not under the direct control and supervision of DMI and/or installer on the roof.
   e. Damage caused by natural disasters, including, but not limited to lightening, any strong gale, hurricane, tornado, or earthquake.
   f. Damage caused by any panels or other components installed in a manner that does not permit drainage of water from all surfaces or have a slope of less than ¼" per foot.
   g. Damage caused, after installation of the roof system by the installer, resulting from any alterations, such as, but not limited to, structures, fixtures, or utilities being placed upon or attached to the roof without prior written authorization from DMI.
   h. Corrosion to the underside of the roof system which is or was caused at any time in part or wholly by any condensation resulting from either or both of the following; the use of inadequate vapor barrier where insulation is installed immediately beneath the roof panels. (An adequate vapor barrier must have a perm rating of .05 or less with sealed joints and perimeter) or inadequate ventilation of the attic space between roof panel and insulation.
   i. If there is any failure by the owner or occupant or user to use reasonable care in maintaining the roof.
   j. If the owner fails to comply with every term and/or condition stated in this Limited Warranty.
   k. Any other cause beyond DMI's control, including but not limited to acts of war, terrorism or civil disobedience.

3. DMI shall not have any liability or responsibility under or in connection with either this Limited Warranty or the roof in the event of a failure by any contractor or subcontractor to use approved installation methods and details indicated in approved shop drawing details furnished by DMI, [or to substitute therefore only products approved in writing in advance by DMI as equal (if provided by the contractor or subcontractor)].

4. DMI shall not have any obligation under this Limited Warranty until final shop drawings of the projects roof are submitted by DMI to the installer and accepted in writing by the installer, architect, general contractor and DMI. Shop drawings must show the exact number, size and location of all roof penetrations and roof top equipment.

5. DMI shall not have any obligation under this Limited Warranty until all invoices for installation, supplies, materials, and services have been paid in full to both DMI and installer.

6. DMI shall not be responsible for any consequential damage or loss to the building, its contents or other materials.

7. In no event shall DMI have any liability for any commercial loss, claims for labor, or consequential damages of any other type, whether owner's claim be based in contract, tort, warranty, strict liability, or otherwise, it is expressly agreed that owners remedies expressed in this Limited Warranty are owners exclusive remedies.

8. DMI's failure at any time to enforce any of the terms and conditions stated herein shall not be construed to be a waiver of such provisions or of the right to exercise any right in the future.

9. During the term of this warranty, DMI, its sales representatives and employees, shall have free access to the roof during regular business hours.

This Limited Warranty is tendered for the sole benefit of the original purchaser as named below and is not transferable or assignable. It becomes valid only when signed by DMI.

This Limited Warranty may not be changed orally.

THIS LIMITED WARRANTY SHALL BE GOVERNED BY AND CONSTRUED AND ENFORCED IN ACCORDANCE WITH THE LAWS OF THE STATE OF OHIO. JURISDICTION AND VENUE FOR ANY DISPUTE CONCERNING THE ROOF OR THIS LIMITED WARRANTY ARE FIXED IN FRANKLIN COUNTY, OHIO.

Watkins Roofing, Inc.
Installing Contractor

Signature | President (Title) | 07-01-24 (Date)

State of Missouri
Building Owner

Signature | CA FMDC (Title) | 7.3.24 (Date)

Dimensional Metals, Inc.
58 Klema Drive North – Reynoldsburg, OH 43068 (740) 927-3633

Signature | PRES (Title) | 7/17/24 (Date)

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WATKINS ROOFING
SINCE 1935

4401 I-70 Drive Southeast
Columbia, MO 65201
Phone: 573-449-2951
Fax: 573-874-0201
watkinsroofing@socket.net

ROOFING INSTALLER'S WARRANTY

A. WHEREAS **Watkins Roofing, Inc.** of **4401 I-70 Drive SE, Columbia, MO 65201**, herein called the "Roofing Installer," has performed roofing and associated work ("the work") on the following project:
1. Owner: State of Missouri
2. Address: OA-FMDC, Jefferson City, MO
3. Building Name/Type: Ozark Correction Center
4. Address: 929 Honor Camp Ln, Forland, MO 65652
5. Area of the Work: Roofing, Sheet Metal
6. Acceptance Date: 03/20/2024
7. Warranty Period: 2 Years
8. Expiration Date: 03/20/2026.

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant the work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of the work as are necessary to correct faulty and defective work and as are necessary to maintain the work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:
1. Specifically excluded from this Warranty are damages to the work and other parts of the building, and to building contents, caused by:
a. Lightning;
b. Peak gust wind speed exceeding 72 mph;
c. Fire;
d. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
e. Faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
f. Vapor condensation on bottom of roofing; and
g. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

2. When the work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.

3. Roofing Installer is responsible for damage to the work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of the work.

4. During Warranty Period, if Owner allows alteration of the work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of the alterations, but only to the extent the alterations affect the work covered by this Warranty. If Owner engages Roofing Installer to perform the alterations, Warranty shall not become null and void unless Roofing Installer, before starting the alterations, notified Owner in writing, showing reasonable cause for claim, that the alterations would likely damage or deteriorate the work, thereby reasonably justifying a limitation or termination of this Warranty.

5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a use or service more severe than originally specified, this Warranty shall become null and void on date of the change, but only to the extent the change affects the work covered by this Warranty.

6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect the work and to examine evidence of such leaks, defects, or deterioration.

7. This Warranty is recognized to be the only warranty of Roofing Installer on the work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of the work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this 24th day of May, 2024.

1. Authorized Signature: 
2. Name: Mark Emms
3. Title: President

SECTION 099113
EXTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.

C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
   1. Mechanical and Electrical:
      a. Natural Gas Piping

1.02 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide complete list of products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
   2. MPI product number (e.g. MPI #47).
   3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.

B. Paints:
   1. Behr Process Corporation: www.behr.com.
   2. PPG Paints: www.ppgpaints.com.
   3. Rodda Paint Company: www.roddapaint.com.
   4. Sherwin-Williams Company: www.sherwin-williams.com.

C. Primer Sealers: Same manufacturer as top coats.

2.02 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready mixed, unless required to be a field-catalyzed paint.
   1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   2. Supply each paint material in quantity required to complete entire project's work from a single production run.
   3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

2.03 PAINT SYSTEMS - EXTERIOR

A. Paint E-OP - Exterior Surfaces to be Painted, Unless Otherwise Indicated: Including concrete, concrete masonry units, brick, fiber cement siding, primed wood, and primed metal.
   1. Two top coats and one coat primer.
   2. Top Coat(s): Exterior Alkyd Enamel; MPI #94 or 96.
      a. Products:
         1) Behr Alkyd Interior/Exterior Satin Enamel No. 7900.
         2) Behr Alkyd Interior/Exterior Semi-Gloss Enamel No. 3900.
         3) PPG Paints Interior/Exterior Industrial Enamel, Gloss, 7-282. (MPI #96)

4) PPG Paints Fast Dry 35 Quick Drying Enamel, Gloss, 95-9000.
5) Rodda Porsalite, Semi-Gloss, 745001. (MPI #94)

2.04 PRIMERS

A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.
1. Rust-Inhibitive Water Based Primer; MPI #107.
a. Products:
1) Behr Premium Plus Interior/Exterior Multi-Surface Primer and Sealer No. 436. (MPI #107)
2) PPG Paints Pitt-Tech Plus DTM Industrial Primer, 90-912 Series.
3) Sumter Coatings, Inc. Universal Primer Water Base.

PART 3 EXECUTION

3.01 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

F. Exterior Wood Surfaces to Receive Opaque Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior calking compound after prime coat has been applied. Back prime concealed surfaces before installation.

3.02 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Exterior Wood to Receive Opaque Finish: If final painting must be delayed more than 2 weeks after installation of woodwork, apply primer within 2 weeks and final coating within 4 weeks.

C. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

E. Apply each coat to uniform appearance.

F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

G. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.03 SCHEDULE - PAINT SYSTEMS

A. Shop-Primed Metal Items: Finish surfaces exposed to view.
1. Exterior: Paint-ME-OP-2A, semi-gloss.

3.04 COLOR SCHEDULE

A. All new Natural Gas Piping, unions, shut-off valves, and regulators: Gray or color selected by owner.

END OF SECTION

SECTION 220517
SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe sleeves.

B. Manufactured sleeve-seal systems.

1.02 RELATED REQUIREMENTS

A. Section 22 05 23 - General-Duty Valves for Plumbing Piping.

B. Section 22 05 53 - Identification for Plumbing Piping and Equipment: Piping identification.

C. Section 22 07 19 - Plumbing Piping Insulation.

1.03 REFERENCE STANDARDS

A. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type) 2016.

B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems 2013a (Reapproved 2017).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

PART 2 PRODUCTS

2.01 PIPE SLEEVES

A. Manufacturers:
   1. Flexicraft Industries; Pipe Wall Sleeve

B. Vertical Piping:
   1. Sleeve Length: 1 inch above finished floor.
   2. Provide sealant for watertight joint.
   3. Blocked Out Floor Openings: Provide 1-1/2 inch angle set in silicon adhesive around opening.

C. Plastic or Sheet Metal: Pipe passing through interior walls, partitions, and floors, unless steel or brass sleeves are specified below.

D. Pipe Passing Through Below Grade Exterior Walls:
   1. Zinc coated or cast iron pipe.
   2. Provide watertight space with link rubber or modular seal between sleeve and pipe on both pipe ends.

E. Pipe Passing Through Concrete Beam Flanges, except where Brass Pipe Sleeves are Specified:
   1. Galvanized steel pipe or black iron pipe with asphalt coating.
   2. Connect sleeve with floor plate except in mechanical rooms.

F. Pipe Passing Through Mechanical, Laundry, and Animal Room Floors above Basement:
   1. Galvanized steel pipe or black iron pipe with asphalt coating.
   2. Connect sleeve with floor plate except in mechanical rooms.

G. Penetrations in concrete beam flanges are permitted but are prohibited through ribs or beams without prior approval from the Engineer.

2.02 MANUFACTURED SLEEVE-SEAL SYSTEMS

A. Manufacturers:
   1. Advance Products & Systems, LLC; Innerlynx
   2. Flexicraft Industries; PipeSeal

B. Modular/Mechanical Seal:
   1. Synthetic rubber interlocking links continuously fill annular space between pipe and wall/casing opening.
   2. Provide watertight seal between pipe and wall/casing opening.
   3. Elastomer element size and material in accordance with manufacturer's recommendations.
   4. Glass reinforced plastic pressure end plates.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

3.02 INSTALLATION

A. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

B. Install piping to conserve building space, to not interfere with use of space and other work.

C. Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

D. Provide sleeves when penetrating footings, floors, walls, and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
   1. Underground Piping: Caulk pipe sleeve watertight with lead and oakum or mechanically expandable chloroprene inserts with bitumen sealed metal components.
   2. Aboveground Piping:
      a. Pack solid using mineral fiber complying with ASTM C592.
      b. Fill space with an elastomer caulk to a depth of 0.50 inch where penetrations occur between conditioned and unconditioned spaces.

E. Manufactured Sleeve-Seal Systems:
   1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
   2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.
   3. Locate piping in center of sleeve or penetration.
   4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
   5. Tighten bolting for a water-tight seal.
   6. Install in accordance with manufacturer's recommendations.

F. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

END OF SECTION

SECTION 220523
GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Ball valves.

B. Check valves.

C. Flow limiting valves.

1.02 RELATED REQUIREMENTS

A. Section 22 05 53 - Identification for Plumbing Piping and Equipment.

B. Section 22 07 16 - Plumbing Equipment Insulation.

C. Section 22 07 19 - Plumbing Piping Insulation.

D. Section 22 10 05 - Plumbing Piping.

1.03 REFERENCE STANDARDS

A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.

B. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings; 2004 (Reapproved 2023).

C. ASTM A536 - Standard Specification for Ductile Iron Castings; 1984, with Editorial Revision (2019).

D. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings; 2017.

E. AWWA C606 - Grooved and Shouldered Joints; 2022.

F. MSS SP-67 - Butterfly Valves; 2022.

G. MSS SP-71 - Gray Iron Swing Check Valves, Flanged and Threaded Ends; 2018.

H. MSS SP-72 - Ball Valves with Flanged or Butt-Welding Ends for General Service; 2010a.

I. MSS SP-80 - Bronze Gate, Globe, Angle, and Check Valves; 2019.

J. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010, with Errata .

K. NSF 61 - Drinking Water System Components - Health Effects; 2023, with Errata.

L. NSF 372 - Drinking Water System Components - Lead Content; 2022.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

C. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.

1.05 QUALITY ASSURANCE

A. Manufacturer:
   1. Obtain valves for each valve type from single manufacturer.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. See drawings for specific valve locations.

B. Listed pipe sizes shown using nominal pipe sizes (NPS) and nominal diameter (DN).

C. Provide the following valves for the applications if not indicated on drawings:
   1. Shutoff: Ball, butterfly.
   2. Swing Check (Pump Outlet):
      a. 2 inch and Smaller: Bronze swing check valves with bronze disc.
      b. 2-1/2 inch and Larger for Domestic Water: Iron swing check valves with closure control, metal seat check valves.

D. Domestic, Hot and Cold Water Valves:
   1. 2 inch and Smaller:
      a. Bronze and Brass: Provide with solder-joint ends.
      b. Ball: Two piece, full port, bronze with bronze trim.
      c. Bronze Swing Check: Class 125, bronze disc.
   2. 2-1/2 inch and Larger:
      a. Iron Grooved-End Butterfly: 175 CWP.

2.02 GENERAL REQUIREMENTS

A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.

B. Valve Sizes: Match upstream piping unless otherwise indicated.

C. Valve Actuator Types:
   1. Hand Lever: Quarter-turn valves 6 inch and smaller except plug valves.

D. Insulated Piping Valves: With 2 inch stem extensions and the following features:
   1. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
   2. Butterfly Valves: Extended neck.

E. Valve-End Connections:
   1. Solder Joint Connections: ASME B16.18.
   2. Grooved End Connections: AWWA C606.

F. General ASME Compliance:

G. Potable Water Use:
   1. Certified: Approved for use in compliance with NSF 61 and NSF 372.
   2. Lead-Free Certified: Wetted surface material includes less than 0.25 percent lead content.

H. Source Limitations: Obtain each valve type from a single manufacturer.

2.03 BRONZE, BALL VALVES

A. General:
   1. Fabricate from dezincification resistant material.
   2. Copper alloys containing more than 15 percent zinc are not permitted.

B. One Piece, Reduced Port with Bronze Trim:
   1. Comply with MSS SP-110.
   2. WSP Rating: 400 psi.
   3. CWP Rating: 600 psi.
   4. Body: Bronze.
   5. End Connections: Pipe press.
   6. Seats: PTFE.

C. Two Piece, Full Port with Bronze Trim:
   1. Comply with MSS SP-110.

2. WSP Rating: 150 psi.
3. WOG Rating: 600 psi.
4. Body: Forged bronze or dezincified-brass alloy.
5. Ends Connections: Pipe solder.
6. Seats: PTFE.

2.04 IRON, BALL VALVES

A. Class 125, Full Port, Stainless Steel Trim:
1. Comply with MSS SP-72.
2. CWP Rating: 200 psi.
3. Body: ASTM A536 Grade 65-45-12, ductile iron.
4. End Connections: Grooved.
5. Seats: PTFE.
6. Operator: Lever with locking handle.

2.05 IRON, GROOVED-END BUTTERFLY VALVES

A. CWP Rating: 175 psi.
1. Comply with MSS SP-67, Type I.
2. Body: Coated ductile iron.
3. Stem: Two-piece stainless steel.
4. Disc: Coated ductile iron.
5. Disc Seal: EPDM.

2.06 BRONZE, SWING CHECK VALVES

A. General:
1. Fabricate from dezincification resistant material.
2. Copper alloys containing more than 15 percent zinc are not permitted.

B. Class 125:
1. Pressure and Temperature Rating: MSS SP-80, Type 3.
2. Design: Y-pattern, horizontal or vertical flow.
3. WOG Rating: 200 psi.
4. Body: Bronze, ASTM B62.
5. End Connections: Soldered.
6. Disc: Bronze.

2.07 IRON, SWING CHECK VALVES WITH CLOSURE CONTROL

A. Class 125 with Lever and Spring-Closure Control.
1. Comply with MSS SP-71, Type I.
2. Description:
a. CWP Rating: 200 psi.
b. Design: Clear or full waterway.
c. Body: ASTM A126, gray iron with bolted bonnet.
d. Ends: Flanged as indicated.
e. Trim: Bronze.
f. Gasket: Asbestos free.
g. Closer Control: Factory installed, exterior lever, and weight.

2.08 FLOW LIMITING VALVES

A. Size: As indicated on drawings.

B. Flow Setting: As indicated on drawings.

C. Flow Accuracy: Plus or minus 5 percent.

D. Body and Cap: Lead-free brass.

E. Cap and Plug: Lead-free brass.

F. Cartridge: Stainless steel with replaceable EPDM seal.

G. Maximum Service Pressure: 600 psi, WOG.

H. Maximum Service Temperature: 250 degrees F.

PART 3 EXECUTION

3.01 EXAMINATION

A. Discard all packing materials and verify that valve interior, including threads and flanges are completely clean without signs of damage or degradation that could result in leakage.

B. Verify valve parts to be fully operational in all positions from closed to fully open.

C. Should valve is determined to be defective, replace with new valve.

3.02 INSTALLATION

A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.

B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.

END OF SECTION

SECTION 220529
HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Prefabricated trapeze-framed systems.

B. Beam clamps.

C. Pipe hangers.

D. Pipe rollers and roller supports.

E. Pipe supports, guides, shields, and saddles.

F. Nonpenetrating rooftop supports for low-slope roofs.

1.02 RELATED REQUIREMENTS

A. Section 05 50 00 - Metal Fabrications.

1.03 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.

C. ASTM A181/A181M - Standard Specification for Carbon Steel Forgings, for General-Purpose Piping 2022.

D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.

E. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings 1999, with Editorial Revision (2018).

F. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates 2018.

G. ASTM A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures 1999 (Reapproved 2018).

H. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.

I. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength 2018a.

J. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2019.

K. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.

L. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022.

M. FM (AG) - FM Approval Guide current edition.

N. MFMA-4 - Metal Framing Standards Publication 2004.

O. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation 2018, with Amendment (2019).

P. UL (DIR) - Online Certifications Directory Current Edition.

Q. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.

1.05 QUALITY ASSURANCE

A. Comply with applicable building code.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Provide required hardware to hang or support piping, equipment, or fixtures with related accessories as necessary to complete installation of plumbing work.

B. Provide hardware products listed, classified, and labeled as suitable for intended purpose.

C. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.

D. Materials for Metal Fabricated Supports: Comply with Section 05 50 00.
   1. Zinc-Plated Steel: Electroplated in accordance with ASTM B633 unless stated otherwise.
   2. Galvanized Steel: Hot-dip galvanized in accordance with ASTM A123/A123M or ASTM A153/A153M unless stated otherwise.

E. Corrosion Resistance: Use corrosion-resistant metal-based materials fully compatible with exposed piping materials and suitable for the environment where installed.

2.02 PREFABRICATED TRAPEZE-FRAMED SYSTEMS

A. Prefabricated Trapeze-Framed Metal Strut Systems:
   1. Manufacturers:
      a. Anvil International, LLC
      b. --THE FOLLOWING MANUFACTURER HAS REGIONAL AVAILABILITY--
      c. Gripple, Inc; Fast Track - Standard
      d. Unistrut, a brand of Atkore International, Inc
   2. Strut Channel or Bracket Material:
   3. Accessories: Provide bracket covers, cable basket clips, cable tray clips, clamps, conduit clamps, fire-retarding brackets, j-hooks, protectors, and vibration dampeners.

2.03 BEAM CLAMPS

A. Manufacturers:
   1. B-Line, a brand of Eaton Corporation
   2. Unistrut, a brand of Atkore International, Inc

B. MSS SP-58 types 19 through 23, 25 or 27 through 30 based on required load.

C. C-Clamp: MSS SP-58 type 23, malleable iron and steel with plain, stainless steel, and zinc finish.

D. Small or Junior Beam Clamp: MSS SP-58 type 19, malleable iron with plain finish. For inverted usage provide manufacturer listed size(s).

E. Wide Mouth Beam Clamp: MSS SP-58 type 19, malleable iron with plain finish.

F. Centerload Beam Clamp with Extension Piece: MSS SP-58 type 30, malleable iron with plain finish.

G. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.

H. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.

2.04 PIPE HANGERS

A. Band Hangers, Adjustable:
   1. Manufacturers:
      a. B-Line, a brand of Eaton Corporation
      b. Gripple, Inc; Universal Clamp (Threaded)
   2. MSS SP-58 type 7 or 9, zinc-plated ASTM A1011/A1011M steel or ASTM A653/A653M carbon steel.

B. Swivel Ring Hangers, Adjustable:
   1. Manufacturers:
      a. B-Line, a brand of Eaton Corporation
      b. FNW; 7010
   2. MSS SP-58 type 10, epoxy-painted, zinc-colored.
   3. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.
   4. FM (AG) and UL (DIR) listed for specific pipe size runs and loads.

C. Clevis Hangers, Adjustable:
   1. Manufacturers:
      a. B-Line, a brand of Eaton Corporation
      b. FNW; 7005
      c. nVent Caddy, a brand of nVent
   2. Copper Tube: MSS SP-58 type 1, epoxy-plated copper.
   3. Felt-Lined: MSS SP-58 type 1, zinc-plated, silicone-free carbon steel.
   4. Light-Duty: MSS SP-58 type 1, zinc-colored, epoxy plated.
   5. Standard-Duty: MSS SP-58 type 1, zinc-colored, epoxy plated.
   6. UL (DIR) listed: Pipe sizes 2-1/2 to 8 inch.

2.05 PIPE CLAMPS

A. Riser Clamps:
   1. Manufacturers:
      a. B-Line, a brand of Eaton Corporation
      b. FNW; 7020
      c. nVent Caddy, a brand of nVent
   2. For insulated pipe runs, provide two bolt-type clamps designed for installation under insulation.
   3. MSS SP-58 type 1 or 8, carbon steel or steel with epoxy plated, plain, stainless steel, or zinc plated finish.
   4. UL (DIR) listed: Pipe sizes 1/2 to 8 inch.

B. Strut Clamps:
   1. Manufacturers:
      a. B-Line, a brand of Eaton Corporation
      b. FNW; 7815:
      c. Unistrut, a brand of Atkore International, Inc
   2. Pipe Clamp: Two-piece rigid, universal, or outer diameter type, carbon steel with epoxy copper or zinc finish.
   3. Cushioned Pipe or Tubing Strut Clamp: Provide strut clamp with thermoplastic elastomer cushion having dielectric strength of 670 V/mil.
   4. Service Temperature Range: Minus 65 to 275 degrees F.

C. Insulation Coupling:

1. Manufacturers:
   a. FNW; 7897
   b. nVent Caddy, a brand of nVent
   c. Unistrut, a brand of Atkore International, Inc
2. Two bolt-type clamps designed for installation under insulation.
3. Material: Carbon steel with epoxy copper or zinc finish.

2.06 PIPE SUPPORTS, GUIDES, SHIELDS, AND SADDLES

A. Dielectric Barriers: Provide between metallic supports and metallic piping and associated items of dissimilar type; acceptable dielectric barriers include rubber or plastic sheets or coatings attached securely to pipe or item.

B. Stanchions:
   1. Manufacturers:
      a. Anvil International
      b. B-Line, a brand of Eaton Corporation
      c. nVent Caddy, a brand of nVent
   2. Material: Malleable iron, ASTM A47/A47M; or carbon steel, ASTM A36/A36M.
   3. Provide coated or plated saddles to isolate steel hangers from dissimilar metal tube or pipe.
   4. For pipe runs, use stanchions of same type and material where vertical adjustment is required for stationary pipe.

C. Pipe Shields for Insulated Piping:
   1. Manufacturers:
      a. Anvil International
      b. FNW; 7753
      c. Gregory Industries, Inc
   2. MSS SP-58 type 40, ASTM A1011/A1011M steel or ASTM A653/A653M carbon steel.
   3. General Construction and Requirements:
      a. Surface Burning Characteristics: Comply with ASTM E84 or UL 723.
      b. Shields Material: UV-resistant polypropylene with glass fill.
      c. Maximum Insulated Pipe Outer Diameter: 12-5/8 inch.
      d. Service Temperature: Minus 40 to 178 degrees F.
      e. Pipe shields to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.

D. Pipe Supports:
   1. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.
   2. Liquid Temperatures Up to 122 degrees F:
      a. Overhead Support: MSS SP-58 types 1, 3 through 12 clamps.
      b. Support From Below: MSS SP-58 types 35 through 38.

E. Pipe Supports, Thermal Insulated:
   1. General Requirements:
      a. Insulated pipe supports to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
      b. Surface Burning Characteristics: Flame spread index/smoke developed index of 5/30, maximum, when tested in accordance with ASTM E84 or UL 723.
      c. Provide pipe supports for 1/2 to 30 inch iron pipes.
      d. Insulation inserts to consist of rigid phenolic foam insulation surrounded by 360 degree, PVC jacketing.
   2. PVC Jacket:

a. Pipe insulation protection shields to be provided with ball bearing hinge and locking seam.
b. Moisture Vapor Transmission: 0.0071 perm inch, when tested in accordance with ASTM E96/E96M.
c. Minimum Thickness: 60 mil, 0.06 inch.

2.07 NONPENETRATING ROOFTOP SUPPORTS FOR LOW-SLOPE ROOFS

A. Nonpenetrating Rooftop Supports for Low-Slope Roofs:
1. Manufacturers:
a. Cooper B-Line, a division of Eaton Corporation
b. Erico International Corporation, a brand of Pentair
c. Ferguson Enterprises Inc
2. Provide steel pedestals with thermoplastic or rubber base that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified.
3. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.

C. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

D. Unless specifically indicated or approved by Architect, do not provide support from roof deck.

E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

F. Provide thermal insulated pipe supports complete with hangers and accessories. Install thermal insulated pipe supports during the installation of the piping system.

G. Equipment Support and Attachment:
1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

H. Secure fasteners according to manufacturer's recommended torque settings.

I. Remove temporary supports.

3.02 CONTINUOUS INSULATION THROUGH THE SUPPORT

A. Insulation of the piping material shall continue through the clamp connecting it to the associated support. Contractor shall either increase the clamp or insulate over both the clamp and piping. Engineer will require this in the field.

END OF SECTION

SECTION 220553
IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Pipe markers.

D. Underground warning tape.

E. Ceiling tacks.

1.02 RELATED REQUIREMENTS

A. Section 09 91 23 - Interior Painting: Identification painting.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. Nameplates:
   1. Heat exchangers, water heaters, and other heat transfer products.
   2. Control panels, transducers, and other related control equipment products.
   3. Pumps, tanks, filters, water treatment devices, and other plumbing equipment products.

B. Tags:
   1. Manual operated and automated control valves.
   2. Instrumentation, relays, gauges, and other related control equipment products.
   3. Ceiling tacks placed on lay-in ceiling surface to reference plumbing components.

C. Pipe Markers: Piping.

2.02 NAMEPLATES

A. Manufacturers:
   1. Brimar Industries, Inc: www.pipemarker.com/#sle.
   2. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
   3. Seton Identification Products: www.seton.com/#sle.

B. Description: Laminated three-layer plastic with engraved letters.
   1. Letter Color: White.
   2. Letter Height: 1/4 inch.
   3. Background Color: Black.
   4. Plastic: Comply with ASTM D709.

2.03 TAGS

A. Manufacturers:
   1. Advanced Graphic Engraving: www.advancedgraphicengraving.com/#sle.
   2. Brady Corporation: www.bradycorp.com/#sle.
   3. Brimar Industries, Inc: www.pipemarker.com/#sle.
   4. Craftmark Pipe Markers: www.craftmarkid.com/#sle.
   5. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
   6. Seton Identification Products: www.seton.com/#sle.

B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.

2.04 PIPE MARKERS

A. Manufacturers:
   1. Brady Corporation: www.bradycorp.com/#sle.

2. Brimar Industries, Inc: www.pipemarker.com/#sle.
3. Craftmark Pipe Markers: www.craftmarkid.com/#sle.
4. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.

B. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

C. Color code as follows:
1. Potable, Cooling, Boiler, Feed, Other Water: Green with white letters.

2.05 UNDERGROUND WARNING TAPE

A. Materials: Use non-detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
1. Exception: Use foil-backed detectable type tape where required by serving utility or where directed by Owner.

B. Non-detectable Type Tape: 6 inches wide, with minimum thickness of 4 mil, 0.004 inch.

C. Foil-backed Detectable Type Tape: 3 inches wide, with minimum thickness of 5 mil, 0.005 inch, unless otherwise required for proper detection.

D. Legend: Type of service, continuously repeated over full length of tape.

2.06 CEILING TACKS

A. Manufacturers:
1. Craftmark Pipe Markers: www.craftmarkid.com/#sle.

B. Description: Steel with 3/4 inch diameter color coded head.

C. Color code as follows:
1. Plumbing Valves: Green.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install tags with corrosion resistant chain.

C. Apply stencil painting in accordance with Section 09 91 23.

D. Install plastic pipe markers in accordance with manufacturer's instructions.

E. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.

F. Use tags on piping 3/4 inch diameter and smaller.
1. Identify service, flow direction, and pressure.
2. Install in clear view and align with axis of piping.
3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

G. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

SECTION 220719
PLUMBING PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping insulation.

B. Jackets and accessories.

1.02 RELATED REQUIREMENTS

A. Section 07 84 00 - Firestopping.

B. Section 22 10 05 - Plumbing Piping: Placement of hangers and hanger inserts.

1.03 REFERENCE STANDARDS

A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus 2019.

B. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form 2020a.

C. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation 2019.

D. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel 2008 (Reapproved 2018).

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2020.

F. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials 2016.

G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

A. Manufacturer:
   1. Aeroflex USA, Inc
   2. Armacell LLC; AP Armaflex
   3. K-Flex USA LLC; Insul-Tube

B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
   1. Minimum Service Temperature: Minus 40 degrees F.
   2. Maximum Service Temperature: 220 degrees F.
   3. Connection: Waterproof vapor barrier adhesive.

C. Elastomeric Adhesive:
   1. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.
   2. Basis-of-Design: ArmaFlex 520 Black Low VOC adhesive.

2.03 JACKETS

A. PVC Plastic.
   1. Manufacturers:
      a. Johns Manville Corporation.
      b. Dow Consumer Solutions.
   2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
      a. Minimum Service Temperature: 0 degrees F.
      b. Maximum Service Temperature: 150 degrees F.
      c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
      d. Thickness: 10 mil.
      e. Connections: Brush on welding adhesive.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Exposed Piping: Locate insulation and cover seams in least visible locations.

C. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.

D. Inserts and Shields:
   1. Application: Piping 1-1/2 inches diameter or larger.
   2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
   3. Insert Location: Between support shield and piping and under the finish jacket.
   4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.

E. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07 84 00.

F. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with PVC jacket and fitting covers.

3.02 SCHEDULES

A. Plumbing Systems:
   1. Domestic Cold Water Supply:
      a. 1-1/4 inch and smaller: 1/2” thick flexible elastomeric: closed cell.
      b. 1-1/2 inch and larger: 1” thick flexible elastomeric: closed cell.
      c. Provide white paintable PVC wrap-around insulation in all exposed ceiling/structure area. Refer to the architectural reflected ceiling drawings.
   2. Domestic Hot and Recirculation Water Supply:
      a. 1-1/4 inch and smaller: 1” thick flexible elastomeric: closed cell.
      b. 1-1/2 inch and larger: 1-1/2” thick flexible elastomeric: closed cell.
      c. Provide white paintable PVC wrap-around insulation in all exposed ceiling/structure area. Refer to the architectural reflected ceiling drawings.

END OF SECTION

SECTION 221005
PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe, pipe fittings, specialties, and connections for piping systems.
   1. Domestic water
   2. Natural gas piping.
   3. Flanges, unions, and couplings.
   4. Pipe hangers and supports.

1.02 RELATED REQUIREMENTS

A. Section 09 91 13 - Exterior Painting.

B. Section 09 91 23 - Interior Painting.

C. Section 22 05 16 - Expansion Fittings and Loops for Plumbing Piping.

D. Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment.

E. Section 22 05 53 - Identification for Plumbing Piping and Equipment.

F. Section 22 07 19 - Plumbing Piping Insulation.

1.03 REFERENCE STANDARDS

A. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2021.

B. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.

C. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.

D. ASME B31.1 - Power Piping; 2022.

E. ASME B31.9 - Building Services Piping; 2020.

F. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.

G. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2021.

H. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

I. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2023a.

J. ASTM B32 - Standard Specification for Solder Metal; 2020.

K. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2022.

L. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2020.

M. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2016.

N. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2023.

O. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2020a.

P. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2021a.

Q. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series); 2020.

R. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2020.

S. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2020.

T. ASTM D2846/D2846M - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems; 2019a.

U. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets; 2020.

V. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2023.

W. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

X. ASTM F493 - Standard Specification for Solvent Cements for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe and Fittings; 2022.

Y. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2021.

Z. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2020.

AA. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2018, with Editorial Revision (2020).

BB. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry; 2018, with Editorial Revision (2020).

CC. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2017, with Editorial Revision (2020).

DD. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).

EE. NSF 61 - Drinking Water System Components - Health Effects; 2023, with Errata.

FF. NSF 372 - Drinking Water System Components - Lead Content; 2022.

GG. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with applicable codes.

B. Valves: Manufacturer's name and pressure rating marked on valve body.

C. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

B. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

B. Plenum-Installed Acid Waste Piping: Flame-spread index equal or below 25 and smoke-spread index equal or below 50 according to ASTM E84 or UL 723 tests.

2.02 DOMESTIC WATER PIPING, ABOVE GRADE

A. Copper Pipe: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
   2. Joints: ASTM B32, alloy Sn95 solder, or grooved mechanical couplings.

2.03 NATURAL GAS PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
   1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
   2. Joints: Threaded or welded to ASME B31.1.

2.04 NATURAL GAS PIPING, BURIED BEYOND 5 FEET OF BUILDING

A. Polyethylene Pipe: ASTM D2513, SDR 11.
   1. Fittings: ASTM D2683 or ASTM D2513 socket type.
   2. Joints: Fusion welded.

2.05 NATURAL GAS PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
   1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
   2. Joints: Threaded or welded to ASME B31.1.

2.06 PIPE FLANGES, UNIONS, AND COUPLINGS

A. Unions for Pipe Sizes 3 inch and Under:
   1. Ferrous Pipe: Class 150 malleable iron threaded unions.
   2. Copper Tube and Pipe: Class 150 bronze unions with soldered joints.

2.07 PIPE HANGERS AND SUPPORTS

A. See Section 22 05 29 for additional requirements.

B. Provide hangers and supports that comply with MSS SP-58.
   1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
   2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
      a. Cold and Hot Pipe Sizes 6 inch and Larger: Double hangers.
   3. Trapeze Hangers: Welded steel channel frames attached to structure.
   4. Vertical Pipe Support: Steel riser clamp.
   5. Rooftop Supports for Low-Slope Roofs: Steel pedestals with bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified; and as follows:
      a. Bases: High-density polypropylene.
      b. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
      c. Steel Components: Stainless steel or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
      d. Attachment and Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports; corrosion-resistant material.
      e. Height: Provide minimum clearance of 6 inches under pipe to top of roofing.

C. Plumbing Piping - Water:
   1. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
   2. Hangers for Cold Pipe Sizes 2 inch and Over: Carbon steel, adjustable, clevis.
   3. Hangers for Hot Pipe Sizes 2 to 4 inch: Carbon steel, adjustable, clevis.
   4. Wall Support for Pipe Sizes Up to 3 inch: Cast iron hook.
   5. Wall Support for Pipe Sizes 4 inch and Larger: Welded steel bracket and wrought steel clamp.
   6. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
   7. Floor Support for Hot Pipe Sizes to 4 inch: Cast iron adjustable pipe saddle, locknut, nipple, floor flange, and concrete pier or steel support.

D. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
   1. Concrete Wedge Expansion Anchors: Comply with ICC-ES AC193.
   2. Masonry Wedge Expansion Anchors: Comply with ICC-ES AC01.
   3. Concrete Screw Type Anchors: Comply with ICC-ES AC193.
   4. Masonry Screw Type Anchors: Comply with ICC-ES AC106.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

D. Install piping to maintain headroom, conserve space, and not interfere with use of space.

E. Group piping whenever practical at common elevations.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. See Section 22 05 16.

G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

H. Provide access where valves and fittings are not exposed.

I. Install vent piping penetrating roofed areas to maintain integrity of roof assembly.

J. Provide support for utility meters in accordance with requirements of utility companies.

K. Prepare exposed, unfinished pipe, fittings, supports, and accessories for finish painting.

L. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.

M. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.

N. Sleeve pipes passing through partitions, walls, and floors.

O. Pipe Hangers and Supports:
   1. Install in accordance with ASME B31.9.
   2. Support horizontal piping as indicated.

3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
4. Place hangers within 12 inches of each horizontal elbow.
5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

P. Pipe Sleeve-Seal Systems:
1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.
3. Locate piping in center of sleeve or penetration.
4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
5. Tighten bolting for a watertight seal.
6. Install in accordance with manufacturer's recommendations.

Q. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

3.03 TOLERANCES

A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum slope in accordance with International Plumbing Code.

B. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

3.04 FIELD TESTS AND INSPECTIONS

A. Verify and inspect systems according to requirements by the Authority Having Jurisdiction. In the absence of specific test and inspection procedures proceed as indicated below.

B. Domestic Water Systems:
1. Perform hydrostatic testing for leakage prior to system disinfection.
2. Test Preparation: Close each fixture valve or disconnect and cap each connected fixture.
3. General:
a. Fill the system with water and raise static head to 10 psi above service pressure. Minimum static head of 50 to 150 psi. As an exception, certain codes allow a maximum static pressure of 80 psi.

C. Gas Distribution Systems:
1. Test Preparation: Close each appliance valve or disconnect and cap each connected appliance.
2. General Systems:
a. Inject a minimum of 10 psi of compressed air into the piping system for a duration of 15 minutes and verify with a gauge that no perceptible pressure drop is measured.
b. Ensure test pressure gauge has a range of twice the specific pressure rate selected with an accuracy of 1/10 of 1 pound.
3. Welded Pipes or Systems with Service Pressures Above 14 in-wc:
a. Inject a minimum of 60 psi of compressed air into the piping system for a duration of 30 minutes and verify with a gauge that no perceptible pressure drop is measured.
b. Ensure test pressure gauge has a range of twice the specific pressure rate selected with an accuracy of 1/10 of 1 pound with 1 psi increments.

D. Test Results: Document and certify successful results, otherwise repair, document, and retest.

3.05 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Prior to starting work, verify system is complete, flushed, and clean.

B. Ensure acidity (pH) of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).

3.06 SCHEDULES

A. Pipe Hanger Spacing:
   1. Metal Piping:
      a. Pipe Size: 1/2 inch to 1-1/4 inch:
         1) Maximum Hanger Spacing: 6.5 ft.
         2) Hanger Rod Diameter: 3/8 inches.
      b. Pipe Size: 1-1/2 inch to 2 inch:
         1) Maximum Hanger Spacing: 10 ft.
         2) Hanger Rod Diameter: 3/8 inch.
      c. Pipe Size: 2-1/2 inch to 3 inch:
         1) Maximum Hanger Spacing: 10 ft.
         2) Hanger Rod Diameter: 1/2 inch.
      d. Pipe Size: 4 inch to 6 inch:
         1) Maximum Hanger Spacing: 10 ft.
         2) Hanger Rod Diameter: 5/8 inch.
   2. Plastic Piping:
      a. All Sizes:
         1) Maximum Hanger Spacing: 6 ft.
         2) Hanger Rod Diameter: 3/8 inch.

END OF SECTION

SECTION 221006
PLUMBING PIPING SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Mixing valves.

B. Relief valves.

C. Exterior penetration accessories.

1.02 RELATED REQUIREMENTS

A. Section 221005 - Plumbing Piping.

B. Section 223000 - Plumbing Equipment.

C. Section 224000 - Plumbing Fixtures.

1.03 REFERENCE STANDARDS

A. ASME A112.6.3 - Floor Drains 2022.

B. ASME A112.6.4 - Roof, Deck, and Balcony Drains 2022.

C. ASSE 1011 - Performance Requirements for Hose Connection Vacuum Breakers 2023.

D. ASSE 1013 - Performance Requirements for Reduced Pressure Principle Backflow Prevention Assemblies 2021.

E. ASSE 1019 - Performance Requirements for Wall Hydrant with Backflow Protection and Freeze Resistance 2011 (Reaffirmed 2016).

F. ASSE 1047 - Performance Requirements for Reduced Pressure Detector Backflow Prevention Assemblies 2021.

G. NSF 61 - Drinking Water System Components - Health Effects 2022, with Errata.

H. NSF 372 - Drinking Water System Components - Lead Content 2022.

I. PDI-WH 201 - Water Hammer Arresters; 2017.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

2.02 MIXING VALVES

A. Thermostatic Master Mixing Valves:
   1. Manufacturers:
      a. Leonard Valve Company
      b. Watts
      c. Cash Acme
      d. Resideo

B. Water Temperature Limiting Valves:
   1. Valve: ASSE 1017, bronze or brass body; thermostatic element; corrosion- and lime-resistant internal components; integral locking temperature adjustment with high-temperature limit stop; integral check valves with strainer screens on inlets.
   2. Refer to Master Mixing Valve Schedule for further requirements.

2.03 RELIEF VALVES

A. Manufacturers:
   1. Cash Acme, a brand of Reliance Worldwide Corporation
   2. ITT Bell & Gossett

B. Bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labelled.

2.04 EXTERIOR PENETRATION ACCESSORIES

A. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.
   1. Manufacturers:
      a. Quickflash Weatherproofing Products, Inc

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibbs.

END OF SECTION

SECTION 223000
PLUMBING EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water heaters.

1.02 RELATED REQUIREMENTS

A. Section 22 05 48 - Vibration and Seismic Controls for Plumbing Piping and Equipment.

1.03 REFERENCE STANDARDS

A. ANSI Z21.10.1 - Gas Water Heaters - Volume I - Storage Water Heaters with Input Ratings of 75,000 Btu per Hour or Less 2014.

B. ANSI Z21.10.3 - Gas-Fired Water Heaters - Volume III - Storage Water Heaters with Input Ratings Above 75,000 Btu per Hour, Circulating and Instantaneous 2015.

C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. ASME A13.1 - Scheme for the Identification of Piping Systems; 2023.

E. ICC (IPC) - International Plumbing Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. NSF 61 - Drinking Water System Components - Health Effects; 2023, with Errata.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittals procedures.

B. Product Data:
   1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
   2. Indicate pump type, capacity, power requirements.
   3. Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
   4. Provide electrical characteristics and connection requirements.

1.05 QUALITY ASSURANCE

A. Identification: Provide pumps with manufacturer's name, model number, and rated capacity identified by permanently attached label.

1.06 WARRANTY

A. See Section 01 78 00 – Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide 5-year manufacturer warranty. Complete forms in Owner’s name and register with manufacturer.

PART 2 PRODUCTS

2.01 WATER HEATERS

A. Manufacturers:
   1. Rheem
   2. Lochinvar
   3. Bradford White
   4. AO Smith

5. Submit substitution request to engineer.

B. Gas-Fired Volumetric Water Heaters:
   1. Type: natural gas-fired water tube boiler, with stainless steel heat exchanger, ASME labeled.
   2. Performance - Refer to Water Heater Schedule.
   3. Accessories:
      a. High-limit temperature control.
      b. Outlet water temperature sensor.
      c. Inlet water temperature sensor.
      d. Flue temperature sensor.
      e. Low water flow protection.
      f. Temperature and Pressure Relief Valve: ASME labeled.
      g. Pump: Bronze, in-line circulation pump mounted between heater and storage tank, controlled by tank-mounted immersion thermostat.
   4. Certified For The Following Applications:
      a. Automatic storage water heater.
      b. For operation at 180 degrees F.
   5. Controls: Automatic water thermostat with temperature range adjustable from 120 to 180 degrees F, automatic reset high temperature limiting thermostat factory set at 200 degrees F, gas pressure regulator, multi-ribbon or tubular burner, 100 percent safety shut-off pilot and thermocouple, flue baffle and draft hood.

2.02 HOT WATER STORAGE TANKS

A. Manufacturers:
   1. Lochinvar
   2. Bradford White
   3. Submit substitution request to engineer.

B. Jacketed Tanks
   1. Tank: Vertical, steel construction, glass-lined, ASME labeled for working pressure of 125 psig.
   2. Storage Capacity – Refer to Water Heater Schedule.
   3. Performance: 80% usable storage factor, ASHRAE 90.1-2019 compliant insulation
   4. Accessories
      a. Access Manway.
      b. Temperature and Pressure Relief Valve: ASME labeled.
      c. Anode: Magnesium.
      d. Lifting Lugs.
      e. Aquastat.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.

B. Coordinate with plumbing piping and related fuel piping work to achieve operating system.

3.02 SCHEDULES

A. Refer to construction documents for scheduled equipment.

END OF SECTION

SECTION 230529
HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment components for equipment, piping, and other HVAC/hydronic work.

1.02 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.

C. ASTM A181/A181M - Standard Specification for Carbon Steel Forgings, for General - Purpose Piping 2014 (Reapproved 2020).

D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2014.

E. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings 1999, with Editorial Revision (2018).

F. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2019.

G. MFMA-4 - Metal Framing Standards Publication 2004.

H. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation 2018.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.
   2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
   3. 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 10%. Include consideration for vibration, equipment operation, and shock loads where applicable.
   4. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
      a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
      b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
   1. Manufacturers:
      a. Cooper B-Line, a division of Eaton Corporation

b. Ferguson Enterprises Inc
c. Thomas & Betts Corporation
d. Unistrut, a brand of Atkore International Inc
2. Comply with MFMA-4.
3. Channel Material:
a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
4. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch.
5. Minimum Channel Dimensions: 1-5/8 inch width by 13/16 inch height.

C. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
1. Minimum Size, Unless Otherwise Indicated or Required:
a. Equipment Supports: 1/2 inch diameter.
b. Piping up to 1 inch (27 mm) nominal: 1/4 inch diameter.
c. Piping larger than 1 inch (27 mm) nominal: 3/8 inch diameter.

D. Steel Cable:
1. Manufacturers:
a. Ductmate Industries, Inc, a DMI Company; Clutcher Cable Hanging System:
b. Gripple

E. Pipe Supports:
1. Liquid Temperatures Up To 122 degrees F:
a. Overhead Support: MSS SP-58 Types 1, 3 through 12.
b. Support From Below: MSS SP-58 Types 35 through 38.
2. Operating Temperatures from 122 to 446 degrees F:
a. Overhead Support: MSS SP-58 Type 1 or 3 through 12, with appropriate saddle of MSS SP-58 Type 40 for insulated pipe.

F. Beam Clamps: MSS SP-58 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.
2. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.

G. Strut Clamps: Two-piece pipe clamp.

H. Pipe Hangers: For a given pipe run, use hangers of the same type and material.
1. Material: Malleable iron, ASTM A47/A47M; or carbon steel, ASTM A36/A36M.
2. Provide coated or plated hangers to isolate steel hangers from dissimilar metal tube or pipe.

I. Nonpenetrating Rooftop Supports for Low-Slope Roofs:
1. Manufacturers:
a. Cooper B-Line, a division of Eaton Corporation
b. Erico International Corporation, a brand of Pentair
c. Ferguson Enterprises Inc
2. Provide steel pedestals with thermoplastic or rubber base that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified.
3. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
4. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
5. Mounting Height: Provide minimum clearance of 6 inches under supported component to top of roofing.

J. Anchors and Fasteners:

1. Manufacturers - Mechanical Anchors:
   a. Hilti, Inc
   b. Gripple
   c. Simpson Strong-Tie Company Inc
2. Manufacturers - Powder-Actuated Fastening Systems:
   a. Hilti, Inc
   b. Gripple
   c. Simpson Strong-Tie Company Inc
3. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
4. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
5. Hollow Stud Walls: Use toggle bolts.
6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
7. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
   a. Comply with MFMA-4.
   b. Channel Material: Use galvanized steel.
   c. Manufacturer: Same as manufacturer of metal channel (strut) framing system.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.

C. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

D. Unless specifically indicated or approved by Architect, do not provide support from roof deck.

E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

F. Equipment Support and Attachment:
   1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
   2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
   3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
   4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

G. Preset Concrete Inserts: Use manufacturer-provided closure strips to inhibit concrete seepage during concrete pour.

H. Secure fasteners according to manufacturer's recommended torque settings.

I. Remove temporary supports.

END OF SECTION

SECTION 230553
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Pipe markers.

D. Ceiling tacks.

1.02 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

C. Product Data: Provide manufacturers catalog literature for each product required.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. Rooftop Units: Nameplates.

B. Furnaces and Unit Heaters: Tags.

C. Control Panels: Nameplates.

D. Piping: Pipe markers.

2.02 NAMEPLATES

A. Manufacturers:
   1. Advanced Graphic Engraving, LLC
   2. Brimar Industries, Inc
   3. Craftmark Pipe Markers
   4. Kolbi Pipe Marker Co
   5. Seton Identification Products, a Tricor Direct Company.

B. Letter Color: White.

C. Letter Height: 1/4 inch.

D. Background Color: Black.

2.03 TAGS

A. Manufacturers:
   1. Advanced Graphic Engraving
   2. Brady Corporation
   3. Brimar Industries, Inc
   4. Craftmark Pipe Markers
   5. Kolbi Pipe Marker Co
   6. Seton Identification Products, a Tricor Company

B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.

2.04 PIPE MARKERS

A. Manufacturers:
   1. Brady Corporation
   2. Brimar Industries, Inc

3. Craftmark Pipe Markers
4. Kolbi Pipe Marker Co
5. Seton Identification Products, a Tricor Company

B. Color: Comply with ASME A13.1.

C. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install tags with corrosion resistant chain.

C. Install plastic pipe markers in accordance with manufacturer's instructions.

D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

E. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.

F. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

SECTION 230593
TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Testing, adjustment, and balancing of air systems.

1.02 REFERENCE STANDARDS

A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition 2016.

B. ASHRAE Std 110 - Methods of Testing Performance of Laboratory Fume Hoods 2016.

C. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems 2008 (Reaffirmed 2017).

D. NEBB (TAB) - Procedural Standards for Testing Adjusting and Balancing of Environmental Systems 2015, with Errata (2017).

E. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing 2002.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
   1. Include at least the following in the plan:
      a. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
      b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
      c. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
      d. Final test report forms to be used.
      e. Detailed step-by-step procedures for TAB work for each system and issue, including:
         1) Terminal flow calibration (for each terminal type).
         2) Diffuser proportioning.
         3) Branch/submain proportioning.
         4) Total flow calculations.
         5) Rechecking.
         6) Diversity issues.
      f. Expected problems and solutions, etc.
      g. Criteria for using air flow straighteners or relocating flow stations and sensors; analogous explanations for the water side.
      h. Time schedule for TAB work to be done in phases (by floor, etc.).
      i. Procedures for formal deficiency reports, including scope, frequency and distribution.

C. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
   1. Revise TAB plan to reflect actual procedures and submit as part of final report.
   2. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
   3. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
   4. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
   5. Units of Measure: Report data in both I-P (inch-pound) and SI (metric) units.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. Perform total system balance in accordance with one of the following:
   1. AABC (NSTSB), AABC National Standards for Total System Balance.
   2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
   3. SMACNA (TAB).

B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.

C. TAB Agency Qualifications:
   1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
   2. Having minimum of three years documented experience.
   3. Certified by one of the following:
      a. AABC, Associated Air Balance Council: www.aabc.com/#sle; upon completion submit AABC National Performance Guaranty.
      b. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org/#sle.

D. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

E. TAB Supervisor Qualifications: Professional Engineer licensed in the State in which the Project is located.

F. Pre-Qualified TAB Agencies:
   1. Total Air Balance.
   2. Tabco.
   3. Precisionaire of the Midwest.
   4. CJD Engineering.

3.02 EXAMINATION

A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
   1. Systems are started and operating in a safe and normal condition.
   2. Temperature control systems are installed complete and operable.
   3. Proper thermal overload protection is in place for electrical equipment.
   4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
   5. Duct systems are clean of debris.
   6. Fans are rotating correctly.
   7. Air outlets are installed and connected.
   8. Duct system leakage is minimized.

3.03 PREPARATION

A. Hold a pre-balancing meeting at least one week prior to starting TAB work.

B. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect to facilitate spot checks during testing.

3.04 ADJUSTMENT TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.

B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

3.05 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.

B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.

C. Measure air quantities at air inlets and outlets.

D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.

I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

K. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.

L. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure near the building entries.

3.06 SCOPE

A. Test, adjust, and balance the following:
   1. Packaged Rooftop Heating/Cooling Units.
   2. Furnaces
   3. Air Inlets and Outlets.

3.07 MINIMUM DATA TO BE REPORTED

A. Air Moving Equipment:
   1. Location.
   2. Manufacturer.
   3. Model number.
   4. Serial number.
   5. Arrangement/Class/Discharge.
   6. Air flow, specified and actual.
   7. Return air flow, specified and actual.
   8. Outside air flow, specified and actual.
   9. Total static pressure (total external), specified and actual.
   10. Inlet pressure.
   11. Discharge pressure.

12. Sheave Make/Size/Bore.
13. Number of Belts/Make/Size.
14. Fan RPM.

B. Return Air/Outside Air:

C. Exhaust Fans:
1. Location.
2. Manufacturer.
3. Model number.
4. Serial number.
5. Air flow, specified and actual.
6. Total static pressure (total external), specified and actual.
7. Inlet pressure.
8. Discharge pressure.
9. Sheave Make/Size/Bore.
10. Number of Belts/Make/Size.
11. Fan RPM.

END OF SECTION

SECTION 230713
DUCT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Duct insulation.

B. Duct liner.

1.02 REFERENCE STANDARDS

A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus 2017.

B. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications 2013 (Reapproved 2019).

C. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation 2020.

D. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material) 2019.

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2020.

F. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials 2016.

G. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi 2015.

H. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER, FLEXIBLE

A. Manufacturer:
   1. Johns Manville
   2. JP Lamborn Co; Thermal Sleeve MT
   3. Knauf Insulation; Atmosphere Duct Wrap
   4. Owens Corning Corporation
   5. CertainTeed Corporation

B. Insulation: ASTM C553; flexible, noncombustible blanket.
   1. K value: 0.36 at 75 degrees F, when tested in accordance with ASTM C518.
   2. Maximum Service Temperature: 1200 degrees F.
   3. Maximum Water Vapor Absorption: 5.0 percent by weight.

C. Vapor Barrier Jacket:
   1. Kraft paper with glass fiber yarn and bonded to aluminized film.
   2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.

D. Vapor Barrier Tape:
   1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

2.03 DUCT LINER

A. Manufacturers:
   1. Armacell LLC; AP Coilflex: www.armacell.us/#sle.
   2. Ductmate Industries, Inc, a DMI Company; www.ductmate.com/#sle.
   3. Johns Manville; www.jm.com/#sle.
   4. Knauf Insulation; www.knaufinsulation.com/#sle.
   5. Owens Corning Corporation; QuietR Rotary Duct Insulation; www.ocbuildingspec.com/#sle.

   Note: Choose the liner type - Elastomeric Foam or Glass Fiber.

B. Glass Fiber Insulation: Non-corrosive, incombustible glass fiber complying with ASTM C1071; flexible blanket, rigid board, and preformed round liner board; impregnated surface and edges coated with poly vinyl acetate polymer, acrylic polymer, or black composite.
   1. Fungal Resistance: No growth when tested according to ASTM G21.
   2. Apparent Thermal Conductivity: Maximum of 0.31 at 75 degrees F.
   3. Service Temperature: Up to 250 degrees F.
   4. Rated Velocity on Coated Air Side for Air Erosion: 5,000 fpm, minimum.
   5. Minimum Noise Reduction Coefficients:
      a. 1 inch Thickness: 0.45.

C. Adhesive: Waterproof, fire-retardant type, ASTM C916.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NAIMA National Insulation Standards.

C. Insulated Ducts Conveying Air Below Ambient Temperature:
   1. Finish with tape and vapor barrier jacket.

D. External Duct Insulation Application:
   1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.

3.02 SCHEDULES

A. Exposed Rectangular Supply, Exhaust, Outside Air and Return Ducts:
   1. 1" duct liner.

B. Concealed Round Supply, Exhaust and Return Ducts Above Ceiling:
   1. 1.5" Flexible Fiberglass Insulation.

C. Concealed Rectangular Supply, Return, Exhaust and Outside Air Ducts Above Ceiling:
   1. 1.5" Flexible Fiberglass Insulation.

D. Rectangular Supply, Return, Exhaust and Outside Air Ducts located in Attic Space:
   1. 1.5" Flexible Fiberglass Insulation and 1” duct liner

E. Exterior Rectangular Supply and Return Ductwork:
   1. Pre-fabricated exterior rated ductwork.

END OF SECTION

SECTION 230923
DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC - SCHNEIDER ELECTRIC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. iBMS: Intelligent-building management system.

B. BMS: Building management system.

C. OWS: Operator system workstations and servers.

D. NSC: Network server controllers.

E. SDCU: Connected room solutions.

F. SDCU: BACnet IP controllers.

G. SDCU: BACnet MS/TP controllers.

H. Room controllers / thermostats.

I. I/O: Input-output devices.

1.02 RELATED REQUIREMENTS

A. Section 230593 - Testing, Adjusting, and Balancing for HVAC.

B. Section 230800 - Commissioning of HVAC.

1.03 ABBREVIATIONS AND ACRONYMS

A. Standard:
1. ASHRAE: American Society Heating, Refrigeration, Air Conditioning Engineers.
2. AHU: Air Handling Unit.
3. BAS: Building Automation System for HVAC, same as BMS.
4. BMS: Building Management System for HVAC, same as BAS.
5. BTL: BACnet Testing Laboratory.
6. Cx: Commissioning.
7. CxA: Commissioning Agent.
8. DDC: Direct Digital Controller.
9. EIA: Electronic Industries Alliance.
10. FIP: Field Interface Panel.
11. GUI: Graphical User Interface.
12. HMI: Human-Machine Interface, hardware- or software-based interface.
13. HVAC: Heating, Ventilation, and Air Conditioning.
14. iBMS: Intelligent Building Management System or BMS for facility services.
15. IEEE: Institute Electrical Electronic Engineers.
16. MER: Mechanical Equipment Room.
17. PID: Proportional, Integral, and Derivative.
18. VAV: Variable Air Volume Box.
19. RTC: Real time clock.

B. Communications and Protocols:
1. ARP: Address Resolution Protocol.
2. BACnet: Building Automation and Control Networks.
3. BACnet SC: BACnet Secure Connect.
4. CORBA: Common Object Request Broker Architecture.
5. CSMA/CD: Carrier Sense Multiple Access/Collision Detect.
6. DALI: Digital Addressable Lighting Interface.
7. DDE: Dynamic Data Exchange.
8. FTP: File Transfer Protocol.
9. FTT: Free Topology Transceivers.

10. HTTP: Hyper Text Transfer Protocol.
11. HTTPS: Hyper Text Transfer Protocol Secure.
12. IIOP: Internet Inter-ORB Protocol.
13. IP: Internet Protocol.
14. LAN: Local Area Network.
15. LON: Echelon Communication – Local Operating Network.
16. MS/TP: Master Slave Token Passing.
17. MQTT: Message Queuing Telemetry Transport.
18. Niagara: Fox Protocol.
19. OBIX: Open Building Information Exchange.
20. ODBC: Open Database Connectivity.
21. ORB: Object Request Broker.
22. RSTP: Rapid Spanning Tree Protocol
23. SNVT: Standard Network Variables Types.
24. SQL: Structured Query Language.
25. TCP/IP: Transmission Control Protocol over Internet Protocol (suite of protocols).
26. UDP: User Datagram Protocol.
27. XML: eXtensible Markup Language.

C. BMS Controllers:
1. NSC: Network or Supervisory Controller(s).
2. Server(s) loaded with BMS specific software.
3. OWS: Workstation(s) loaded with BMS specific software.
4. B-OWS: BACnet Workstation(s) loaded with BMS specific software.
5. EWS: Administration and Programming (Engineering) Workstations.

D. DDC Types:
1. B-ASD: BACnet Application Specific Device.
2. B-AAC: BACnet Advanced Application Controller.
3. B-ASC: BACnet Application Specific Controller.
4. HRC: Hotel Room Controller.
5. MPC: Multipurpose Controller.
6. NSC: Network Server Controller.
7. RC: Room Controller.
8. RPC: Room Purpose Controller.
9. SDCU: Standalone Digital Control Units or DDCs.
10. SLC: Supervisory Logic Controller.
11. SSC: Standalone Server Controller.
12. UEC: Unitary Equipment Controller.
13. VAVDDC: Variable Air Volume Direct Digital Controller.

E. Tools and Software:
1. AFDD: Automated Fault Detection and Diagnostic.
2. DR: Demand Response.
3. CCDT: Configuration, Commissioning and Diagnostic Tool.
4. POT: Portable Operator’s Terminal.
5. EPMS: Electrical Power and Energy Management Software.

1.04 REFERENCE STANDARDS

A. 21 CFR 11 - Part 11, Electronic Records; Electronic Signatures — Scope and Application; Current Edition.

B. 47 CFR 15 - Radio Frequency Devices; current edition.

C. 47 CFR 68 - Connection of Terminal Equipment to the Telephone Network; Current Edition .

D. ASHRAE Std 135 - A Data Communication Protocol for Building Automation and Control Networks; 2020, with Addendum (2024).

E. Bluetooth CS - Bluetooth Core Specification; 2016, Addendum 2017.

F. IEC 60929 - AC and/or DC-Supplied Electronic Control Gear for Tubular Fluorescent Lamps - Performance Requirements; 2011, with Amendment (2015).

G. IEC 62443-4-1 - Security for Industrial Automation and Control Systems – Part 4-1: Secure Product Development Lifecycle Requirements; 2018.

H. IEEE 802.3 - IEEE Standard for Ethernet; 2022, with Amendment (2024).

I. IEEE 802.11 - IEEE Standard for Information Technology--Telecommunications and Information Exchange between Systems - Local and Metropolitan Area Networks--Specific Requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications; 2020, with Amendment (2023).

J. IEEE 802.15.4 - IEEE Standard for Low-Rate Wireless Networks; 2020, with Corrigendum (2022).

K. ISO/IEC 27034-1 - Information Technology – Security Techniques – Application Security – Part 1: Overview and Concepts; 2011 (Corrigendum 2014).

L. LonMark Interoperability Guide - LonMark Application-Layer Interoperability Guide and LonMark Layer 1-6 Interoperability Guide; Version 3.4; 2005.

M. Modbus (PS) - The Modbus Organization Communications Protocol.; Latest Update.

N. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.

O. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

P. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

Q. NFPA 92 - Standard for Smoke Control Systems; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

R. UL 555 - Standard for Fire Dampers; Current Edition, Including All Revisions.

S. UL 555C - Standard for Safety Ceiling Dampers; Current Edition, Including All Revisions.

T. UL 555S - Standard for Smoke Dampers; Current Edition, Including All Revisions.

U. UL 864 - Control Units and Accessories for Fire Alarm Systems; Current Edition, Including All Revisions.

V. UL 916 - Energy Management Equipment; Current Edition, Including All Revisions.

W. UL 2043 - Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces; Current Edition, Including All Revisions.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Submittals:
   1. Product Data:
      a. Include manufacturer data for hardware and software products required to complete specified work.
      b. Develop and include schedules for valves, dampers, and air flow stations indicating location, size, configuration, capacity, and accessories.
   2. Shop Drawings:
      a. Develop drawings using Visio Professional or AutoCAD software and include pdf copies.
      b. Include riser diagram depicting location of each controller, workstations, and associated network wiring.

c. Include individual schematics of each mechanical system showing each connected point with reference to their associated controller. Typical will be allowed where appropriate.
d. Include narrative descriptions of sequences of operation, program listings, point lists, and complete list with descriptions of graphic-panels, reports, alarms, and configuration work furnished as part of _WS software work.

3. Provide five hardbound copies using three-ring binder with index and tabs. Include diagrams using folded 11 by 17 inch (297 by 210 mm) paper size. Make printed copies in color when color is used to differentiate information.
4. Provide soft-copy loaded on CD, DVD, thumb drive, or downloadable content-holding web page.
5. Once reviewed, return hardbound or pdf submittal; copy may include review comments for corrections or requesting additional data required for approval. Address written comments and update content until document is fully approved. Once approved, work can begin.
6. Certificates:
   a. Certify that products of this section meet or exceed specified requirements.
   b. Reputable third party certification stating that supplier and vendor conformance with IEC 62443-4-1 Security Development Lifecycle process.
   c. Certify that vendor controls guidance for IT and OT convergence comply with ISO/IEC 27034-1 and IEC 62443-4-1 Security Development Lifecycle.
   d. Certify that system supplier and installer were subject to regular and verifiable best practice Cybersecurity testing by manufacturer. Results of this testing will be made available upon request prior to system deployment.
7. Evaluation Service Reports: Show compliance with specified requirements.
8. Manufacturer qualification statement.
9. Installer qualification statement. Include specifics for fiber optic work.

C. Maintenance contract.

D. Executed warranty.

E. Specimen warranty.

F. Project Record Documents:
   1. Closeout Submittal:
      a. System architecture drawing.
      b. Layout drawing for each control panel.
      c. Wiring diagram for individual components.
      d. System flow diagram for each controlled system.
      e. Instrumentation list for each controlled system.
      f. Sequence of control.
      g. Binding map.
      h. BMS Schedule: IP and field level addresses with communication settings.
      i. Operation and Maintenance Manuals.
   2. BMS-Specific References:
      a. Product manuals for key software tasks.
      b. Operating the system.
      c. Administrating the system.
      d. Engineering the OWS and EWS.
      e. Application programming.
      f. Engineering the network.
      g. Setting up the web server.
      h. Report creation.
      i. Graphics creation.
      j. All other engineering tasks.
      k. System architecture diagram.

l. List of recommended maintenance tasks with description and frequency for associated system, data, and web servers, operator workstations, and web clients.
m. Product manual reference that includes task executing instructions.
n. Names, addresses, and telephone numbers of installing contractors and service representatives for equipment and control systems.
o. Licenses, guarantees, and warranty documents for equipment and systems.

3. Site-Specific Information:
a. System architecture diagram for components annotated with specific location information.
b. As-built drawing for each control panel.
c. As-built wiring design diagram for each component.
d. Installation design details for each I/O device.
e. As-built system flow diagram for each system.
f. Sequence of control for each system.
g. Building binding map.
h. Product data sheet for each component.
i. Installation data sheet for each component.

G. Software:
1. Provide copies of each loaded software with associated licensing documentation and support contact information. Indicate that licensing is in Owner name for sign-off.
2. Once signed, manufacturer's standard software and firmware licensing agreement grants unrestricted usage of the same including custom-developed programs and applications denoting manufacturer's right to disclose of trade secrets contained within source or applied software code.
3. Licensing agreement will not preclude software use by third-party individuals for tasks related to commissioning, servicing, or future altering of installed-system configuration as long as licensed software products reside within Owner-controlled devices.
4. Firmware Files: Submit copy of pre-installed or downloaded firmware files loaded on electronic-erasable memory of installed devices unless firmware is loaded on non-erasable chip requiring factory or field replacement(s).
5. Project-developed software, files, and documentation is to become Owner property. These include but are not limited to:
a. Server and workstation software.
b. Application programming tools and listing.
c. Configuration tools.
d. Network diagnostic tools.
e. Addressing tools.
f. Application files.
g. Configuration files.
h. Graphic files.
i. Report files.
j. Graphic symbol libraries.
k. Descriptive point lists.
l. Application program listing.
m. Application programs with comments.
n. Printouts of each report.
o. Alarm list.
p. Printouts of each graphic panel.
q. Commissioning and system startup reports.
r. Copy of each database, configuration file, or specific system file developed.

H. Maintenance Materials:
1. See Section 016000 - Product Requirements for additional provisions.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least three years of documented experience.
   1. Unlisted Manufacturers: Other manufacturers interested in participating as acceptable bidders for this project not listed as prequalified will furnish detailed technical prebid submittal with associated information to Architect at least two weeks prior to published bid date to allow adequate time to review bidder's credentials and capabilities.

B. Installer Qualifications:
   1. Provide proof of being listed as authorized distributor or branch office of specified manufacturer specializing in performing work of specified type and with at least three years of documented experience.
   2. Provide address of existing full service facility within 100 miles (160.0 km) of the work site:
      a. Staffed with engineers trained and certified by manufacturer for BMS configuration, programming, and service.
      b. Staffed with technicians fully capable of providing instructions, maintenance, and emergency service on installed system components.
   3. Installers not listed as prequalified will submit credentials as detailed in prebid submittal for Architect review at least two weeks prior to bid date. Failure to follow attached formats will disqualify potential alternate bidders. Credentials must attest that installer meets specified requirements. Architect judgment regarding approval to bid as an acceptable installer after reviewing submitted data will be final.

C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of type specified in this section.

D. Documents at Project Site: Maintain one copy of manufacturer instructions and shop drawings.

1.07 DELIVERY, STORAGE, AND HANDLING

A. See Section 017419 - Construction Waste Management and Disposal for packaging waste requirements.

B. Prior to delivery, ensure suitable storage space is available to store products and materials in well-ventilated area protected from weather, moisture, soiling, extreme temperatures, extreme humidity, and corrosive atmospheres within manufacturer-stated storage requirements.

C. Deliver materials to project site in supplier's or manufacturer's original wrappings and containers, labeled with supplier's or manufacturer's name, material or product brand name, and equipment tag number or service name as identified within contract documents.

D. Store materials indoor in clean, dry space with uniform temperature to prevent condensation. In addition, protect electronics from electrical and magnetic energy emanations that could reasonably cause damage.

E. Inspect and report any concealed damage or violation of delivery storage, and handling requirements to Architect.

1.08 WARRANTY

A. See Section 017800 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide 1-year manufacturer warranty for components, software, parts, and other furnished products. Complete forms in Owner name and register with manufacturer.

C. Installer Warranty:
   1. Provide 1-year warranty for furnished and installed products commencing on Date of Substantial Completion. Complete forms in Owner name and register with installer.
   2. Act as manufacturer-agent to apply manufacturer warranty against defects in materials and workmanship for furnished products.
   3. Verify corrective software modifications made during warranty period are updated on user documentation and both user and manufacturer archived software disks.

4. Furnish labor to repair, reprogram, or replace these products and components at no extra charge during normal working hours within warranty period.
5. Ensure warranty service request response issued within 24 business hours from initial request.

D. Extended Correction Period: Correct defective work within 2-year period commencing on Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Schneider Electric: EcoStruxure Building Operation: www.se.com/#sle.
1. _WS; WebStation: EcoStruxure Building Operation.
2. NSC: AS-B Series, SpaceLogic Edge Server.
3. SDCU: BACnet IP Controllers: MP/RP Series, SpaceLogic IP Controllers.
4. SDCU: Connected Room Solutions: RPC Series, SpaceLogic IP Controllers.
5. SDCU: BACnet MS/TP Controllers: MP/RP EasyLogic Series.
6. SDCU: LonWorks Controllers.

B. Substitutions: See Section 016000 - Product Requirements.

C. Source Limitations: Furnish products produced by same manufacturer as other controls systems, produced by single manufacturer, and obtained from single supplier.

2.02 BAS - OPEN, INTEROPERABLE ARCHITECTURE DESCRIPTION

A. BAS provides control, alarm detection, scheduling, reporting, graphical, and information management for entire facility over LAN or WAN by using distributed NSCs, SDCUs, and OWS. Modular BAS design is intended for distributed processing capability that allows future expansion.

B. Open architecture that utilizes ASHRAE Std 135 or LonTalk protocol, BACnet protocol for interoperability with equipment supporting HVAC open protocols to reduce future building maintenance, upgrade, and expansion costs.
1. BACnet:
   a. BACnet devices connect via Ethernet IP or MS/TP.
   b. Support BACnet SC node, hub, and router functions as defined in Annex AB of ASHRAE Std 135.
   c. AAC devices capable of communicating either as MS/TP device or BACnet IP device on TCP/IP trunk.
   d. BACnet system architecture utilizes MS/TP selectable between 9.6 to 76.8 kbaud as common communication protocol between controllers to assure interoperability between system components.
2. LonTalk:
   a. Encapsulate LonTalk packets into TCP/IP messages to take advantage of existing infrastructure or to increase network bandwidth where necessary or desired.
   b. Encapsulate LonTalk protocol into IP datagrams; comply with existing LonMark guide functionality lines based on industry-standard protocols.
   c. Encapsulate LonTalk protocol into IP datagrams to comply with existing LonMark guide functionality lines, based on industry standard protocols.
   d. Connect physical LonWorks devices via Ethernet IP or FTT-10A.
   e. Products used in constructing BMS to comply with LonMark.
   f. When Lon-Mark devices are unavailable, BMS system supplier provides device resource files and external interface definitions for LonMark devices.
3. Modbus2: System supports both TCP and RTU protocols natively and use of gateways not required.
4. Include software tools required for network management of both LonTalk and BACnet protocols.

C. System Features:

1. Complete temperature-control DDC with electronic sensors and electronic or electric actuation of MER valves, dampers, and electronic actuation of terminal equipment valves and actuators.
2. BMS seamlessly connects devices throughout building regardless of subsystem type, such as variable frequency drives, low-voltage lighting systems, electrical circuit breakers, power metering, and card access easily coexist on same network channel.
3. Supplied system required to access all data using HTML5-enabled browsers without requiring proprietary operator interface and configuration programs. Do not require system browser to enable JAVA.
4. Hierarchical topology required to assure reasonable system response times and to manage the flow and sharing of data, without unduly burdening customer's internal Intranet network.
5. Scalable and expandable at each system level using same software interface, TCP/IP level, and fieldbus level controllers. Systems requiring replacement of either workstation software or field controllers in order to expand system are unacceptable.
6. BAS is capable of operating normally without restrictions at multiple software version levels. Enterprise Servers manage NSCs of different versions, provided that Enterprise Server is same or newer version than most recent interconnected NSC version.

D. System Components:
   1. OWS:
      a. BACnet clients to comply with B-OWS device profile with ability to support data read and write functionality.
      b. Administration and Programming Workstations: Workstation or server-loaded, front-end manufacturer-specific, factory-tested software for system operation that conforms to B-OWS device profile. Third-party workstation software is not acceptable.
      c. Web-Based Operator Workstations: Utilizes compatible web browser interface for direct access into system points, graphics, setpoints, alarms, and related features such as trends, reports, charts, and other engineering tools typically available at workstation end. Comply with B-OWS device profile. No additional computer hardware required to support web-based user interface.
   2. NSC:
      a. Ethernet-based controller with built-in router connects with system workstations at minimum speed of 100 Mbps for communication with SDCU and/or other Input/Output Modules.
      b. Comply with BACnet device profile B-BC. NSC utilizing RS-232 serial or ARCNET to communicate with workstations are not acceptable.
      c. NSC supports using graphical and/or line application programming language.
      d. Web-based operation is directly supported by NSCs without additional software requirements.
      e. NSC Native Protocols: Each NSC supports Modbus RTU/ASCII (and J-bus), Modbus TCP, BACnet MS/TP, BACnet IP, LonTalk, and WebServices as native protocol without needing to provide multiple NSCs nor additional software, allowing native support of 3-concurrent protocols.
      f. NSC fieldbus layer supports the following types of SDCUs:
         1) BACnet IP: Supports up to 5 subnetworks of 50 SDCUs connected in daisy chain topology, totaling 250 SCDUs or 6 RSTP subnetworks of 39 SCDUs totaling 234 SDCUs maximum.
         2) BACnet MS/TP: Supports up to 2 subnetworks of up to 127 SCDUs at minimum speed of 76.8 kbps connected in daisy chain topology, totaling 254 SDCUs.
         3) LonWorks: Supports up peer-to-peer, event-driven FFT-10A subnetwork of up to 64 SCDUs at minimum speed of 76.8 kbps connected in daisy chain topology. If using TAC Xenta controllers, then 30 of the 64 can be Xenta SDCUs. If using I/A MNL controllers, then up to 127 SDCUs can be supported.

4) Modbus: Supports up to 2 subnetworks of 31 SDCUs when Modbus RTU (RS-485 or RS-232) is used totaling 62 SDCUs. If utilizing Modbus TCP, then supports up to 100 SDCUs.
5) EnOcean: Supports wireless devices in 315, 868, or 902 Mhz frequency band. This protocol requires external-mount RP-SMA antenna.
6) ZigBee Pro: Supports wireless devices. This protocol requires external-mount RP-SMA antenna.

3. SDCUs: Standalone microcomputer controllers of modular design containing I/O and programs for application specific or programmable control. Typically furnished for distributed control of mechanical equipment such as air handlers, central plant heating and/or cooling equipment, and terminal units. Comply with BACnet device profile B-AAC.
4. Enterprise Level BAS:
   a. Consists of an Enterprise Server which enables multiple NSCs, including all graphics, alarms, schedules, trends, programming, and configuration; accessible from a single workstation simultaneously for operations and engineering tasks.
   b. Supports built-in reporting functionality without dependency on other software.
   c. Supports standard data accessing for third-party reporting or analytics software.
   d. Supports hosting up to 250 servers or NSCs beneath it.
   e. Supports robust reporting capability outside of trend chart and listing OWS capacity by using Microsoft Windows SQL software which can be installed on same computer as Enterprise Server. Use Timescale DB compression to allow server disk space reduction.
   f. Supports deployment of central server that gathers and reports on data from as many as 50 different Enterprise Level BAS Servers to accommodate very large sites with requirements for full data aggregation.

E. LAN:
1. Consists of 10/100 Mbps Ethernet network that supports BACnet, Modbus, XML, and HTTPS protocols for maximum integration flexibility of building data with enterprise information systems while providing support for multiple interconnected NSCs and OWSs.
2. Configure system using top-level 10/100 Mbps Ethernet network using BACnet/IP, LonWorks IP, and/or Modbus TCP protocol installed in lengths under 300 feet (91 mm).
3. Comply with IEEE 802.3 at the Enterprise level and utilize CSMA/CD protocol, ARP, and UDP.
4. Supports having each NSC, workstation, and server residing directly on Ethernet TCP/IP LAN/WAN with no required gateways. NSCs, workstations, and servers can use standard, commercially available, off-the-shelf Ethernet infrastructure components such as routers, switches, and hubs; allows Owner to utilize existing, new enterprise network, or structured cabling system with option delegating maintenance to IT or Information Systems Department.

F. WAN:
1. BAS supports software segmentation into multiple LANs distributed over WAN so a workstation can manage a single LAN, building, and/or entire system while keeping each LAN segment portion on updated database.
2. Single WAN isolated behind campus firewall connects each building at TCP/IP protocol utilizing fixed IP addresses at each WAN-connected device.
3. If WAN network access is not provided by client network manager, provide secure temporary network access point until permanent WAN access point is provided.

G. Provide equipment and labor not specifically referred to herein or on the plans, and required to meet functional intent, without additional cost to Owner.

H. Ensure work described in this section is installed, wired, circuit tested, and calibrated by factory-certified technicians qualified for this work and in regular employment of approved manufacturer local field office, with minimum of three years of documented installation

experience with the manufacturer. Include documented experience in bid and submittal package verifying longevity of installing company relationship with manufacturer.

I. Ensure system supervision, hardware engineering, software engineering, calibration, and checkout services are executed by direct employees of approved manufacturer local field office that are not subcontracted.

J. Ensure controls contractor support facility located within 100 miles of site provides factory-certified technicians and engineers, spare parts inventory, necessary testing and diagnostic equipment required for installed system, and offers emergency services 24 hours per day, 7 days per week.

K. Provide Commissioning, Configuration, and Diagnostic Tool (CCDT) consisting of color-displayed personal computer software and interfaces for uploading or downloading I/O objects, monitoring overrides, timed overrides, and controller resident time schedules for High Point Count Controllers (AAC), Unitary Equipment Controllers (UEC), and VAV Controllers (VAVDDC).

2.03 IBMS: INTELLIGENT BUILDING MANGEMENT SYSTEM

A. BMS that includes additional capacity and interface-specific features to host both HVAC and non-HVAC systems for specific intelligently coordinated automatic control; see Section 251500.

2.04 BMS: BUILDING MANGEMENT SYSTEM

A. Open architecture that utilizes ASHRAE Std 135 or LonTalk protocol, BACnet to assure interoperability between interconnected system components such as NSCs, SDCUs, OWS, and others while ensuring that full project support using open protocols to reduce future building maintenance, upgrade, and expansion costs.

B. Graphical, web-based, operator interface that allows for instant system access using standard browser to PC-based workstations, mobile devices, and microcomputer controllers of modular design providing distributed processing capability and allowing future expansion of both input/output points and processing/control functions.

C. Seamlessly connect devices throughout the facility regardless of subsystem type where variable frequency drives, low-voltage lighting systems, electrical circuit breakers, power meters, and card access system easily coexist.
   1. Web-browser interface is to access data using HTML5 markup language to present content without requiring proprietary operator interface, special configured programs, or JAVA-supported software.
   2. Data to reside in supplier-installed server for common database access.
   3. Determine hierarchical topology required to assure reasonable system response times and to manage the flow and sharing of data without unduly burdening the Intranet network.

D. Field HMI: Provide HMI app for portable devices; see Section 253500.

E. System Expansion Requirements:
   1. Scalable and expandable using existing software interface and controllers. Systems that require software or field controller replacement(s) in order to expand it will not be acceptable.
   2. The Enterprise Server will manage one or more NSCs loaded with matching or previous software versions as long as the server operates using matching or most recent software version.

F. Software Tools: Include commissioning, configuration and diagnostic tool (CCDT) software tool and required special connectors to interface each field-installed DDC.

G. Automatic Fault Detection and Diagnostic for HVAC Controls: See Section 250190.

H. Balance of Work:
   1. Safety Interlocks: Provide wiring and incidental items such as relays to enable this functionality as indicated on drawings besides those listed.

a. Air handler shutdown from duct-mounted smoke detectors or fire alarm panel in compliance with NFPA 90A.
b. Boiler plant shutdown from emergency shutdown hand-stations or safety devices.
c. Chiller plant shutdown and leak-purge ventilation from refrigeration-leak detector or other safety devices.
d. Smoke control management from fire smoke control panel, fire alarm system, or other safety device(s) in compliance with UL 555, UL 555C, UL 555S, and UL 864 UUKL.
e. Stairwell pressurization control when enabled from fire alarm system or other safety device(s).

2. Except as otherwise specified, review approved submittals to identify and provide HVAC-control interface products when equipment manufacturer or system division does not provide these as indicated on drawings.
3. Provide HVAC controls for the following:
   a. Air handling units.

I. Communication Requirements:
1. Network: Extend existing Ethernet backbone in compliance with IEEE 802.3 at minimum speed of 100/10 Mbps.
   a. Support XML HTTPS and other listed protocols for maximum flexibility of building data integration with enterprise information systems and providing support to multiple NSC and OWS.
   b. Enterprise Systems: Utilize Carrier Sense Multiple/Access/Collision Detect (CSMA/CD), Address Resolution Protocol (ARP) and User Datagram Protocol (UDP).
2. Link NSC and _WS devices over LAN/WAN communications using BACnet IP, LonWorks IP, Modbus IP or combination thereof.
3. Segmentation: Allow software linked-device segmentation into multiple LAN across WAN.
4. Gateways: Not allowed, unless noted otherwise.
5. Configure using graphical and/or line-based NSC application programming language.
6. Connect each building over TCP/IP layer on single WAN isolated behind campus firewall using fixed IP address for each WAN connected device.
7. Configure _WS to interface and manage one or more building system while keeping their respective databases separate.
8. BMS devices including NSCs, _WS, and servers will reside directly on Ethernet TCP/IP LAN/WAN with no required gateways using standard, commercially available, off-the-shelf infrastructure components such as routers, switches, and hubs interconnected over new or existing structured cabling system thus allowing direct control by assigned IT Department.

J. Electronic Records; Electronic Signatures Requirements:
1. Provide factory-configured BMS software to execute in compliance with 21 CFR 11.
2. Subpart B - Electronic Records, Section 11.10 - Controls for Closed Systems:
   a. Validate systems to ensure accuracy, reliability, consistent intended performance, and ability to discern invalid or altered records.
      1) Altered Records Detection: If records can be altered by tools outside the BMS then detect and trace each action on each altered record. Include copy of each altered record as detected in the audit trail.
      2) Detection of Invalid Records: Configure system to detect invalid records.
      3) Records: System to generate accurate and complete records including metadata.
   b. Generate accurate and complete copies of electronic records (e-records) in both human readable and electronic form suitable for inspection, review, and copying. Include reference for direct contact in case of questions regarding ability to perform such review and copying.

1) Support viewing of e-records or generation of valid paper copies. Audit and historical data viewable from within BMS operating system with no need for additional viewers.
2) Export e-records to portable file formats, either manually or automatically on demand or via schedule. Format audit and historical data into pdf reports protected by digital certificates. In turn, digitally signed reports can be verified using standard technologies such as Adobe Acrobat Reader.
3) Enable review of, and production of reports on historical data for custom filtered time period(s) throughout the full retention period.
4) Produce Mean Kinetic Value/Temperature reports for custom filtered time period(s) throughout the full retention period.

c. Configure protection of records to enable their accurate and ready retrieval throughout the records retention period.
1) Archive e-records using standard file format when internal retention strategy does not include keeping e-records in the originating system format.
2) For automated archiving, include transaction safeguards to prevent deletion of e-records from source until confirmed as successfully archived.

d. Limit system access to authorized individuals:
1) Include security mechanism that uses at least two distinct identification components (e.g., User ID/ password, PKI mechanisms) or biometrics. System users will gain access via unique user name and encrypted password.
2) Allow setting individual accounts; shared accounts for access levels other than read only, are not acceptable.
3) Passwords must be stored using encrypted form. In case encryption of passwords is not possible, then file(s) containing passwords and user-IDs will be secured by technical means and their access strictly controlled with no read option by any user; include SOP/strict instructions for administrator(s) to access and read secured file(s) containing password and user-IDs references.
4) Screen displayed password entry fields will be obscured when being filled (e.g., *********).
5) Allow for quality passwords that use configurable number of alphanumeric and special characters and enforce their use. Establish password policy to allow for password aging, quantity of characters, types of characters, required cases and frequency of reuse.
6) Include log-off mechanism to execute after predefined period of user inactivity, or mechanism where user ID entry is required after inactivity period.
7) System is to force users to change their password after the first login. Changes to passwords or to other properties of users (except for one’s own password) will require approval and signature of two people with both user names and comments recorded permanently in the audit trail.

e. Use of secure, computer-generated, time-stamped audit trails to independently record operator date and time entries and actions that create, modify, or delete electronic records. Record changes are not to obscure previously recorded information. Such audit trail documentation will be retained and available for agency review and copying.
1) Provide secure, computer-generated time stamped audit trails for e-records every time operator entries or actions create, modify or delete electronic records.
2) Computer-generated audit trails contain information about the person or equipment performing the activity, date and time of execution, and what was changed or done.
3) The audit trail changes recorded are not to obscure or destroy original recorded information.
4) Audit trails cannot be turned off.

5) Audit trails will be available for review and be copied during the entire retention period.
6) Audit trails will be part of each back up.
7) Computer-generated audit trails record every hour and minute and be as precise as required by intended business process (e.g., to verify correct sequencing of events).
8) Use server time for time stamp generation.
9) Subject time and date settings to rigorous control to ensure accuracy of time stamps. Provide ability to restrict access to time settings. Prevent users from changing time and date settings.
10) Time clock can be synchronized to central system.
11) System spanning multiple time zones will be able to display and print time zone used.
12) Audit trails can be reviewed.

f. Use of authority checks to ensure that only authorized individuals can use the system, electronically sign a record, access the operation or computer system input or output device, alter a record, or perform the operation at hand.
1) System to apply authority checks to ensure that only authorized individuals can:
(a) Make use of system functions and features.
(b) Electronically sign a record.
(c) Create, modify, inactivate/logically delete, or delete records.
(d) Access input and/or output devices.
(e) Perform operations at hand.
2) Implement authority checks by role-based access.
3) Automatically system captured records (e.g., process data) must not be modified. Provide mechanisms that prevent users, except system administrators, from having access other than “read” to such records. If the system lacks such controls, computer-generated audit trails must be implemented.
4) If it is critical for intended process that specific hardware items, devices, or equipment (e.g., shop-floor terminals, barcode readers) create, submit or modify records then include reporting and alarm features (prompts, flags, or other help features) in place to ensure consistency of records and to alert user of records being out of acceptable range.

3. Subpart B - Electronic Records, Section 11.50 - Signature Manifestations:
a. Signed electronic records will contain information associated with the signing that clearly indicate the following:
1) The printed name of the signer.
2) The date and time when the signature was executed.
3) The meaning (such as review, approval, responsibility, or authorship) associated with the signature.
(a) The system is to record the unique identifier of the person executing the signature, the date & time of the signature, the meaning of a signature (e.g., approval, review, responsibility, authorship) for/ to each signature event. Ideally, e-signatures will be applied directly to records. Alternatively, separate e-signature records are allowable if they are unambiguously linked with the record to which they apply.
(b) Ensure that each user is uniquely identifiable in the system. Where the user ID is not the user’s full name, ensure it is traceable to the user’s full name. This does not impact the requirement that signed records used for GxP purposes will display the full name (at least name & surname) of the signer.
(c) The system is to allow for preprogramming of signature meanings (e.g., via configurable picklists), if this makes a good business sense, e.g., in case of predictable and/or recurrent signature meanings (e.g., approval / rejection

of documents). Where preprogramming of meanings for signatures appears not useful, implement free text comments associated with the signature.

4) Only specifically designated users will be given the right to sign records.
5) Users' rights to sign records can be controlled by schedule.
6) Users' rights to sign records can be controlled by location, i.e., IP address.
7) System capable of working either with single signature approval, or dual signature approval. When two signatures are required, the audit trail must include a separate time entry for each signature and a separate area for each signer to record that signer's individual comments or justification. Each are separate events in the event log, and the action requested is to take place when both signatures have been completed in their entirety.
8) System to provide means for differentiated user-level permissions based on location and/or time of day.

b. The items identified in this section will be subject to the same controls as for electronic records and will be included as part of any human readable form of the electronic record such as electronic display or printout.
   1) Whenever a signed record is required to remain used for GxP purposes, ensure that the full name (at least forename and surname) of the signer, date and time of the application of the signature and meaning of the signature are displayed and printed.
   2) Electronic signatures and handwritten signatures executed to electronic records will be linked to their respective electronic records to ensure that signatures cannot be excised, copied, or otherwise transferred to falsify an electronic record by ordinary means.

4. Subpart C - Electronic Signatures, Section 11.100 - General Requirements:
   a. Each electronic signature will be unique to one individual and will not be reused by, or reassigned to, anyone else.
      1) The system must not accept duplicate user accounts. The system will maintain the uniqueness of each combined identification code and password, such that electronic signature will be unique to one individual and will not be reused or reassigned to anyone else.
      2) The system must not allow the removal of any retired accounts. If an account becomes inactive due to a person's change in employment status, that account must continue to remain associated with all previous activities.
5. Subpart C - Electronic Signatures, Section 11.200 - Electronic Signature Components and Controls:
   a. Electronic signatures that are not based upon biometrics are to:
      1) Employ at least two distinct identification components such as an identification code and password.
         (a) When an individual executes a series of signings during a single, continuous period of controlled system access, the first signing will be executed using all electronic signature components; subsequent signings will be executed using at least one electronic signature component that is only executable and designed for use only by the individual.
         (b) When an individual executes one or more signings not performed during a single, continuous period of controlled system access, each signing will be executed using all of the electronic signature components.
      2) Be used only by their genuine owners.
      3) Be administered and executed to ensure that attempted use of an individual electronic signature by anyone other than the genuine owner requires collaboration of two or more individuals.
   b. Systems must be designed to require two components for the execution of the first e-signature within a session (e.g., User ID and password).

c. The system will be designed to require the private component for the execution of subsequent signings within a session.
d. To facilitate work, it is allowed that the system prepopulates automatically the user identification information (also for the first signature).

6. Subpart C - Electronic Signatures, Section 11.300 - Controls for Identification Codes/Passwords:
   a. Ensuring that identification code and password issuance are periodically checked, recalled, or revised (e.g., to cover such events as password aging).
      1) The system will support password-aging processes (prompts for password renewal after user adjusted number of calendar days).
      2) The system will allow for configuration of the password aging parameter.
      3) The setting of the password aging parameter will be limited to duly authorized personnel only.
      4) The system will ensure that an identification code and password are periodically checked, recalled, or revised.
      5) Check that the system can lock a user account after a specified number of failed access attempts.
   b. Use of transaction safeguards to prevent unauthorized use of passwords and/or identification codes, and to detect and report in an immediate and urgent manner any attempts at their unauthorized use to the system security unit, and, as appropriate, to organizational management.
      1) The system will be able to log unauthorized access attempts.
      2) The system will be able to detect potential unauthorized access attempts and notify immediate and urgent manner the system administrator.

2.05 _WS: SYSTEM WORKSTATIONS AND SERVERS

A. OWS, General:
   1. Password-protected, licensed system-interface through standard web browser for access to monitor and control system objects such as points, graphic-panels, alarms, graphics, setpoints, trends, reports, and other objects described herein.
   2. Conform to B-OWS BACnet device profile.
   3. Hardware can be thick-client for OWS or thin-client for WebStation (webOWS).

B. EWS, General:
   1. PC-based programming device loaded with standard software developed and tested for full compatibility with system components. Third party front-end workstation software will not be acceptable.
   2. Computer-device loaded with configuration and application-programming software required to create or modify BMS objects such as NSC and server-loaded databases.

C. Enterprise Server or Enterprise Central Server: Provide for coordination of large site or multi-site systems.

D. Communications: Application-programming software will communicate with NSCs using high-resolution color graphics for alarms, trend charts and stored data presentation of user configurable data captures.

E. Automatic Client/Server (_WS/NSC) Configuration: Changes or additions applied at single _WS will automatically appear in other _WS regardless of type. Applied updates are executed at NSC level, therefore central database systems will not be acceptable.

F. System Requirements:
   1. Client License Type:
      a. OWS: Provide three licenses.
      b. EWS: Provide one license.
      c. WebStation (webOWS): Provide three licenses.
      d. Enterprise Server: Provide one license.
      e. Enterprise Central: Provide one license to host up to 250 NSCs.

2. Computer Hardware Requirements by Client License Type:
   a. OWS:
      1) Processor: Intel Core i5 at 3.0 Ghz or higher processor.
      2) Memory: 8 Gb or higher.
      3) Communications: 10/100/1000 Mbps Ethernet, USB v. 2.x or later.
      4) Storage: 1 Tb or higher using solid-state hard drive.
      5) Operating System: Microsoft Windows 11.
      6) Other Software Required: Microsoft .Net version 4.7.2 or later.
   b. EWS:
      1) Processor: Intel Core i5 at 3.0 Ghz or higher processor.
      2) Memory: 8 Gb or higher.
      3) Communications: 10/100/1000 Mbps Ethernet, USB v. 2.x or later.
      4) Storage: 1 Tb or higher using solid-state hard drive.
      5) Operating System: Microsoft Windows 11.
      6) Other Software Required: Microsoft .Net version 4.7.2 or later.
   c. WebStation (webOWS):
      1) Owner-provided device loaded with internet browser which may include Google Chrome v.71 or higher, Mozilla Firefox v.64 or higher, Microsoft Edge (HTML) v.17 or higher, or Safari v.11.4 or higher.
      2) No additional software required for NSC supported operation, there will be no cap on support of multiple webOWS other than what internal-NSC CPU and memory capacity can support.
   d. Enterprise Server:
      1) Processor: Intel Core i5 at 3.0 Ghz or higher processor.
      2) Memory: 8 Gb or higher, recommended.
      3) Communications: 10/100/1000 Mbps Ethernet, USB v. 2.x or later.
      4) Storage: 1 Tb or higher using solid-state hard drive.
      5) Operating System: Microsoft Windows Server 2022.
      6) Other Software Required: Microsoft .Net version 4.7.2 or later.
      7) External Log Storage: Microsoft SQL Server 2016 SP1 and later.
   e. Enterprise Central Server:
      1) Processor: Intel Core i5 at 4.0 Ghz or higher processor.
      2) Memory: 12 Gb or higher.
      3) Communications: 10/100/1000 Mbps Ethernet, USB v. 2.x or later.
      4) Storage: 4 Tb, recommended using solid-state hard drive.
      5) Operating System: Microsoft Windows Server 2022.
      6) Other Software Required: Microsoft .Net version 4.7.2 or later.
      7) External Log Storage: Microsoft SQL Server 2016 SP1 and later.
3. Owner-Provided Hardware: Follow minimum requirements listed by Client-License type; See Section 251119 for workstations and 251113 for servers.
4. WebStation (webOWS) Requirements:
   a. General:
      1) BAS web-based workstations (WebStation) to support minimum of 100 concurrent users.
      2) Day-to-day system operation will be accessible through standard web-browser interface, allowing technicians and operators to view any part of the system from anywhere on the network.
      3) Provide system access on site via mobile device environment with as minimum full access to view and overwrite system values.
      4) View predefined groups of points with their values updated automatically.
      5) Provide same graphical capabilities as the OWS but automatically reformatting displayed data for use on smaller device(s).

6) Automatically detect light mode and dark mode settings within operating system and adapt accordingly.
7) Support light/dark display mode setting override independent of operating system's setting.
8) Automatically respond and adapt to different screen sizes and orientations from smart phone to smart televisions regardless of size.
9) Support slideshow functionality.
10) Support presentation mode that when enabled will have any functionality for interactivity disabled.
11) Support full screen mode for displaying alarm views, graphics, dashboards, or custom reports.

b. Graphic Displays:
1) Share same graphical displays as EWS presenting dynamic data on site layouts, floor plans, and equipment graphics. Support commands to change setpoints, enable/disable equipment, and start/stop equipment.
2) Navigate through entire system to change point value or status within any controller. AppleID changes are effective immediately and recorded for storage within system database.
3) Out-of-the-box dashboards that enable customizable views of live data which can be public to users or capable of being user-specific based on log in credentials.
4) Allow user to create custom dashboards.
5) Kiosk mode which allows display of occupant level data on monitors or tablets throughout the building.

c. Alarm Management:
1) Systems requiring additional client software WebStation viewing will not be considered.
2) Include live alarm viewer identical to OWS or EWS alarm viewer.
3) Once allowed, users must be able to receive, silence, and acknowledge alarms.
4) Allow operator to provide input addition to alarm record before acknowledgement using viewable attachment(s), checklists, and direct operator text input.

5. Administration and Programming Software:
a. Allows system architecture configuration setup consisting of client-server relationships where _WS operates as client(s) while NSC(s) as server(s).
b. Allows client device configuration for data presentation with input validation and server configuration for data gathering and delivery.
c. Allows data presentation configuration of alarms, reports, graphic-panel(s), and graphic charts generated using short or long term data captures and operator-initiated control actions such as schedule and setpoint adjustments.
d. Allows online or offline SDCU programming from any OWS while keeping associated information available within NSC-stored graphic or text displays.
e. Allows configuration of graphic displays featuring animation effects that enhances data presentation to alert operators of problems and facilitates locating specifics using mouse selectable operator functions.

6. User Interface:
a. Allow creation of custom, browser-style user-linked interface(s). Also, allow creation of customized group-assigned workspace.
b. User-linked interface to support creation of "hot-spots" that can be linked to view, edit, or configure any system object. Furthermore, allow interface to become "PC Desktop" with links to run other Windows applications.
c. Allow use of local or remote Windows security settings to setup each user accounts for BMS access level which may limit PC and LAN/WAN access to prevent, for example, shutdown of active-alarm viewer or PC software loading.

d. System to automatically switch between displayed metric or imperial units based on OWS location.
e. Capable of displaying data via user-selectable language that includes English, Spanish, German, French, Japanese, Italian, Finnish, Portuguese, Swedish, Russian, and Chinese both in traditional and simplified form without requiring additional add-on(s) from standard OWS software-installer.
f. WebStation (webOWS) will automatically redirect traffic into HTTPS connection to ensure more secure communications.
g. Synchronize personalized layouts and panels between OWS and WebStations (webOWS) to ensure consistent user experiences between dissimilar.
h. Servers and clients can get placed in different time zones and set to synchronize via NTP server.
i. OWS to show continuous communication status with server.

7. User Account Management:
   a. Support password policy with the following components:
      1) Mandatory change of password at first login with default credentials.
      2) Disabling each imported user account by default.
      3) Custom password complexity rules and enforcement.
      4) Custom password reuse and enforcement.
      5) Configurable password black-listing to limit common known password use.
      6) Password aging rules.
      7) Integration with Windows Active Directory for user log-on credentials.
      8) Include configurable reminder for “Days until password expires.”
   b. User Access and Permission Requirements:
      1) The BMS will support single sign-on using SAML 2.0 Authentication scheme over HTTPS language to enable secure navigation across multiple systems without the need to login.
      2) User and group account management interface to customize system and object accessibility assignment.
      3) Once associated group accessible user accounts can inherit group permissions.
      4) Support BMS permission integration with Windows Active Directory.
      5) Support account, permissions, group, archiving, and audit reports.
      6) Link username/password combination to assign capabilities such as object edit, object view, alarm acknowledgement, program enabling/disabling, and change value edits. Apply listed edits independently of each and every system object class.
   c. Support configurable password policy to include:
      1) Minimum number of characters.
      2) Minimum number of lowercase characters.
      3) Minimum number of numeric characters.
      4) Minimum number of special characters.
      5) Number of consecutive unique passwords before reuse.
      6) No more than three repeating identical characters.
   d. Guest Account:
      1) Enable anonymous access to previously engineered views such as dashboards, graphics, and other objects using configurable permissions without assigning a username or password.
      2) Use as default to simplify presentation of Kiosk Mode across multiple screens.
      3) Provide time configurability to logout non-guest user and revert to preconfigured presentation view such as offered by the Guest account functionality.
      4) Provide configurability in managing access and permission levels based on location, IP addresses, address range(s), schedule, time of day, and combination thereof.

8. System Security:
    a. Provide Cybersecurity service incident escalation through dedicated help desk available 7 days, 24 hours a day for 365 days a year.
    b. Support configuration for inactivity auto log-off of logged clients.
    c. Support self-signed certificates, default certificates and certification authority (CA) certificates.
    d. Client web or rich client access communications to support TLS 1.3 or higher encryption.
    e. Disable devices and software that support HTTP and require access via HTTPS.
    f. Automatically alarm or generate notification on failed access attempts.
    g. Support SNMP V3 monitoring of network performance and stack statistics for the purpose of managing denial of service attacks.
    h. Initiate periodical alarm at predetermined period of time until default password for each device is changed from default factory setting.
    i. Support encrypted password authentication for serving or consuming web services.
    j. Use blacklisted and whitelisted IPs and MAC addresses to gate access.
    k. Differentiate, limit, or enable user access depending on client's IP address or range location (where) and time of day (when).
    l. BMS system supplier vendor to provide the latest antivirus, anti-malware software, and apply updates automatically during warranty period. Monitor virus updates to detect possible negative impacts to operation of PC-server application software.
9. Configuration Interface:
    a. Use familiar Windows Explorer style interface for an operator or programmer to view and/or edit any system object such as controller, point, alarm, report, schedule, and others.
    b. This interface will present full "network map" of controllers with their associated objects such as points, programs, graphics, alarms, and reports in an easy to understand structure. Object names will be alphanumeric and use Windows long filename conventions.
    c. User defined object type support for use as building blocks for BMS database creation within system as input, output, string variables, setpoints, alarm algorithms, alarm notification objects, reports, graphic displays, schedules, and programs.
    d. Set up groups of user defined object types as predefined system and subsystems aggregates. The configuration interface will support copying, pasting, exporting, and importing portions of the database for additional efficiency.
    e. System to maintain link to created "child" objects. User applied parent-object changes and updates can be replicated to child objects upon user command.
10. Graphics Display Editor:
    a. Create and save pages.
    b. Group and ungroup symbols.
    c. Modify an existing symbol.
    d. Modify an existing graphic page.
    e. Rotate and mirror a symbol.
    f. Place a symbol on a page.
    g. Place analog dynamic data in decimal format on a page.
    h. Place binary dynamic data using state descriptors on a page.
    i. Create motion through the use of animated .gif files or JavaScript.
    j. Place test mode indication on a page.
    k. Place manual mode indication on a page.
    l. Place page link using fixed symbol or flyover.
    m. Place link to other graphic(s).
    n. Place link to web site(s).
    o. Place link to note(s).

p. Place link to time schedule(s).
q. Place link to OWS executable (.exe) file(s).
r. Place link to written document(s) using Microsoft Word (.doc) format.
s. Background color assignment.
t. Foreground color assignment.
u. Place page alarm indicator(s).
v. Dynamically update analog symbol, text, value, or color as function of field value.
w. Dynamically update binary symbol, text, value, and color as function of field state.
x. Each symbol used by Schneider Electric EcoBuilding Business for creating graphic pages will be saved to library file for Owner use.
y. Integral software application for creating user defined, color graphic displays to view mechanical systems, electrical systems, or building schematics.
z. Once created, graphic displays can include database-mapped objects including point data including point associated attributes such as engineering units and others. In addition, mapped objects will allow operators to operate equipment or change setpoints.
aa. Ability to import external files using .gif, .png, .bmp, .jpeg, .tif, or CAD-generated pictures as graphic display background with layering ability.
bb. Support HTML5 enabled graphics.
cc. Support JavaScript use to customize graphic display behavior.
dd. Graphics editor to use Scalable Vector Graphics (SVG) technology.
ee. Include built-in animated object library with graphic objects such as dampers, fans, pumps, buttons, knobs, gauges, and others for placement using software configuration wizard to build graphic displays that mimic field interfaced equipment and systems.
ff. Support high-DPI icons automatically chosen when accessing graphic(s) on high definition displays such as Retina or 4K type.
gg. Allow operators to use their user interface for setpoint adjust, equipment start-stop, PID loop parameter modifications, or schedules changes.
hh. Denote status changes or alarm conditions using highlighted objects and applying other effects such as changing size, color, text, blinking, or assigning specific display(s).
ii. Ability to link graphic displays through user-actions, user-defined objects, alarm(s), or mathematical expression result(s). Operators must be able to change from one graphic display to another by using their mouse - no menus will be required.
jj. Allow to create and save graphical components and JavaScript code in reusable and transferable, customized libraries.
kk. Automatically rescale graphic display based on monitor or viewing device being used.
ll. Ability to create graphic displays on varying layers that can be moved and repeated.
mm. Ability to create graphic displays within varying window panes that can be moved and/or referenced. For example, creating pane-attached graphical menu for use and reference on every other graphic page thus allowing to apply single spot updates that push to each page that references it.
nn. Ability to create reusable cascading menus.
oo. Allow multiple graphic display instances developed from single instance to facilitate change replication across them.
pp. Automatically capture and report data gathered from NSC or other controller at user-configurable frequency.

11. Alarm Management:
    a. Integrate alarms regardless of origin for inclusion into notification alerts, operator acknowledgment, graphic displays, or initiating reports.
    b. Accept alarms generated directly from linked NSCs or other controllers.
    c. Generate alarms based on NSC or other controller data value when compared to software configured limits or conditional equations.

d. Include data search capability for user to sort, filter, and search on any available criteria such as priority, category, origin, alarm type, and other criteria.
e. Include minimum of 1,000 alarm notification levels at NSC, OWS, and WebStation devices. Increase minimum number to 10,000 when using Enterprise Server.
f. Allow addition of unique set of parameters per notification level for controlling alarm; display, distribution, acknowledgment, keyboard annunciation, and record keeping.
g. Include user customizable active alarm viewer allowing to hide or display alarm attribute(s) per user or user type.
h. Allow system setting to present alarms with configurable colors based on priority, category, origin, alarm type, and custom criteria.
i. Allow system setting to link files, documents, hyperlinks, navigation links, and graphics links to an alarm for easy access upon occurrence.
j. Automatically log in database each alarm with respective message, point name, point value, source device, timestamp, time of acknowledgement with user ID, time of alarm silence (soft acknowledgement) with user ID.
k. Support multiple alarm notification distribution methods within one notification.
l. Support individual and user group alarm notification forwarding to preconfigured list of recipients over email using Simple Mail Transfer Protocol (SMTP) or secure email using Simple Mail Transfer Protocol Secure (SMTPS) without requiring special software interface or email client software running for distribution.
m. Support SNMP alarm notifications.
n. Support file (on disk) alarm notifications for use by other alarm management services.
o. Support alarm assignment to specific users via preconfigured list and date/time. For example, critical high temperature alarm assigned to Facilities Department or central alarming OWS depending on time and/or date.
p. Play an audible sound on alarm initiation or return to normal. Support alarm assignment of custom audio sound based on alarm-criteria such as priority, category, origin, alarm type, and other configurable criteria.
q. Support custom configuration of active alarm viewer for setting specific instructions. For example, an operator must confirm accomplishment of displayed check list steps prior to alarm acknowledgement.
r. Support custom configuration of active alarm viewer to filter and show visible and total number of alarms without the 'return to normal' flag, disabled or hidden.
s. Support custom configuration of active alarm viewer to auto hide alarms when triggered.
t. Capability to save and apply alarm favorites.
u. Support custom configuration of active alarm viewer to require operator to type in text within alarm entry and/or choose alarm actions drop-down list for certain alarms.
v. Alarms will be configurable such that an operator must type in text in an alarm entry and/or pick from a drop-down list of causes for certain alarms to ensure accountability (audit trail) for critical alarms response.
w. Support custom configuration of active alarm viewer to configure user-actions via user and group permissions when responding.
x. Support custom configuration of active alarm viewer to have audit trail of operator actions to alarm responses.

12. Reports:
    a. Support built-in reporting functionality without dependency on other software.
    b. Support standard accessing of data by third party reporting or analytics software.
    c. Support server-loaded Microsoft SQL to expand reporting capability outside OWS trend chart and listing ability. Use Timescale DB compression to allow reduction of server disk space.
    d. Custom-Formatted Reporting:
        1) Support built-in native reporting capability both at local and NSC level without dependency on external software.

2) Generate custom static-paginated reports either manually, using schedule(s), alarm trigger(s) or custom condition(s) within application software execution.
3) Custom reporting will not be external database dependent and will be capable of generating reports using full range of available data from most recent to historical.
4) Support report generation containing current active alarms.
5) Produce custom reports using .txt, .xlxs and .pdf file formats.
6) Support digital signing of pdf for traceability and authenticity.

13. Dashboard:
    a. Allow dashboard configuration to provide rapid identification of real-time and historical trends, including energy use, operational efficiencies and critical metrics.
    b. Create dashboard(s) using web-browser interface for custom item selections from wide range of layouts and widgets (dashboard components).
    c. Dashboard view customization via web browser data point selection(s) without requiring specific tools or prior training.
    d. Built-in dashboards - Provide minimum set of dashboard components for Owner use:
        1) Resource Utilization:
            (a) Illustrate comparative resource (like energy) consumption over flexible time period.
            (b) Location-based information ordering that will allow plotting data from multiple locations using common columnar chart for clear analysis and comparison.
        2) Utility Performance Index:
            (a) Enables creation and visualization of one or more Key Performance Index (KPI) charts for comparisons of resource utilization efficiencies for multiple locations.
            (b) Display total resource consumption (y-axis) versus resource consumption per unit area (x-axis) using scatter plot chart.
            (c) For example, Energy KPI can be displayed by selecting the locations of interest (e.g., campus offices) prior to select as vertical axis variable their electric consumption in kWh and for their kWh per SF as normalized metric for horizontal axis.
        3) Real Time Gauges:
            (a) Use gauges for real time value tracking for objects such as temperature, pressure, humidity, and level.
        4) Historical Gauges:
            (a) Use gauges for calculations using historical data for presenting maximum, minimum, average values of temperature, pressure, or humidity over given period.
        5) Period over Period Comparison:
            (a) Visually compare historical data such as temperature, energy, or others across multiple overlapping time periods such as hours, days, weeks, or custom setting(s).
    e. Custom Dashboard Components:
        1) Allow access to system information such as system health data, alarms, trends, events, user access, and others.
        2) Allow customized dashboard pages to present specific customer-required information.
        3) The BMS web-based operating environment will allow Operator to update multiple setpoints or parameters in one single operation from within accessible search tool or graphics.
        4) Support custom or out-of-the-box visual dashboards for BMS Alarms and Events that enables interactive visualization, analysis, and organizational KPIs support.
        5) At minimum include:

(a) Interactive Alarms and Events Sankey Chart with drill down capability across; category or origin; server or controller, priority, types, assigned vs unassigned, status, user activity, and assignment (who).
(b) Historical Alarm Count widget that shows how number of alarms have evolved over time.
(c) Interactive Pie Chart for alarms and events to illustrate proportion of user defined attribute vs total system alarms or events for user defined timeline.
(d) Interactive Pareto Chart enables focusing on the higher impact alarms and events depending on the occurrence.
(e) Tracking of Alarms and Event KPIs; assigned or unassigned alarms (workload), alarm counts (system stability), filter by different parts of the (building, server, and others).

14. Scheduling:
    a. Configure and download schedules for any network controller from OWS or WebStation.
    b. Use calendar style for time of day schedules viewable in graphical and tabular formats.
    c. Allow schedule programming for minimum of one year in advance.
    d. Allow particular day schedule updating where user can simply make desired modifications for single days.
    e. Display schedule(s) using year, month, week and day format. Allow user to switch view, scroll from one month to the next, or alter scheduled times.
    f. Assign specific controllers and store in local FLASH memory then automatically update OWS or WebStation changes to corresponding controller schedule.
    g. Support lead schedule assignment such that shadow or local schedules are updated based upon lead changes.
    h. Support schedule assignment of event exception lists(s) for specific days, dates, or date ranges.
    i. Display combined views showing all calendars and prioritized exemptions on one screen.
    j. Support minimum of 16 priority levels.
    k. Allow direct schedule value control without the need of special program logic.
15. Software Programming Environment:
    a. Include access to SDCU-supported programming language superset.
    b. Support both NSC script programming language as well as graphical function-block programming language. For both languages, programmer will be able to configure application software for custom program development and write global control programs. Both languages will have debugging capabilities in their editors.
    c. Allow offline view and editing of NSC programming prior to field deployment with full access to tasks and features except viewing of live tasks or values.
    d. Include access to SDCU-supported programming language superset.
    e. Allow saving custom programs as libraries for system reuse thus allowing access by wizard tool for loading library file programs within program editor.
    f. View live and real-time graphic programming execution from OWS or WebStation.
    g. Support ‘binding templates’ creation thus allowing user to bind multiple points to multiple objects all at once.
    h. Support text recognition so key terms will appear when typing (IntelliType).
    i. Support application assignment of different priorities and cycle times for prioritized execution of different function.
    j. Support object creation to allow system integration of common objects such as power meters, VFD drives, and others with simple import actions without the need of complicated programming or configuration setups.
    k. Support ‘custom variables’ created within programming environment, graphics, or as full controller ‘templates’ that can be pushed as singular reference to multiple

objects. This facilitates applying updates or changes by automatically replicating singular change to each remote connected instance.

16. Saving and Reloading Files:
    a. Include OWS application to save and restore NSC and field controller memory files.
    b. Include capability to save or reload individual NSC or field controller objects. This allows off-line control program debugging prior to reloading with just the modified information.
17. Audit Trail Requirements:
    a. Automatically log and timestamp every OWS or WebStation user operation from logging on/off, changing point value(s), modifying program(s), enabling/disabling object(s), viewing graphic display(s), running report(s), modifying schedule(s), and others.
    b. Use same user account browser interface, WebStation, and OWS. Operators must not be forced to memorize multiple passwords.
    c. Record executed commands and user activity within system's activity log, which can later be searched and retrieved by user, date, or both.
    d. View access to history of alarms, user actions, and commands for any system object individually or at least within the last 5,000 system-recorded event records.
    e. Preconfigure Enterprise server to store up to 5 million events.
    f. Event view to support viewing up to 100,000 events.
    g. Configure, view, and save custom-filtered event information views.
    h. Support search and view of each forced value within the system.
18. Fault-Tolerant Enterprise Server Operation (Top level NSC):
    a. Single system-component failure will not cause system failure.
    b. Initiate alarm event to inform system users of detected component failure.
    c. Prevent system user log off due to system failure or switchover.
19. Groups and Schedules:
    a. View predefined groups of points with their values updated automatically.
    b. Schedule Edits: Change start and stop times, add new times, and modify calendars.
20. Web Services:
    a. Installed system to use web services to consume information within NSCs, other controllers, products, and systems. Inability to perform NSC web services will be unacceptable.
    b. Use SOAP and REST web services to consume data into the system.
21. MQTT (MQ Telemetry Transport, Communications Protocol):
    a. The BMS System and NSCs will support MQTT Subscribe and Publish capability.
22. Semantic Tagging:
    a. The BMS will support tagging of data following a globally recognized schema that can be both human and machine interpretable. Tags will be utilizable across the following workflows and efficiencies:
        1) For integrators:
            (a) Ability to model entities using semantics.
            (b) Ability to build alarm or event views, predefined searchable objects, and reports based on semantics.
            (c) Ability to use semantic tagging in designing reports.
            (d) Ability to import or export designed semantic model in to and from the system across the following formats: Turtle ttl - xml file with worldwide web consortium, markup language, and semantic tagging, Excel, CSV, and text.
        2) For Operator:
            (a) Alarm: Generation of context from single datapoint to enable quicker act on anomalies.
            (b) Alarm Filtering: Alarm-views can be easily filtered based on the semantic tags.

(c) Simplified navigation via semantic model such as location, systems, equipment, and points.
(d) Ability to navigate, search, and filter based on semantics.
(e) Ability to view and navigate through meaningful relationships.

3) For Software Developers:
(a) Ability to discover and utilize semantic model via APIs and other interfaces.
(b) Ability to export semantic tagging associated data export to external databases.

b. The BMS will support BRICK schema.

2.06 NSC: NETWORK SERVER CONTROLLERS

A. The BACnet NSCs will support BACnet SC node, hub and router functions as defined in the Annex AB of ASHRAE Std 135-2020.

B. Provide sufficient number of NSCs to fully meet specified requirements with associated point list either attached or indicated on drawings.

C. The NSC is defined as single device that combines network routing, control, and server functions.

D. Provide each network server-controller factory tested with label showing it as certified by BACnet Testing Laboratory (BTL) as BACnet Building Controller (B-BC). Controllers that support lesser profiles such as B-SA are not acceptable.

E. Network server-router-controller that will connect directly to workstation(s) over Ethernet at minimum speed of 100 Mbps and provide communication to SDCUs, and other I/O modules.

F. Controllers that utilize RS-232 serial communications or ARCNET to communicate with OWS will not be accepted.

G. Provide global supervisory control functions and common interface to linked fieldbus control devices and common LAN/WAN link.

H. Capable of whitelisting IP addresses to restrict access to predefined list of hosts or devices.

I. Capable of whitelisting file extensions for documents.

J. Encrypted and authenticated communication configurable for non-open protocol communications using TLS 1.3.

K. Support Simple Network Management Protocol version 3 (SNMPv3) for monitoring NSCs using Network Management Tool.

L. Support remote system logging used by System Information and Event Monitoring (SIEM) software.

M. Configured to monitor and control assigned HVAC equipment such as AHU(s) or boiler(s).

N. Contain graphics, trends, trend charts, alarm views, and other similar presentation objects that can be served to OWS or WebStation (webOWS) interfaces.

O. Capable of being implemented in containerized software version, deployed as Docker Container that provides server software function without requiring hardware controllers and power supplies.
1. Capable of running on OS (including Linux) with Docker x86-64 support.
2. Support multiple instances on same OS.

P. Capable of executing application control programs to provide:
1. Calendar functions.
2. Scheduling.
3. Trending.
4. Alarm monitoring and routing.
5. Time synchronization by means of an Internet site including automatic synchronization.

6. Native integration of LonWorks controller data and Modbus2 controller data or BACnet controller data and Modbus2 controller data.
7. Network Management functions for LonWorks based devices.

Q. Hardware:
1. Memory:
   a. Store operating system, application programs, and other portions of configured database in non-volatile flash memory; not dependent upon presence of a battery.
   b. Contain enough memory for loaded applications, history logging, and minimum of 20 percent of selected size for additional free memory.
2. Communication Ports:
   a. Ethernet:
      1) Two 10/100 Mbps ports for communication with other devices and internet.
      2) Support active switch, IPv4 or IPv6 addressing, and BACnet/IP or Modbus2 TCP communication protocols.
      3) Port 1: Support static or DHCP client configuration to link other OWS or NSCs.
      4) Port 2:
         (a) Support switch mode or DHCP server to set addressing of DHCP client devices. Port can be disabled.
         (b) DHCP Server Mode:
            (1) Support up to 50 BACnet/IP daisy chained SDCUs.
            (2) Support up to 250 SDCUs when interconnected into five daisy chained sub networks using external switch.
         (c) RSTP (Rapid Spanning Tree Protocol):
            (1) Support up to 39 IP devices.
            (2) Support up to 234 SDCUs when interconnected into six sub networks using external managed switch.
            (3) External switch to support IEEE 802.1W or IEEE 802.1Q-2014.
   b. RS-485: Two port software configurable for BACnet/MSTP, Modbus2 RTU, or Modbus2 ASCII communication protocols.
   c. TP/FT: One FFT-10 port for communication to LonWorks devices.
   d. USB: Two ports, one for device and one for host.
3. External Device or System Integration:
   a. Integrate using device driver over controller port(s), DDC, or dedicated gateway.
   b. Convert data from each respective source-generated communications protocol.
   c. Field coordinate driver(s), data table(s), references, graphic panel(s), and related reference data required to complete intended integration.
4. Footprint: Maximum of 3.94-W by 4.92-H by 2.95-D inch (100-W by 125-H by 75-D mm).

R. Controller Interconnectivity Requirements:
1. Support wired and wireless communication protocols as well as web protocols and services without needing to provide multiple NSCs nor additional software for support.
2. BACnet SC: Comply with ASHRAE Std 135, support BACnet IP controller segments.
3. BACnet IP: Interconnect over IP in compliance with ASHRAE Std 135.
4. BACnet MS/TP:
   a. Interconnect field devices using MS/TP in compliance with ASHRAE Std 135.
   b. Support up to 50 devices in daisy-chain topology or 39 when using RSTP topology.
   c. Segmentation: Maximum capacity expansion of 250 devices spread over 5 segments when using daisy-chain topology or up to 234 devices spread over 6 segments when using RSTP topology.
5. LonWorks IP:
   a. Comply with LonMark Interoperability Guide and ANSI/CEA-709.1.
   b. LonTalk packets encapsulated into TCP/IP messages to take advantage of existing infrastructure or to increase network bandwidth where necessary or desired.

c. Encapsulation of LonTalk protocol into IP Datagram is to conform to existing LonMark guide functionality lines and based on industry standard protocols.
d. Provide LonMark compliant products. If LonMark devices are not available then provide device resource files and external interface definitions for LonMark devices.

6. LonWorks FFT-10A:
   a. Interconnect field devices using FTT-10A in compliance with LonMark Interoperability Guide and ANSI/CEA-709.1.
   b. Support up to 32 devices per port at minimum speed of 76.8 kbps for peer-to-peer, event-driven communication with HVAC and lighting control equipment or maximum combined capacity of up to 64 devices when both ports are used.
   c. Xenta Controllers: Maximum capacity of 30 devices on dedicated port.
   d. MNL Controllers: Maximum capacity is up to 127 devices.
7. Modbus2 IP: Support TCP over Ethernet, comply with Modbus (PS) and ANSI/CEA-709.1.
8. Modbus2 RTU (ASCII and J-bus):
   a. Interconnect fieldbus devices in compliance with Modbus (PS) and ANSI/CEA-709.1.
   b. Support up to 100 devices for HVAC and lighting control equipment operation with respective power metering.
   c. Use RS-485 or RS-232 port with capacity to communicate with up to 31 devices per port for HVAC and lighting control equipment operation with respective power metering. When both ports are used combined capacity will allow up to 62 devices in total.
9. Wi-Fi: Interconnect wireless field devices in compliance with IEEE 802.11.
10. Bluetooth: Interconnect wireless field devices in compliance with Bluetooth CS.
11. EnOcean:
    a. Interconnect wireless field devices in compliance with ESP3 specification.
    b. Support SDCU-level EnOcean wireless devices within 315Mhz, 868Mhz, or 902Mhz frequency band using internal antenna or external-mount antenna with RP-SMA connector.
12. ZigBee:
    a. Interconnect wireless field devices in compliance with IEEE 802.15.4.
    b. Support SDCU-level ZigBee Pro wireless devices using internal antenna or external-mount antenna with RP-SMA connector.
13. Compliance: UL 864, UL 916, 47 CFR 15 for Class A radiation, and 47 CFR 68.

S. Modular I/O Expansion:
1. Provide I/O capacity through plug-in modules of various types as required to meet individual control applications.
2. Capable of allowing module “hot-change” (hot-swap) while keeping the system on-line without user interventions thus automatically addressing and configuring details.
3. Protect module addresses If module backplane or connected module(s) were to fail.
4. Universal Inputs: Support the following thermistors without external converters:
   a. 10 kohm: Type; I (Continuum), II (I/NET), III (Satchwell), or IV (FD).
   b. Linearized 10 kohm: Type V (FD w/11k shunt) or type III (Satchwell).
   c. 1.8 kohm (Xenta).
   d. 1 kohm (Balco).
   e. 20 kohm (Honeywell).
   f. 2.2 kohm (Johnson).
   g. PT100 (Siemens).
   h. PT1000 (Sauter).
   i. Ni1000 (Danfoss).
5. Analog Inputs: Current at 0 to 20 mA VDC or voltage at 0 to 10 VDC.
6. Digital Inputs: Dry contacts, pulse accumulators, and voltage sensing.
7. Digital Outputs: 24 VAC triacs and relays.

8. Analog Outputs: Current at 0 to 20 mA VDC or voltage at 0 to 10 VDC.
9. Hardware Output Override Switches:
    a. Provide integral 3-position manual override switch for each analog and digital output for manual override into On, Off, or Auto output state. Provide controller feedback for override switch position monitoring.
    b. Provide integral override potentiometer for each analog output for manual adjustment of configured output signal over full range when manual override switch is indexed to On.

T. Local Status Indicator Lamps:
1. Provide LED indication of CPU status, Ethernet LAN status, and field bus status.
2. Provide indication of point value such as On or Off for each input and output.
3. Support software configuration of LED indication lamps to customize specific objects to indicate when On or Off or whether indicating color turns red or green.

U. Real Time Clock (RTC):
1. Include RTC accurate plus/minus 10 seconds per day and formatted to include time of day, day, month, year, and day of week.
2. Allows assigned time zone UTC offset to store and apply daylight savings time.
3. Capable of keeping date and time accurate up to 10 consecutive days without power without the need of batteries for RTC backup.

V. Power Supply:
1. Provide 24 VDC power supply with 30 watts for interconnected NSC and associated I/O modules. Expand power supply capacity when additional power consuming modules are required.
2. Include separate terminal base to allow power and communications interconnections between power supply, NSC and I/O modules allowing for ease of replacement without separate or loose wiring.

W. Software Requirements:
1. Store in non-volatile flash memory executable software applications such as operating system, application programs, and other configured database objects such as graphics, trends, alarms, views, and other definable objects as memory storage capacity allows and without restrictions placed on system application programs types.
2. Capable of parallel processing, executing each control program simultaneously without affecting the operation of other program unless linked to do so.
3. Each program will have full access to processor I/O facilities without being interrupted due to normal user communications including interrogation, program entry, program printout for storage, and others.
4. Provide memory capacity of 4 GB segregated into 2 GB for applications and historical data and 2 GB dedicated for backup storage.
5. Network Server Controllers: Provide storage capacity for backups of fieldbus controller and network server controller databases. Provide storage capacity and locations required, in alignment with client IT standards.
6. Alarm Management:
    a. Allow system point alarms configuration based on high or low limits or in comparison to other point values. NSC to test each alarm per scan and display one or more alarm messages or reports for those active.
    b. Allow unlimited number of alarms for each user configured point and object.
    c. Alarms can be configured to generate based upon a single system condition or multiple system conditions.
    d. Generate alarms based on alarm-condition evaluation and present using fully configurable order such as by priority, by time, by category, and others upon system logging regardless of whether the log-in takes place at OWS or WebStation end.
    e. The alarm management supports configuration of user cause with action note selection for association with an alarm event. Checklists will also be possible in order

to present operator with a suggested mode of troubleshooting. When acknowledging an alarm, allow system-user assignment for direct alarm notification and resolution.

f. Alarms must be capable of being routed to any BACnet workstation that conforms to the B-OWS device profile and uses the BACnet IP protocol.

7. Power Failure Mode:
   a. Restart: Upon restoration of power after an outage, restart automatically and without human intervention, then update monitoring functions, resume halted operations, synchronize time and status, and implement preconfigured start-up strategies as required.
   b. Data Retention: During a power failure keep objects and data configuration retained including installed programs, tends, and historical data without time restrictions or need for batteries to achieve it.
8. Floor Zoning, Software-Defined:
   a. Support synchronized control of lights, blinds, and HVAC across multiple floorplan scenarios.
   b. Handle multiple synchronized control sequences or scenarios of lights, blinds, and HVAC to accommodate different floor plan scenarios.
   c. Allow manual or automatic changeover of synchronized lights, blinds, and HVAC control from one floorplan scenario to another.
   d. Adapt synchronized controls of lights, blinds, and HVAC to different floorplan scenario using other device running standard web browser.
   e. Allow administrator to manage user and group permissions to view or reconfigure floor plan scenarios.
9. Energy Management, Executable Routine Requirements:
   a. Time of day scheduling.
   b. Calendar based scheduling.
   c. Holiday scheduling.
   d. Temporary schedule overrides.
   e. Timed overrides.
   f. Optimal start.
   g. Optimal stop.
   h. Night setback control.
   i. Enthalpy switchover (Economizer).
   j. Peak demand limiting.
   k. Temperature compensated duty cycling.
   l. CFM Tracking.
   m. Heating/Cooling interlock.
   n. Hot/Cold deck reset.
   o. Hot water reset.
   p. Chilled water reset.
   q. Condenser water reset.
   r. Chiller sequencing.
10. Embedded Web Server:
    a. Configured to serve out web pages containing the same information available at system OWS.
    b. Web page development will not require additional engineering labor over that required to show them at system OWS.
    c. Configurable to log each Embedded Web Server access attempt.
    d. Configurable to redirect IP-based HTTP based connections to secure HTTPS connections.
    e. Authenticate and authorize users and automatically logout after adjustable time period.
11. Data Storage for Trend-logs and History:

a. Capable of logging any input, output, calculated value, or other system variable over user defined time intervals ranging from one second to 1440 minutes or based upon user configurable change-of-value(s).
b. At a minimum, store 1,000 trend-logs with 100,000 records. Each log can record either instantaneous average, minimum, or maximum point value. Logged data will be downloadable to higher level NSC or server for long term archiving based upon user-defined time intervals or manual command.
c. For extended trend logs provide a minimum of 1,500 trend-logs with 600,000 records.
d. Allow user curating of meter log data to ensure accuracy upon meter replacements.
e. Automatically trend every hardware input and output point hosted within whether directly or using external I/O modules without requiring manual creation. NSC to set automatic trend-logs based upon change-of-value(s) and store at least 500 trend samples before replacing the oldest sample with new data.
f. Logged data presentation will be built into NSC server capability. Display data using time stamped text-based list format or chart format using fully configurable pen colors, weights, scales, and time spans.
g. Include tooltips visible based on user preference.
h. Comments will be visible whenever viewing the trend log list.
i. Give indication of memory usage and alert user if too many logs are allocated.
j. BMS software and Network Servers will support historical data recording independent of NSC-memory limitations and available for reporting and analysis without additional configurations or actions.
k. Allow data access and use from BMS or third-party reporting systems.

X. User Programming Language:
1. Provide workstation-loaded software application that includes strategies, sequences of operation, control algorithms, parameters, and setpoints.
2. Programming language will be either script-based structured text or graphical function-block based.
3. Allows configuration of control programs, schedules, alarms, reports, communication links, local displays, mathematical calculations, historical data storage, and user comments anywhere within configured program.
4. The use of “canned” program method(s) will not be accepted.
5. Pretested Control Algorithms Required:
   a. Proportional, integral plus derivative control (PID).
   b. Two-position control.
   c. Digital filter.
   d. Ratio calculator.
   e. Equipment cycling protection.
6. Implement NSC in a containerized software version, deployed as a Docker container that provides server software function without needing hardware controllers and power supplies.
   a. Runs on any OS with Docker x86_64 support.
   b. Multiple instances are supported on same OS.
7. Mathematical Functions:
   a. Include basic mathematical functions addition, subtraction, multiplication, division, square, square root, exponential, logarithm, boolean logic statements, or combinations of both.
   b. Include complex logical statements including operators such as greater-than (>), less-than (<), equal (=), and, or, exclusive, and others. Allow statement usage within the same equations with mathematical operators and nested up to five parentheses deep.

Y. Regulatory Certification Compliance:
1. CE – EN 61000-6-3.

2. CE – EN 61000-6-2.
3. CE – EN 61010-1.
4. CE – EN 61326-1.
5. FCC CFR 47 Part 15 Class A.
6. RCM.
7. RoHS 2011/65/EU.
8. China RoHS SJ/T 11364-2014.
9. UL 916 listed for energy management equipment.

Z. HMI, Tablet Display:
1. Provide tablet display for industrial-grade Human-Machine Interface (HMI) that can be locked within BMS to create a dedicated tool for local operation and maintenance.
2. Table display to provide an easy-to-use interface through which users and engineers can locally access both attached and linked NSCs.
3. Set display to always start in kiosk mode ensuring that end user can only use device with attached NSC.
4. Require password on start up and after defined period of inactivity.
5. Support being handheld or control cabinet fitted.
6. Provide touchscreen system navigation making it easy to operate and maintain.
7. Include hardware components for wall or panel surface-mounting.
8. Display: 10.1 by 10.1 inch (255 by 255 mm) screen with resolution of 1,280 by 800 pixels, 16:10 aspect ratio, and based on the Android platform.
9. Enclosure: IP54 rated frame that helps protect against dust and moisture.
10. Power: 24 VDC through Y-shaped cable.
11. Communications: BACnet IP over wired built-in USB connection.
12. Wireless Wi-Fi Communications Module:
    a. Link tablet display and NCS using wireless access point.
    b. Provide adhesive-mount Wi-Fi antenna.
    c. Comply with IEEE 802.11b/g/n.
    d. Support enhanced wireless security using 64-bit and 128-bit WEP encryption.
13. Connect using only secure HTTPS connections via NSC WebStation functionality.
14. Connect using specific password-protected user account defined within NSC configuration.

2.07 SDCU: BACNET IP CONTROLLERS

A. Provide enclosed controller with respective I/O expansion modules and accessories to meet mechanical equipment control requirements for equipment including central plant(s), air handlers, and terminal units.

B. Configure each SDCU to operate completely stand alone, containing required I/O and programs to control associated equipment or system.

C. Communications:
1. Peer-to-peer communications between devices without requiring NSC.
2. Act as master to allow for the exchange and sharing of data variables and messages with other controller(s) connected within same communication cabling. Slave controllers are not acceptable.
3. Equipped with dual 10/100 Mbps, base-T, Ethernet communication ports and internal switch ready to support:
    a. IPv4 addressing.
    b. Disabling secondary Ethernet port.
    c. Static IP setting, DHCP client and Auto-IP address acquisition.
    d. Configurable to restrict communications to only whitelisted IP addresses.
4. Topology Support:
    a. Daisy chain topology of up to 50 controllers. Communication disruptions will initiate system alarm to notify assigned NSC and BMS front-end about identified disruption.

b. Rapid Spanning Tree Protocol (RSTP) that builds a loop-free logical topology of up to 39 controllers ensuring uninterrupted communication and related alarms broadcasting in case of disruption(s).
c. Capture BACnet IP traffic in server without disconnecting wiring; for use with WireShark or other packet capture presentation tools.

D. Performance:
1. Listed by BTL (v16 or later) as BACnet Advanced Application Controllers (B-AAC).
2. 22-bit microprocessor operating at 500 MHz that supports BACnet protocol stack in accordance with ASHRAE Std 135 and supported BACnet device profile.
3. Multitasking, real-time digital control processors consisting of communication controllers, controls processing, and power supplies with built-in inputs and outputs.
4. Support upgrade of firmware with no impact to operation.

E. Programmability:
1. Support both script and graphical programming languages consistent with the NSC.
2. Control programs to reside within same enclosure as I/O circuitry that reads inputs and controls outputs.
3. Store programmed control sequences in non-volatile flash memory which is not dependent upon battery power for retaining.
4. Communicate with NSC at minimum baud rate 100 Mbps.
5. Support add-on display for access in real-time for monitoring inputs and overriding of outputs. Feature not available for VAVs.
6. Use dedicated processor for override functionality to assure reliable operation when overriding an output.
7. Include memory capacity to support operating system, databases, and other functions including:
a. Control processes.
b. Energy management applications.
c. Alarm management.
d. Historical data and trend data.
e. Maintenance support applications.
f. Custom processes.
g. Manual override monitoring.
8. Support local storage of trend data up to twice built-in I/O capacity and be capable of recording and holding five days worth of data captured at 15 minute intervals minimum.
9. Use 16-bit A/D converter for analog or universal inputs.
10. Use 10-bit D/A converter for analog or universal outputs.
11. Built-in I/O Support:
a. Hardwired Sensor and Device Interface: Minimum of 8 and up to 20 configurable I/O channels to monitor and control listed types of inputs and outputs without adding equipment inside or outside DDC cabinet.
1) Universal Inputs: Support the following thermistors without external converters.
(a) 10 kohm: Type; I (Continuum), II (I/NET), III (Satchwell), or IV (FD).
(b) Linearized 10 kohm: Type V (FD w/11k shunt) or type III (Satchwell).
(c) 1.8 kohm (Xenta).
(d) 1 kohm (Balco).
(e) 20 kohm (Honeywell).
(f) 2.2 kohm (Johnson).
(g) PT100 (Siemens).
(h) PT1000 (Sauter).
(i) Ni1000 (Danfoss).
2) Analog Inputs: Current at 0 to 20 mA VDC or voltage at 0 to 10 VDC.
3) Digital Inputs: Dry contacts, pulse accumulators, and voltage sensing.
4) Digital outputs: Triac or relay contacts.

5) Analog Outputs: Current at 0 to 20 mA VDC or voltage at 0 to 10 VDC.

b. Intelligent Sensor Interface:
   1) Support dedicated RJ45 port to communicate and power up to four wall-mount sensors without requiring dedicated on-board inputs or outputs.
   2) Support configurable selection of supported protocols.
   3) Support matching bus-connected room or space sensor(s) that does not utilize controller hardware points. Room sensors can be dedicated or combined type for temperature, humidity, CO2, or presence detector.
   4) Support modules for controlling lights and blinds that do not utilize controller hardware points.
   5) Support connecting to open market Modbus devices.
   6) Allow disabling RJ45 communications port via software configuration.

c. HMI: BACnet Operator Display:
   1) As minimum, includes capabilities defined in the BACnet B-OD profile.
   2) Relies on open industry-standard BACnet IP and supports:
      (a) IPv4 addressing.
      (b) Static IP setting and DHCP.
   3) Includes single Ethernet port for direct communication with another device or multiple devices through LAN/WAN switch.
   4) Uses 24 VDC, plus/minus 20 percent tolerance and 9W maximum.
   5) Includes on-board 32-bit microprocessor operating at 800 MHz.
   6) Complies with the following regulatory certifications:
      (a) FCC Rules and Regulations CFR 47, Part 15, Class A.
      (b) Industry Canada.
      (c) ICES-003.
      (d) UL 61010-1 and 61010-2-201.
      (e) CE - Compliance to European Union (EU).
      (f) 2014/30/EU Electromagnetic Compatibility Directive.
      (g) 2014/35/EU Low Voltage Directive.
      (h) 2011/65/EU Restriction of Hazardous Substances (RoHS) Directive.
      (i) 2015/863/EU Amending Annex II to Directive 2011/65/EU.
      (j) EN 61326-1 Product Standard.
      (k) EN 61131-2 Safety Standard.
      (l) WEEE - Directive of the European Union (EU).
      (m) European Union (EU) Directive 2012/19/EU.
   7) Receives and initiates system clock synchronization messages over BACnet.
   8) Automatically synchronize system clocks daily when set as time master.
   9) Adjusts internal clock time automatically according select or different time zones.
   10) Panel-mount product with ingress protection rating equal to IP65 (dust-tight and safe from low pressure water jets).
   11) Maximum support of up to seven controller devices over network.
   12) Allows firmware upgrade using USB-stored image file.
   13) Uses LED indicators as alarm-status indicators of connected BACnet devices that indicates active, acknowledged, or non-active alarm event without requiring user logging in.
   14) Built-in 7 inch (177.8 mm), TFT, LCD color touch-screen display with 800 x 480 pixel resolution,16:10 aspect ration, and 50,000 hours LED lifetime, approximate.
   15) Supports multiple user management consisting of tier-assigned log-in access:
      (a) Tier 1: Users can view content, do supported actions, access user management, upload firmware, and apply factory reset.
      (b) Tier 2: Users can view content and supported actions except user management, upload firmware or apply factory reset.

(c) Tier 3: Users can only view content.

16) User tracker that monitors each user log-in access and manual changes.
17) Schedule management utility to create, edit, export, and apply exception events.
18) Includes Configurable Application Menu (CAM) that allows reading CAM objects when defined in supported controller devices.
19) Capable of being reset to factory default state either by Admin user or manually by physically accessing the rear of the product.

d. Wireless Communications:
1) Bluetooth:
(a) Include on-board Bluetooth low energy radio signal.
(b) Support mobile application for controller commissioning.
(c) Support mobile applications for building occupants.
(d) Support direct connection to external antenna or disabling wireless signal.
2) ZigBee:
(a) Include plug-in slot or connector for ZigBee 3.0 radio module.
(b) Support up to 16 different sensors and devices for easy commissioning.
(c) Support interfacing temperature, humidity, and CO2 sensors holding batteries with 10 years of battery-life.
(d) Support interfacing green-powered temperature-humidity sensors holding batteries with 10 years of battery-life.
(e) Support of older versions of ZigBee 3.0 are not approved due to lack of security layer.
(f) Support external ceiling antenna installation using purpose-designed extension cable, module(s), and housing when radio reception at controller side is compromised.

12. Real Time Clock (RTC):
a. Automatically synchronize RTCs daily from an operator-designated controller (BTL-BAAC) using BACnet time synchronization services.
b. Automatically adjust for daylight saving time.
c. Accuracy: Plus/minus one minute per month.
d. RTC Objects: Time of day, day, month, year, and day of week.
e. Power Loss: Maintain accuracy up to 7 days from power lost event.

F. Spare I/O Capacity: Provide minimum of 20 percent spare capacity for each point type available within controller for future point connection.

G. Power Requirements:
1. 24 VDC (21 to 33 VDC) or 24 Vac plus/minus 20 percent from locally placed external transformer feed.
2. Provide 220 VAC line voltage version where required.
3. Meet UL 916 open class standard permitting SDCU installation without secondary enclosure where appropriate.
4. Support power failure recovery within 10 seconds of detected power disruption and resume operation from where the disruption had occurred.

H. Smoke Control and Smoke Management Application:
1. CE - EMCD 2014/30/EU.
2. CE LVD 2014/35/EU.
3. FCC CFR 47 Part 15 Class B.
4. RCM.
5. RoHS 2011/65/EU.
6. China RoHS SJ/T 11364-2014.
7. Passive Control: Apply NFPA 90A guidelines to shutdown active fans with simultaneous closing of smoke and fire-smoke dampers.

8. Active Control: Apply NFPA 92 guidelines for HVAC system use to prevent smoke migration from fire area(s) prior to exhaust combustion products including smoke exhaust.
9. UL 2043 listed for plenum space-mounting.
10. UL 916 listed for open-energy management equipment.
11. UL 916 listed for energy management equipment.

I. VAV Application:
1. Multipurpose and Room Purpose:
   a. Include built-in flow-through differential pressure transducer with 0 to 1 in-wc (0 to 249.08 Pa) measurement range, accuracy of plus/minus five percent at 0.001 to 1 in-wc (0.25 to 249.08 Pa), and minimum resolution of 0.001 in-wc (0.25 Pa) to ensure that primary air flow conditions are controlled and maintained within plus/minus five percent of applied setpoint between specified minimum and maximum air flow parameters.
   b. Support dedicated commissioning tool for air flow balancing.
   c. Require no programing for air balancing algorithm and allow balancing parameters synchronization from NSC.
2. Room Purpose VAV controllers:
   a. Room purpose controller expansion modules have the ability to interface with the following sensing elements:
      1) People counting.
      2) Motion detecting.
      3) Luminosity and sound pressure level measurements.
      4) Bluetooth Low Energy based applications.
      5) Control of electric lights and window blinds.
   b. Room purpose controller room bus supports up to four connected controller expansion modules with the following restrictions:
      1) Maximum of one DALI light module.
      2) Maximum of one SMI blind module.
      3) Maximum of two Multi-sensor or Insight-Sensor devices.
      4) Availability of four or five universal input/output controller models.
      5) Support a Modbus RTU subnetwork.

J. Remote I/O Controller Expansion:
1. Extend inputs and outputs required for SDCU or NSC.
2. Support daisy and RSTP topologies.
3. Capable of sharing local I/O resources with one or multiple applications distributed across one or multiple SDCUs or NSCs.
4. Support alarm and local trend.
5. Support configurable fallback output value triggered in case of communication disruption.

2.08 SDCU: CONNECTED ROOM SOLUTIONS

A. Listed by BTL (v16 or later) as BACnet Advanced Application Controller (B-AAC).

B. Panel-mount BACnet IP controller with up to four SpaceLogic sensors per room.

C. Provides communication and power to SpaceLogic sensors using Category 5 or 6 cable.

D. Fully programmable capable of supporting different local control strategies.

E. Store control sequences programmed into BACnet/IP fieldbus controllers in non-volatile memory, which is not dependent upon presence of a battery, to be retained.

F. Central repository of common standard applications including:
1. Occupied state.
2. Unoccupied state.
3. Load shed mode.
4. Daylight harvesting.

5. Time clock scheduling.

G. The controller will utilize ASHRAE standards adjust “Minimum Ventilation per Person (CFM)” using people counting sensors.

H. The controller will take the advantage of saving energy by applying room temperature setback(s) within 3 minutes becoming unoccupied using people counting sensors.

I. Graphical Interface: Uses floor plan maps allowing user(s) to assign HVAC equipment, lights, blinds, and sensors directly into room spaces or custom defined zones and partition spaces.

J. Building Automation Devices: Interface up to 256 devices including sensors, pushbuttons, actuators, controllers, components, and other system devices using the KNX open protocol.

K. Wireless Devices: Communicates with wireless devices such as sensors, power meters, and lighting control gateways using IEEE 802.15.4 ZigBee 3.0. The use of previous ZigBee standards is not acceptable.

L. Occupancy and Light Levels: Connects and powers up to four advanced occupancy and light level sensors that do not require batteries for operation.

M. The BACnet IP RP Fieldbus controller supports two RS485 communication ports that connects and supplies power to externally-linked devices over category 5 or category 6 cable(s) using a daisy chain style. Externally-linked devices provides I/O expansion beyond controller capacity and supports:
   1. Temperature, humidity, CO2, or presence detector wall-mount sensors.
   2. Combined temperature, humidity, CO2, or presence detector wall-mount sensors.
   3. Control modules for lights and blinds.
   4. Interfacing open market Modbus RTU devices.
   5. Up to four ceiling-mount intelligent multi-sensors that supports thermal imaging detection.

N. BACnet IP Room Control; Ceiling-Mount, Intelligent Space Sensors:
   1. Sensor includes two RJ45 communication ports that allows daisy chain style communications between linked sensor(s) and parent BACnet IP RP Fieldbus controller over category 5 or category 6 cable.
   2. Parent BACnet IP RP Fieldbus controller can power up to four intelligent sensors.
   3. Sensor includes built-in thermal Imaging sensing with detection coverage area of up to 516.7 sq ft (22.7 ft x 22.7 ft) (48 sq m (6.9 m x 6.9 m)). Also, sensor technology allows people counting to enable proactive building control based on actual number of occupants instead of by presence, preset value, or hours of operation.
   4. Sensor includes built-in ambient light sensor that supports field-of-view coverage of 35 degrees from vertical plane and 0 to 10,000 luminosity range.
   5. Sensor supports Bluetooth Low Energy (BLE) radio that enables connectivity of mobile applications for controlling room lights, blinds, and temperature by allowed user(s).
   6. Sensor’s BLE radio supports iBeacon protocol capable of working in conjunction with location-awareness applications.
   7. The ceiling-mounted intelligent space sensor(s) will be Schneider Electric’s Insight or an approved equivalent for project use.

O. Room Integrations:
   1. Room Lights Using Built-in DALI Port or Expansion Module:
      a. Capable of full control of up to 32 individual lighting fixtures interfaced by ballasts or LED drivers which can be combined up to maximum of 16 groups.
      b. Rated for 10A in total draw or 5A per channel, maximum.
      c. Certified of full IEC 60929 DALI version-2 (DALI2 or DALI-2) control.
      d. Support DALI version-1 (DALI1 or DALI-1) control.
      e. Support discharge lamps, LEDs, and color control (device type 8).
      f. Support feedback from control gear including lamp failure feedback.
      g. Support addressing and grouping of control gear.
      h. Capable of turning on-off, or dim light(s) using 0 to 10 VDC signal.

i. During zero light output, shut down ballasts to minimize leakage current.
j. Certified for multi-master functionality to interface DALI-devices including pushbuttons, sensors, and dimmers over DALI communication bus.
k. Interface and control dimmed lights using phase-cut dimming. Automatically detect appropriate leading or trailing edge control mechanism needed based on load type.

2. Blinds and Shades:
   a. Interface and control blind motors using voltage standard motor interface (SMI) open communications protocol.
   b. Interface and control blind motors using high voltage SMI communications protocol.
   c. Interface and control blind motors using low voltage (24V) relays.
   d. Interface and control blind motors using line voltage relays.
3. Glass Dimmers: Interface with third-party Modbus (PS) devices sensors, pushbuttons, and glass touch panels.

P. SpaceLogic Living Space Sensors:
1. Temperature:
   a. Sensing Element: 10k ohm, type 3 thermistor.
   b. Accuracy: Plus/minus 0.4 degrees F (0.2 degrees C).
   c. Display Resolution: 0.1 or 1 degrees F (0.1 or 1 degrees C).
   d. Measuring Range: 32 to 122 degrees F (0 to 50 degrees C).
   e. Built-in LCD Display.
   f. Color Display: 2.4 by 2.4 inch (61 by 61 mm), backlit, color, touchscreen to show:
      1) Space temperature.
      2) Cooling space temperature set point.
      3) Heating space temperature set point.
      4) Current heating or cooling mode.
      5) Current occupancy mode.
      6) Fan speed.
      7) Current time.
      8) Light control.
      9) Blind adjustment.
      10) Scene selection.
      11) Three-button interface for adjust and override control.
2. Humidity:
   a. Accuracy: Plus/minus 2 percent RH.
   b. Measuring Range: 0 to 100 percent RH.
   c. Display Resolution: 0.1 or 1 percent RH.
   d. Built-in LCD Display.
3. CO2:
   a. Accuracy: Plus/minus 30 ppm and plus/minus 2 percent of measured value.
   b. Measuring Range: 0 to 2,000 ppm.
   c. Operating Elevation: 0 to 16,000 feet (0 to 4876.8 m).
   d. Temperature Dependence: 0.11 percent of full scale per degree.
   e. Stability: Under 2 percent of full scale over sensor life of 15 years.
   f. Sensing Method: Nondispersive infrared (NDIR), diffusion sampling.
   g. Built-in LCD with configurable background screen color (green, yellow, red) based on CO2 level.
4. Motion: Include sensor for occupancy detection.

Q. EcoStruxure Engage Mobile App:
1. Supported across iOS, Android and Windows 10 platforms.
2. Connects to RP-C Controller for remote control of lights, blinds, and HVAC-related functions such as fan speed and temperature.
3. Connect room or wall-mounted Bluetooth CS linked devices for remote control.

4. Integrated mobile-based personal application for user interfacing and control of:
   a. Room Status: Show light and blind status.
   b. Room Light Control: Brighten, dim, turn on, or turn off.
   c. Room Blinds Control: Tilt, raise, or close.
   d. Room HVAC Control: Change setpoints, schedules, or occupancy mode.
   e. Graphics Interface: Provide ability to select scenes based on selectable templates.

R. eCommission SpaceLogic Controller Mobile App:
1. Mobile-based app for configuration, programming, air balancing, and I/O checkout.
2. Supported across iOS, Android and Windows 10 platforms.
3. Downloadable from App Store, Google Store and Windows Store.
4. Interface other SDCUs using Bluetooth or Wi-Fi access point.
5. Allow multiple commissioning tools used within network segment.
6. Functional Requirements:
   a. SDCU Configuration: Set or edit network configuration.
   b. SDCU Programming: Load offline engineered applications.
   c. Air Balancing:
      1) Control damper actuator travel such as open or close.
      2) Generate air balancing report.
   d. DALI-Lighting Commissioning:
      1) Test operation of DALI control gear.
      2) Wink DALI control gear.
      3) Indicate DALI control gear status.
   e. Lighting Commissioning:
      1) Test 0 to 10 VDC light operation.
      2) Wink 0 to 10 VDC lights.
   f. Blind and Shade Commissioning:
      1) Test blinds and shade operation.
   g. I/O Checkout:
      1) Support outputs and input reading value overrides, light and blind point overriding as well as point configuration edits.
      2) Support generation of I/O checkout report(s).

2.09 SDCU: BACNET MS/TP CONTROLLERS

A. Provide BTL (v12 or later) certified device for intended application, listed as BACnet Advanced Application Controller (B-AAC).

B. Include Modbus RTU communication in addition to BACnet MS/TP, up to 76,800 baud rate, and support of wireless communications.

C. Capture BACnet MSTP traffic in server without disconnecting wiring; for use with WireShark or other packet capture presentation tools.

D. Interconnect wireless field devices in compliance with IEEE 802.15.4 using predefined profiles for door switches, window switches, occupancy sensors, water leakage detectors, CO2 sensors, temperature sensors, and humidity sensors. Capable of hosting minimum of 10 devices.

E. Include power indicating light. Use local power, link powered devices are not acceptable.

F. Store application programs using flash memory not dependent upon presence of a battery, or other means such that power loss does not result in loss of application program(s) or configuration parameter settings.

G. Capable of being programmed with customizable scripts using LUA open programming language. Equipped with minimum allocated memory of 256KB of SRAM and 80KB for configurable and reserved for LUA scripting purposes.

H. Field Bus Wiring and Termination:

1. Use bus or daisy chain concept with no tees, stubs, or free topology for component wiring.
2. Provide termination resistor at both ends of each fieldbus segment.
3. Repeaters: Provide enclosed repeaters to interconnect two segments and locate within interstitial space.

I. Local Interface:
1. Support connection to portable interface device such as laptop computer or vendor unique hand-held device.
2. Password protected access to execute other tasks than viewing data. Other tasks include:
   a. Access to configuration menu parameters.
   b. Adjust application parameters.
   c. Execute manual control of input and output points.
   d. View dynamic data.

J. Advanced Application (Programmable) Controllers (B-AAC):
1. General:
   a. Built-in physical input and output circuits for analog input devices, binary input devices, pulse input devices, analog output devices, and binary output devices. The number and type of input and output devices supported will vary by model.
   b. Support I/O expansion by adding circuit boards that physically connect to basic controller.
   c. Support editing of embedded time schedules from OWS with BACnet object support service.
   d. Support embedded trend log data export to OWS with BACnet object support service.
   e. Support Embedded Alarm Messaging to:
      1) Deliver alarm messages to OWS with BACnet object support service for receiving alarm messages and configured as recipient.
      2) Support alarm acknowledgement from OWS with BACnet object support service for executing alarm and event acknowledgement.
   f. Support analog and binary data reading from OWS with BACnet object support service for reading of data.
   g. Support control of out-of-service property and assignment of value or state to analog and binary objects from OWS with BACnet object support service.
   h. Support receipt and response to Time Synchronization commands from BACnet NSC.
   i. Support the “Who is” and “I am.” BACnet services.
   j. Support the “Who has” and “I have.” BACnet services.
2. Analog Input Circuits:
   a. Keep A/D chip resolution below 0.01 volts per increment for measurement range of 0 to 10 VDC at 10 bit with resolution of 10/1024 or 0.00976 volts per increment.
   b. For nonflow sensors, control logic to support calibration offset usage such that raw measured value is added to plus/minus offset to create calibration value for use by control logic and OWS reporting.
   c. For flow sensors, control logic to support adjustable gain and adjustable offset object usage for execution of two point calibration concept for adjustable low and high range value to match values determined with calibration instrument.
   d. Provide software support for input signal linearization of nonlinear sensors such as thermistors and flow sensors.
3. Binary Input Circuits:
   a. Wire dry contact device or sensor into controller using two-wire circuit without requiring external power supply.
4. Pulse Input Circuits:
   a. Wire pulse input device or sensor into controller using two-wire circuit without requiring external power supply.
   b. The pulse input circuit can process up to 20 pulses per second.

5. True Analog Output Circuits:
   a. Logical commands will be processed by digital-to-analog (D/A) converter chip to allow having 0 to 100 percent control signal scalable to full output range of 0 to 10 VDC, 4 to 20 milliamps, 0 to 20 milliamps, or assignable range within full output range (Example: 0 to 100 percent creates 3 to 6 VDC where full output range is 0 to 10 VDC).
   b. Keep D/A chip resolution below 0.04 volts per increment or 0.08 milliamps per increment.
6. Binary Output Circuits:
   a. Single pole, single throw or single pole, double throw relays with support for up to 230 VAC and maximum current of 2 A.
   b. Voltage sourcing or externally powered triacs with support for up to 30 VAC and 0.5 A at 24 VAC.
7. Program Execution:
   a. Process control loops to operate in parallel and not in sequence unless specifically required to operate in sequence by control sequence.
   b. Adjustable process control loop sample rate down to minimum of one second.
   c. Adjustable process variable sample rate down to minimum of one second.
   d. Adjustable algorithm update sample rate down to minimum of one second.
   e. Capable to detect controller power cycle that can be used via user programming to modify controller sequence upon power cycle detection.

2.10 SMALL BUILDING APPLICATIONS - SCC

A. SSC combines communication hub, control functions, and server functions into single unit capable of serving small- to medium-sized buildings.

B. SSC installation and configuration interface can be applied using a windows-based wizard or full-featured, web-based user interface.

C. BACnet server is classified as a native BACnet device supporting BACnet Server B-BC profile. Controllers supporting a lesser profile such as B-SA are unacceptable.

D. SSC supports global supervisory control functions while serving as main interface between LAN and field control devices supporting up to 30 room controller devices.

E. Configurable, encrypted, and authenticated communication for nonopen protocol communications using TLS 1.3. Server is delivered with default self-signed certificate.

F. SSC handles graphics, dashboards, trends, trend logs, alarms, and other similar presentation objects served by using web-based interfaces. Supply enough servers to meet the requirements of this specification and attached point list.

G. SSC is equipped with an LCD with ability to check IP address of server.

H. SSC is capable of executing application control programs to provide:
   1. Scheduling.
   2. Trending.
   3. Alarm monitoring.
   4. Time synchronization by means of an Internet site including automatic synchronization.

I. Hardware Specifications:
   1. Memory:
      a. Operating system of controller, application programs, and all other portions of configuration database are stored in nonvolatile, flash memory and is not dependent upon presence of a battery. Servers and controllers contain enough memory for current application, plus required history logging, and minimum of 20 percent additional free memory.
   2. Each SSC provides the following onboard hardware for communication:
      a. Two 10/100 Mbps Ethernet for communication to workstations, IP fieldbus controllers, and onto the Internet:

1) The two Ethernet ports support active switch and BACnet/IP communication protocols.
2) Ethernet port 1 dedicated to site network.
3) Ethernet port 2 fully configurable and can extend site network, allowing for a private network.
4) Allow disabling of Ethernet port 2.

b. One RS-485 port for communication to BACnet MSTP bus and room controllers.
c. One device USB port that can install and configure server using configuration wizard.
d. One host USB port.

J. Universal Input Temperatures:
1. Each universal input directly connected to SSC is capable of using the following thermistors for use in system without any external converters needed:
a. 10 kOhm Type I (Continuum).
b. 10 kOhm Type II (I/NET).
c. 10 kOhm Type III (Satchwell).
d. 10 kOhm Type IV (FD).
e. Linearized 10 kOhm Type V (FD with 11kOhm shunt).
f. Linearized 10 kOhm (Satchwell).
g. 1.8 kOhm (Xenta).
h. 1 kOhm (Balco).
i. 20 kOhm (Honeywell).
j. 2.2 kOhm (Johnson).

K. Local Status Indicator Lamps:
1. SSC provides at minimum LED indication of CPU status, Ethernet LAN status, and fieldbus status. For each input or output, provide LED indication of point value, either ON or OFF. On the software side this input and output indication is software selectable to display respective status using ON or OFF text or red and green colors.

L. RTC:
1. Each SSC includes a real-time clock, accurate to plus/minus 52 seconds per month.
2. RTC date and time is also accurate, up to 10 days, when SSC is powerless.

M. Power Supply:
1. Includes 24 VAC/DC built-in power supply for SSC.

2.11 TOUCHSCREEN ROOM CONTROLLERS/NETWORK THERMOSTATS

A. Controller communicates via user-selectable protocol choices that includes BACnet MS/TP, Modbus2 RTU, or BACnet IP over WiFi using optional WIFI module and Zigbee.

B. Provide BTL (v12 or later) certified device for intended application, listed as BACnet Application Specific Controller (B-ASC).

C. Controller includes TFT transmissive LED backlit LCD touchscreen (HMI) with at least 12 user-selectable color options, 12 user-selectable HMI button displays, and options for casings and fascia's in black and white.

D. Controller is capable of displaying custom messages using minimum of 2 formats that can be statically defined within the controller or dynamically defined via BACnet commands.
1. Format 1: Displays minimum of 24 character message on default HMI screen which can be scrolled.
2. Format 2: Displays up to 480 characters with ability to scroll multiple messages. This format allows HMI screen to use up to 12 different colors at any given time per message.

E. Controller is capable of automating the following equipment applications using simple user selectable configuration menus displayed on built-in HMI:
1. 2/4-Pipe Fan Coil applications:
a. Analog or 1-speed, 2-speed or 3-speed, and ECM fan control.

b. Control valves via analog, 2-position, or floating signal.
c. Dehumidification control.
d. Fresh air damper control.
e. Electric reheat Control.

2. RTU, Split System or Heat-Pump:
   a. 2-stage heating or cooling.
   b. Analog heating.
   c. Dehumidification output control.
   d. Analog economizer output.
   e. Demand based ventilation fresh air damper control.
3. Pressure Dependent and Pressure Independent VAVs or VVTs:
   a. Single zone; parallel or series fan powered with analog or binary fan speed control.
   b. Damper and reheat control via analog, 2-position, or floating control.
4. Other mechanical system applications utilizing similar I/O and strategies mentioned above.

F. The controller provides the following I/O capabilities:
1. Seven universal inputs:
   a. 10K Type II Thermistor.
   b. 0 to 10 VDC analog.
   c. Binary.
2. Five binary outputs configurable as floating or On/Off.
3. Four universal binary or analog 0 to 10 VDC outputs.
4. Integrated or Dedicated:
   a. Space Temperature.
   b. Space Humidity.
   c. Passive Infrared Motion Detection (PIR).
   d. Light Level Sensor.
5. Up to 20 Zigbee 3.0 Ecco-System and Zigbee Green devices with optional ZigBee Wireless radio, device choices includes:
   a. Temperature and humidity.
   b. Temperature, humidity, and co2.
   c. Door or window contact.
   d. Wall or ceiling PIR with temperature and humidity.
   e. Water leak detection.

G. The controller can be programmed with user customizable script using LUA open programming language within reserved memory space of 8 kb. The LUA programming provides the ability to enhance the controllers inherent control capabilities or create custom control strategies.

H. The controller includes minimum of two level password protection to prevent unauthorized access where level 1 password is for basic daily user functionality and level 2 for installer or management and configuration.

I. Support the following operational modes:
1. Occupied mode.
2. Stand-by mode.
3. Unoccupied mode.
4. Occupied override mode.

2.12 I/O: INPUT-OUTPUT DEVICES

A. Equipment, System, and Field Side: See Section 230913.

B. Room Side: See Section 230913 except for connected room solution devices.

C. Pneumatic Controls: See Section 230943.

D. Plumbing Metering: See Section 220519.

E. HVAC Water and Steam Metering: See Section 230519.

F. Refrigerant Detection System: See Section 284400.

G. Variable Frequency Drives: See Section for 230934 and Section 262923.

H. Non-DALI Lights or Lighting Control System: See Section 260923.

I. Electrical Metering: See Section for 262713 and Section 253613 for smart meters.

J. Electrical Power Monitoring System: See Section 253600.

K. Fire Alarm and Detection System: See Section 284600.

L. Security; Access Control System: See Section 281000.

M. Security; Video Surveillance System: See Section 282000.

2.13 SOURCE QUALITY CONTROL

A. See Section 014000 - Quality Requirements for additional requirements.

B. System Tests:
   1. Test each system point for both hardware and software functionality.
   2. Test each system-linked mechanical and electrical system under control against specified sequence of operation.
   3. Successful completion of system test(s) constitutes warranty period commencement.
   4. Provide Owner with written report as confirmation that installed system functions in accordance with plans and specifications.

PART 3 EXECUTION

3.01 INSTALLERS

A. Installer List:
   1. C&C Group - Brian Schepers
      a. bschepers@c-cgroup.com
      b. 573-291-5425

3.02 INSTALLATION

A. Install in accordance with manufacturer written instructions and Section 250500 where required.

B. Install equipment in accordance with reviewed product data, final shop drawings, and as indicated on drawings.

C. Code Compliance: Install wiring in accordance with applicable codes and ordinances.

D. Interface With Other Work; Provide field supervision to trades installing:
   1. Dampers: Automatic control dampers.
   2. Blank-off Plates: Required for dampers smaller than duct or opening size.
   3. Sheet Metal Baffles Plates: Equipment- or duct-mounted to eliminate stratification.
   4. Electrical Power: 120 VAC power feed to actuators, heat trace, control panels, and related control equipment needs.
   5. HVAC-equipment installed smoke detectors with respective shutdown relay(s) into building fire alarm system. Then complete this work by providing, installing, terminating, and testing respective fan or equipment shut down interlocking wiring.
   6. Electrical Meter or Submeter: Auxiliary contact (pulse initiator) or commutations link for central monitoring of power or load in kW and energy or demand in kWh.

E. Hardware Installation Practices for Wiring:
   1. Controllers: Mounted vertically according to manufacturer’s installation documentation.
   2. Ethernet or Remote Site Controller Power: Provide dedicated 120 VAC power wiring for each device from separate breaker using respective hot, neutral, and ground wires. Terminate ground wire at breaker panel ground bar.

3. True-Earth Ground: Coordinate required ground connections into building true earth ground. Do not use a corroded or galvanized pipe, or structural steel.
4. Building Attached Wires: Tie to surface-mounted fasteners at regular intervals such that wiring does not droop. Do not attach or support wires using ducts, pipes, conduit, or other hanged items.
5. Conduit in Finished Areas: Conceal in ceiling cavity spaces, plenums, furred spaces, and wall construction. Except metallic surface raceway may be used in finished areas on masonry walls. Surface raceways in finished areas must be color-matched to existing finish within standard manufactured color limitations.
6. Conduit in Unfinished Areas: Conceal in ceiling cavity spaces, plenums, furred spaces, and wall construction. Have exposed conduit run parallel to or at right angles of building structure.
7. Wire to Utility Spacing: Keep wires a minimum of 3 inches (7.6 mm) from hot water, steam, or condensate piping.
8. Sensor Wires: Protect with plastic inserts where sensor wires leave conduit system.
9. Telephone Equipment Areas: Do not run wires across these areas.
10. Fire-Rated Penetrations: Provide fire caulking to seal used openings.

F. Installation Practices for Field Devices:
1. Well-Mounted Sensors: Include thermal conducting compound within well to ensure good heat transfer to sensor.
2. Actuators: Mount firmly to give positive movement, then adjust linkage to give smooth, continuous movement throughout 100 percent of selected stroke.
3. Relay Outputs: Include coil transient suppression across selected to limit transients up to 150 percent of rated coil voltage.
4. Water-Mounted Sensors: Ensure mounting hardware allows device removal without shutting down the system in which they are installed.
5. Duct-Mounted Static-Pressure Sensors: Connect high pressure port into metal static-pressure probe inserted at upstream side and leave low pressure port open to plenum area at the point where high pressure port is tapped into ductwork.
6. Building Static-Pressure Sensors: Insert high pressure port into corresponding space using metal tube then pipe low pressure port to building exterior.

G. Wiring, Conduit, and Cable:
1. Compliance: NFPA 70, National Electrical Code.
2. Wire and Cable: Use copper wires with listed minimum wire size and insulation class.
   a. Class One: 14 gauge, 0.0641 inch (1.63 mm), 600 volt maximum.
   b. Class Two: 16 gauge, 0.0508 inch (1.29 mm), 300 volt maximum.
   c. Class Three: 18 gauge, 0.0403 inch (1.02 mm), 300 volt maximum.
   d. Communications: Manufacturer recommended.
3. Power and Class One wiring may be run within same conduit. Class two, class three, and communications wiring may be run within same conduit.
4. Where different wiring classes terminate within same enclosure, maintain clearances and install barriers in accordance with National Electrical Code.
5. Use galvanized EMT when wiring is required to run inside conduit with minimum size of 1/2 inch (25.4 mm). Set-screw fittings are acceptable for dry interior locations. Use watertight compression fittings for exteriors and interior locations subject to moisture. Provide conduit seal-off fitting where exterior conduits enter the building or between areas of high temperature and moisture differential.
6. Use flexible metallic conduit for connections to motors, actuators, controllers, and sensors mounted on vibration producing equipment, 3 feet (0.91 m) maximum. Use liquid-tight flexible conduit in exteriors and interior locations subject to moisture.
7. Provide junction boxes for cable splices, equipment termination, and EMT to flexible conduit transitions. Use junction boxes with blank cover of galvanized pressed steel, 4 sq

in (0.37 sq m) for dry interior locations. Use cast alloy junction boxes with threaded hubs and gasketed covers for damp locations.

8. Use plenum-rated wiring for spaces above used as supply or return air plenums. Teflon wiring can be run without conduit above suspended ceilings. Exception: Use conduit for wires run within suspended ceilings to control outside air dampers or fire management system interfacing.
9. Use multimode glass fiber optic cable with 50/125, 62.5/125, or 100/140 microns in diameter. Plastic fiber cables are not acceptable.
10. When applicable, furnish and install pneumatic to electronic transducers that allow for communication between existing pneumatic systems and BMS system.
11. When applicable, exclude proper operation of existing pneumatic systems from scope. Assess and document performance issues of existing pneumatic systems prior to performing check out and commissioning of current project.

H. Enclosures:
1. Provide an enclosure to protect each field device from dust, moisture, moving parts, and to conceal integral wiring. Where practical, mount within FIP.
2. Installed FIPs to contain power supplies for sensors, interface relays, contactors, and safety circuits.
3. Provide NEMA 250 Type 1 rated FIP enclosures of steel construction with baked enamel finish, hinged door, and keyed lock. Ensure that enclosure size includes 20 percent spare mounting space internally with identically keyed locks.
4. Provide FIP-mounted screw type terminals to terminate field wires. The use of wire nuts within FIP is prohibited. Analog or communications wiring may use FIP as raceway without terminating.
5. Provide NEMA 250 Type 4 rated enclosures for outdoors.
6. Use plastic track for wiring runs within enclosures then wrapped and secured within controllers.

I. Identification:
1. Identify each control wire with labeling tape or sleeves using words, letters, or numbers that can be exactly cross-referenced with as-built drawings.
2. Identify each field-enclosure other than controllers with Bakelite nameplate using white lettering against black or blue background.
3. Mark junction-box covers to indicate that they are part of BMS system.
4. Identify with nameplates each I/O field-device except space sensors or FIP-mounted devices except as indicated on drawings.
5. Label I/O field devices inside FIPs.

J. Existing Controls:
1. When existing controls are reused then test and calibrate for proper operation. Replace each existing control found defective after Owner handles additional material and labor costs associated with specific repairs or replacements.

K. Location of Field-Mounted Products:
1. Install sensors as indicated on drawings unless directed otherwise.
2. Mount space-installed sensors away from heat-generating machinery, direct sunlight, and supply-diffuser air streams.
3. Mount outdoor air temperature sensor(s) on the north building face. Install sensors such that the effects of heat radiated from the building or sunlight is minimized.
4. Locate field-enclosures immediately adjacent to control panel(s) where connected.

L. Software Installation:
1. Provide technician(s) to install, initialize, start-up, and debug installed software including hosting operating-system or other third-party software necessary for successful system operation.
2. Sequences of Operation: Apply specifics as indicated on drawings.

M. Database Configuration:
   1. Provide labor to configure database portions required by points list and sequence of operation.

N. Color Graphic Panels:
   1. Unless otherwise directed, provide color graphic-panel displays as depicted in mechanical drawings for each system and floor plan containing associated points identified on point list with controls to allow issuing of setpoint changes and commands.

O. Reports: At a minimum, provide four reports configured to include:
   1. System user data.
   2. Trend comparison data.
   3. Energy consumption data.
   4. Alarm status and prevalence information.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements for additional requirements.

B. Manufacturer Services: Provide services of manufacturer field representative to inspect installed system and components.

C. Coordination of Other Tests and Inspections:
   1. Provide technician for five days for manpower and engineering services required to assist both HVAC and TAB contractors to test, adjust, and balance related building systems.
   2. Coordinate with TAB contractor to provide complete air and water balance report; see Section 230593.
   3. Provide access to accommodate tests and inspections by independent testing agency employed by Owner.

D. Point to Point Checkout:
   1. Inspect and verify each I/O device for proper installation and functionality. Fill-out dated DDC-associated checkout sheet itemizing each device then submit for Project Manager review and approval prior to inclusion into final report.
   2. In case of wireless devices, record device signal strength noted during device checkout.

E. Controller and Workstation Checkout:
   1. Conduct field checkout of controllers and front end equipment including computers, printers, and related devices to verify proper operation of both hardware and software.
   2. Fill-out dated checkout sheet itemizing each device with description of associated tests applied for inclusion into the final report.

F. System Acceptance Testing:
   1. Verify and compare loaded application software against approved sequences of operation.
   2. Control loops will be exercised by inducing a setpoint shift of at least 20 percent and observing whether system successfully returns process variable to setpoint. Record results for final report inclusion.
   3. Test each alarm within system and validate system generates appropriate alarm message, appears at prescribed destinations mainly workstations or printers, and other related actions occur as defined such as graphic-panels invoked, reports generated, and field actions. Record results for final report inclusion.
   4. Test each graphic-panel display, operation, and navigation; verify appearance, content, and controls are correct and work as intended. Record results for final report inclusion.
   5. Execute Operational Testing:
      a. Verify and test that each point is properly polled, associated alarm is configured and operates accordingly, linked to associated graphic-panel(s), and trend-data captures are included within configured reports.
      b. Test each third party communications-link interface prior to testing each individual polled point. When interface involves Ethernet file transfer then test associated logic that controls intended file transmission and verify specified information content.

3.04 SYSTEM STARTUP

A. Manufacturer Services: Provide services of manufacturer field representative to perform systems startup.

B. Prepare and start equipment and systems in accordance with manufacturers' instructions and recommendations.

C. Installed Product Testing:
   1. Execute both startup and performance verification tests, upon completion have assigned technician to initiate and date accordingly.
   2. Provide respective startup performance verification test reports upon their completion.

D. Startup Test Checklist Requirements:
   1. Measurement of primary and secondary voltage sources.
   2. Verification of proper controller power wiring.
   3. Verification of component inventory against submittal(s).
   4. Verification of labeling on components and wiring.
   5. Verification of connection integrity and quality (loose strands and tight connections).
   6. Verification of bus topology, grounding of shields and installation of termination devices.
   7. Verification of point checkout.
   8. Verify that each I/O device is landed according to approved submittal and functions per sequence of control.
   9. Verify that analog sensors are properly scaled with values correctly reported.
   10. Verify that binary sensors are properly configured with states correctly reported.
   11. Verify that analog outputs are properly configured and move full stroke when commanded.
   12. Verify that binary outputs are properly configured and respond appropriately to respective energize and de-energize commands.
   13. Document noted analog sensor calibration in terms of measured value, reported value, and calculated offset.
   14. Document control loop tuning in terms of sample rate, gain, and integral time constant.

E. Performance Verification Test Checklist Requirements:
   1. Execute and complete written tests allowing operator system interaction.
   2. Develop detailed checklist to test and verify operator system interaction tasks including, but not limited to the following:
      a. Graphics navigation.
      b. Trend data collection and presentation.
      c. Alarm handling, acknowledgement, and routing.
      d. Time schedule editing.
      e. Application parameter adjustment.
      f. Manual control.
      g. Report execution.
      h. Automatic backups.
      i. Web Client access.

F. Control System Switchover:
   1. Demolition of existing control system will occur after system is in place with respective sensors and field interface devices.
   2. Switchover from existing control system to new system will be fully coordinated. Coordinate with Owner or representative on site during switchover.
   3. Minimize system downtime during switchover. Have sufficient installation mechanics on site so that entire switchover can be accomplished within reasonable time frame.

3.05 CLEANING

A. See Section 017419 - Construction Waste Management and Disposal for additional requirements.

B. Upon work completion, check and thoroughly clean each equipment pertinent to this project, and other areas where products were installed.

3.06 COMMISSIONING

A. See Section 019113 - General Commissioning Requirements for additional requirements.

B. HVAC Cx Tests: See Section 230800 to coordinate with CxA requirements.

C. iBMS Cx Tests: See Section 250800 to coordinate with CxA requirements.

D. Functional Tests: Commission and set in operating condition interfaced equipment and systems such as chilled water plant, hot water plant, and air handling systems in the presence of respective equipment and system manufacturer's representatives, Owner, and Architect or their representatives as applicable.

E. Analytics: When provided use AFDD or CCDT to generate analytics to help with system Cx otherwise use of system data logging feature to generate this data.

3.07 CLOSEOUT ACTIVITIES

A. See Section 017800 - Closeout Submittals for additional submittals.

B. See Section 017900 - Demonstration and Training for additional requirements.

C. Demonstrate proper operation of equipment to Owner designated representative.

D. Training: Train Owner personnel on operation and maintenance of system.
   1. Accommodate up to 10 attendees.
   2. Training Reference: Operation and maintenance manual and additional training materials as required.
   3. Provide minimum of 40 hours of training.
   4. Instructor: Manufacturer training personnel.
   5. Location: Coordinate for on-site and classroom.
      a. OWS and EWS Use and Programming: Include three days.
      b. System Engineering and DDC Programming: Include two to three weeks.
      c. Include listed training for 3 persons excluding travel, lodging, and daily expenses.
   6. Minimum Training Curriculum Topics:
      a. System overview.
      b. System software and operation.
      c. System access.
      d. Software features overview.
      e. Changing setpoints and other attributes.
      f. Scheduling.
      g. Editing programmed variables.
      h. Displaying color graphics.
      i. Running reports.
      j. OWS and EWS maintenance.
      k. Viewing application programming.
      l. Operational sequences including start-up, shutdown, adjusting, and balancing.

3.08 PROTECTION

A. See Section 017610 - Temporary Protective Coverings for additional requirements.

B. Protection of In-Place Conditions: Protect and maintain in-place conditions acceptable to ensure that equipment is undamaged at time of Substantial Completion.

3.09 MAINTENANCE

A. See Section 017000 - Execution and Closeout Requirements for additional requirements.

END OF SECTION

SECTION 230993
SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section defines the manner and method by which controls function. Requirements for each type of control system operation are specified. Equipment, devices, and system components required for control systems are specified in other sections.

B. Sequence of operation for:
   1. Furnaces

1.02 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Sequence of Operation Documentation: Submit written sequence of operation for entire HVAC system and each piece of equipment.

1.03 GENERAL REQUIREMENTS

A. Occupancy Schedules:
   1. Obtained by OCC Maintenance Staff.

B. Zone Temperature (base) set-points:
   1. Provide both a normal and VRF setpoints. The VRF setpoints may need to be adjusted depending on the equipment that is installed.
   2. Unoccupied:
      a. Cooling: Coordinate with Owner’s current setpoint energy requirements at the time of installation and programming.
      b. Heating: Coordinate with Owner’s current setpoint energy requirements at the time of installation and programming.
   3. Occupied
      a. Cooling: Coordinate with Owner’s current setpoint energy requirements at the time of installation and programming.
      b. Heating: Coordinate with Owner’s current setpoint energy requirements at the time of installation and programming.
   4. The sensors shall have a plus/minus dead band of 2 degrees F.

C. Equipment controllers shall be furnished by the equipment manufacturer to operate the sequences listed in this specification.

D. Provide the following global information to the equipment controllers
   1. Occupancy Schedules (adjustable)
   2. Base setpoint temperatures (adjustable)
   3. Outdoor air temperature – Provide two sensors and use average value. Failure of one sensor shall cause it to disable an alarm generated.
   4. Outdoor air relative humidity
   5. Outdoor air enthalpy

E. Failure of any of the above sensor shall generate an alarm.

1.04 FURNACES AND CONDENSING UNIT:

A. Furnaces shall be controlled for heating only in this project but controller shall be sized to pick up future condensing unit as referenced in the sequence of operations below.

B. Occupied mode:
   1. In the occupied mode the associated motorized damper in the outside air shall be fully open.

2. The cooling and heating stage shall be controlled in sequence to maintain the space temperature set point.
3. The furnaces fans shall be enabled when cooling or heating is required to maintain the space temperature setpoint.

C. Unoccupied mode:
1. The furnaces and condensing units shall be off.
2. If space temperature moves beyond the unoccupied heating or cooling set points, the furnace fan and condensing units shall be started, and the heating and cooling stage shall be enabled to maintain the unoccupied heating and cooling set points.
3. The associated motorized damper in the outside air branch shall be fully closed.

D. Supply Fan Control:
1. The supply fan shall operate whenever the heating and cooling stages are enabled. The fan speed shall match the associated heating and cooling stages.
2. The system shall set an alarm if the supply fan status does not prove after a delay.

E. Heating Control:
1. The gas heating shall be staged to maintain the space temperature setpoint.
2. The heating stage shall be disabled if the cooling coil is enabled or the supply fan is off.

F. Cooling Control:
1. The DX cooling from the condensing unit shall be staged to maintain the space temperature set point.
2. The cooling stages shall be disabled if the heating coil is enabled or the supply fan is off.

G. Outside Air Main Branch Ductwork Control:
1. In the occupied mode, the motorized damper located in the outside air ductwork (QTY 1) shall be fully open only when there is a call for either heating or cooling. In the unoccupied mode, the motorized damper shall be shut.

H. Optimal Start:
1. The BAS shall monitor the scheduled occupied time, occupied space set points and space temperature to calculate when the optimal start occurs.

I. Morning Warm-up Mode:
1. During optimal start, if the space temperature is below the occupied heating setpoint a morning warm-up shall be activated. When morning warm-up is initiated the unit shall enable the heating and supply fan. The outside air shall remain closed. When the space temperature reaches the occupied heating setpoint (adjustable), the unit shall transition to the occupied mode.

J. Pre-cool Mode:
1. During optimal start, if the space temperature is above the occupied cooling setpoint, pre-cool mode shall be activated. When pre-cool is initiated the unit shall enable the fan and cooling or economizer. The outside air damper shall remain closed, unless economizing. When the space temperature reaches occupied cooling setpoint (adj.), the unit shall transition to the occupied mode.

K. Optimal Stop:
1. The BAS shall monitor the scheduled unoccupied time, occupied setpoint and space temperature to calculate when the optimal stop occurs. When the optimal stop mode is active the unit controller shall maintain the space temperature to the space temperature offset setpoint.

END OF SECTION

SECTION 233100
HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal ductwork.

B. Nonmetal ductwork.

C. Casing and plenums.

D. Pre-Fabricated Exterior Ductwork.

1.02 REFERENCE STANDARDS

A. ASHRAE (FUND) - ASHRAE Handbook - Fundamentals Most Recent Edition Cited by Referring Code or Reference Standard.

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2014.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2020.

E. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements 2015.

F. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements 2015.

G. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements 2015.

H. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2005 (Revised 2009).

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for duct materials.

PART 2 PRODUCTS

2.01 DUCT ASSEMBLIES

A. Regulatory Requirements: Construct ductwork to comply with NFPA 90A standards.

B. Ducts: Galvanized steel, unless otherwise indicated.

C. Low Pressure Supply (Heating Systems): 1/2 inch w.g. pressure class, galvanized steel.

D. Low Pressure Supply (System with Cooling Coils): 1/2 inch w.g. pressure class, galvanized steel.

E. Outside Air Intake: 1/2 inch w.g. pressure class, galvanized steel.

F. Emergency Generation Ventilation: 1/2 inch w.g. pressure class, galvanized steel.

2.02 MATERIALS

A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.

B. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
   1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
   2. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.

C. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

D. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
   1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
   2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
   3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
   4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
   5. Other Types: As required.

2.03 DUCTWORK FABRICATION

A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.

B. No variation of duct configuration or size permitted except by written permission. Size round duct installed in place of rectangular ducts in accordance with ASHRAE (FUND) Handbook - Fundamentals.

C. Duct systems have been designed for metal duct. At the Contractor's option, fibrous glass duct may be substituted for metal duct.

D. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

E. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

F. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).

2.04 MANUFACTURED DUCTWORK AND FITTINGS

A. Double Wall Insulated Round Ducts: Round spiral lockseam duct with galvanized steel outer wall, perforated galvanized steel inner wall; fitting with solid inner wall.
   1. Manufactured in accordance with SMACNA (DCS).
   2. Insulation:
      a. Thickness: 1 inch.
      b. Material: Air.
   3. Manufacturers:
      a. MKT Metal Manufacturing; Weatherguard: www.mktduct.com/#sle.
      b. L&L Fabrication
      c. LINX Industries

B. Round Ducts: Round lockseam duct with galvanized steel outer wall.
   1. Manufacture in accordance with SMACNA (DCS).

C. Flexible Ducts: Multiple layers of aluminum laminate supported by helically wound spring steel wire.
   1. Pressure Rating: 10 inches WG positive and 1.0 inches WG negative.
   2. Maximum Velocity: 4000 fpm.
   3. Temperature Range: Minus 20 degrees F to 210 degrees F.
   4. Manufacturers:
      a. Thermaflex.
         1) M-KC

D. Round Duct Connection System: Interlocking duct connection system in accordance with SMACNA (DCS).

E. Pre-Insulated outdoor HVAC ductwork system.
   1. Manufacturers:
      a. Pro R Duct
   2. All exterior ductwork shall have an interior R-value of 12, pre-finished embossed aluminum external cladding. External cladding shall be white.

3. System shall be used for all exterior rated ductwork. System shall include pre-insulated panels, insluation, sealants, coupling systems, and accessories for a full system.
4. Warranty - Manufacturer shall provide a 10-year limited warranty for the Pre-Insulated Outdoor HVAC ductwork system.
5. Mounting System:
   a. Horizontal Ductwork Support Mounting Rails: Facotry supplied & attached external support rails on all ducts longer than 24$ & depth greater than 24"
   b. Vertical Ductwork Support Mounting Rails: Facotry supplied & attached external support rails on all ducts with vertical rise greater than 6'
6. Designed, fabricated, and installed to be liquid tight preventing exhaust leakage into the building.
7. Fabrication: Ductwork to be fabricated with panels, adhesives, sealants, connectors, reinforcements, supports and accessories in addordance with Manufacturer's specfications and the SMACNA Phenolic Duct Construction Standards.

2.05 CASINGS

A. Fabricate casings in accordance with SMACNA (DCS) and construct for operating pressures indicated.

B. Mount floor mounted casings on 4 inch high concrete curbs. At floor, rivet panels on 8 inch centers to angles. Where floors are acoustically insulated, provide liner of galvanized 18 gage, 0.0478 inch expanded metal mesh supported at 12 inch centers, turned up 12 inches at sides with sheet metal shields.

C. Reinforce door frames with steel angles tied to horizontal and vertical plenum supporting angles. Install hinged access doors where indicated or required for access to equipment for cleaning and inspection.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install, support, and seal ducts in accordance with SMACNA (DCS).

B. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.

C. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.

D. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

END OF SECTION

SECTION 233300
AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air turning devices/extractors.

B. Flexible duct connectors.

C. Volume control dampers.

D. Low leakage (Class 1A) control dampers.

E. Fire Dampers.

1.02 REFERENCE STANDARDS

A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2018.

B. NFPA 92 - Standard for Smoke Control Systems 2018.

C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2005 (Revised 2009).

D. UL 555 - Standard for Fire Dampers Current Edition, Including All Revisions.

E. UL 555S - Standard for Smoke Dampers Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Protect dampers from damage to operating linkages and blades.

PART 2 PRODUCTS

2.01 AIR TURNING DEVICES/EXTRACTORS

A. Manufacturers:
   1. Carlisle HVAC Products; Dynair Hollow Vane and Rail (Double Wall Vane):
   2. Elgen Manufacturing, Inc
   3. Krueger-HVAC, Division of Air System Components
   4. Ruskin Company
   5. Titus HVAC, a brand of Johnson Controls
   6. Ward Industries, a brand of Hart and Cooley, Inc

B. Multi-blade device with radius blades attached to pivoting frame and bracket, steel construction, with push-pull operator strap.

2.02 FLEXIBLE DUCT CONNECTORS

A. Manufacturers:
   1. Carlisle HVAC Products
   2. Ductmate Industries, Inc, a DMI Company
   3. Elgen Manufacturing, Inc

B. Fabricate in accordance with SMACNA (DCS) and as indicated.

C. Flexible Duct Connections: Fabric crimped into metal edging strip.

2.03 VOLUME CONTROL DAMPERS

A. Manufacturers:
   1. AireTechnologies, Inc, a DMI Company
   2. Louvers & Dampers, Inc, a brand of Mestek, Inc

3. MKT Metal Manufacturing
4. Nailor Industries, Inc
5. NCA, a brand of Metal Industries Inc
6. Ruskin Company
7. Pottorff

B. Single Blade Dampers:
1. Fabricate for duct sizes up to 6 by 30 inch.
2. Blade: 24 gage, 0.0239 inch, minimum.

C. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 by 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.

D. Quadrants:
1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.
3. Where rod lengths exceed 30 inches provide regulator at both ends.

E. Rectangular to Round Take-offs.
1. Provide tapered high-efficiency take-off with control volume dampers and insulation stand-off locking quadrant. Install on all supply, return, and exhaust ductwork. Not shown on plans for clarity.
a. Manufacturers:
1) Carlisle HVAC Products; Dynair Double Shear Rattle Free Quadrants 1/2 inch: www.carlislehvac.com/#sle.
2) Elgen Super Standoff HET
3) Flexmaster

2.04 LOW LEAKAGE (CLASS 1A) CONTROL DAMPERS

A. Manufacturers:
1. Ruskin Company; CD50: www.ruskin.com/#sle.
2. Pottorff

B. Maximum Leakage Allowed: 3 cfm/sf at 1 inch wg.

C. Frame:
1. Material: 12 gage galvanized steel.
2. Free-area: Single cross section.

D. Blade:
1. Type: Multi-blade such as V or 3V for low to medium pressure.
2. Operation: Opposed type.
3. Material: 12 gauge galvanized steel.

E. Insulation: Water-resistant sound absorbing material.

F. Temperature Service Range: Minus 25 to 185 degrees F (minus 32 to 85 degrees C).

2.05 FIRE DAMPERS

A. Manufacturers:
1. Pottorff:
a. VFD-10D-B
2. Ruskin Company:

B. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.

C. Horizontal Dampers: Galvanized steel, 22 gage, 0.0299 inch frame, stainless steel closure spring, and lightweight, heat retardant non-asbestos fabric blanket.

D. 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 except for 1.0 inch pressure class ducts up to 12 inches in height.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 23 31 00.99 for duct construction and pressure class.

B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

C. Provide fire dampers, combination fire and smoke dampers, and smoke dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by Authorities Having Jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.

D. Install smoke dampers and combination smoke and fire dampers in accordance with NFPA 92.

E. Demonstrate re-setting of fire dampers to Owner's representative.

F. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.

G. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.

H. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.

I. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

END OF SECTION

SECTION 233700
AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Diffusers:
   1. Critical environment diffusers.

B. Registers/grilles:
   1. Ceiling-mounted, exhaust and return register/grilles.
   2. Ceiling-mounted, supply register/grilles.

1.02 REFERENCE STANDARDS

A. AHRI 880 (I-P) - Performance Rating of Air Terminals; 2017 (Reaffirmed 2023).

B. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Air Inlets; 2023.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Krueger-HVAC

B. Price Industries

C. Titus, a brand of Air Distribution Technologies

2.02 CEILING SUPPLY REGISTERS/GRILLES

A. Type: Streamlined and individually adjustable curved blades to discharge air along face of grille, one-way deflection.

B. Frame: 1-1/4 inch (32 mm) margin with countersunk screw mounting and gasket.

C. Construction: Made of aluminum extrusions with factory enamel finish.

D. Construction: Made of stainless steel.

E. Color: As indicated on drawings.

F. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face.

G. All grilles installed in areas on confinement shall include tamper proof hardware.

2.03 CEILING EXHAUST AND RETURN REGISTERS/GRILLES

A. Type: Streamlined blades, 3/4 inch (19 mm) minimum depth, 3/4 inch (19 mm) maximum spacing, with blades set at 45 degrees, vertical face.

B. Frame: 1-1/4 inch (32 mm) margin with countersunk screw mounting.

C. Fabrication: Steel with 20 gauge, 0.0359 inch (0.91 mm) minimum frames and 22 gauge, 0.0299 inch (0.76 mm) minimum blades, steel and aluminum with 20 gauge, 0.0359 inch (0.91 mm) minimum frame, or aluminum extrusions, with factory baked enamel finish.

D. Fabrication: Stainless steel with 20 gauge, 0.0359 inch (0.91 mm) minimum frames and 22 gauge, 0.0299 inch (0.76 mm) minimum blades, steel and aluminum with 20 gauge, 0.0359 inch (0.91 mm) minimum frame.

E. Color: As indicated on the drawings.

F. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face where not individually connected to exhaust fans.

G. All grilles installed in areas on confinement shall include tamper proof hardware.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Check location of outlets and inlets and make necessary adjustments in position to comply with architectural features, symmetry, and lighting arrangement.

END OF SECTION

SECTION 235400
FURNACES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Forced air furnaces.

1.02 RELATED REQUIREMENTS

A. Section 221005 - Plumbing Piping:

B. Section 230713 - Duct Insulation: Duct liner.

C. Section 233100 - HVAC Ducts and Casings.

1.03 REFERENCE STANDARDS

A. ANSI Z21.47 - American National Standard for Gas-Fired Central Furnaces; 2021.

B. ASHRAE Std 103 - Method of Testing for Annual Fuel Utilization Efficiency of Residential Central Furnaces and Boilers; 2022.

C. NFPA 54 - National Fuel Gas Code; 2024.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

F. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2024.

G. NFPA 211 - Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances; 2024.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Carrier Corporation, a brand of United Technologies Corporation Building & Industrial System

B. Rheem Manufacturing Company Inc

C. Trane Technologies, PLC

D. York International Corporation / Johnson Controls

2.02 REGULATORY REQUIREMENTS

A. Comply with NFPA 70.

2.03 GAS FIRED FURNACES

A. Annual Fuel Utilization Efficiency (AFUE): 0.95 ("condensing") in accordance with ASHRAE Std 103.

B. Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, heating element, controls, air filter, humidifier, and accessories; wired for single power connection with control transformer.
   1. Safety certified by CSA in accordance with ANSI Z21.47.
   2. Venting System: Direct.
   3. Combustion: Sealed.
   4. Air Flow Configuration: Upflow.
   5. Heating: Natural gas fired.
   6. Accessories:
      a. Condensate drain.

b. Concentric roof termination kit.
c. Wall termination kit.
d. Concentric wall termination kit.

7. Performance:
   a. Refer to Furnace Schedule.
8. Cabinet: Steel with baked enamel finish, easily removed and secured access doors with safety interlock switches, glass fiber insulation with reflective liner. If not certified for combustible flooring, please provide additional steel base.
9. Primary Heat Exchanger:
   a. Material: Hot-rolled steel.
   b. Shape: Tubular type.
10. Secondary Heat Exchanger:
    a. Material: Aluminized steel.
    b. Shape: _____.
11. Gas Burner:
    a. Atmospheric type with adjustable combustion air supply.
    b. Gas valve, two stage provides 100 percent safety gas shut-off; 24 volt combining pressure regulation, safety pilot, manual set (On-Off), pilot filtration, automatic electric valve.
    c. Electronic pilot ignition, with electric spark igniter.
    d. Combustion air damper with synchronous spring return damper motor.
    e. Non-corrosive combustion air blower with permanently lubricated motor.
12. Gas Burner Safety Controls:
    a. Thermocouple sensor: Prevents opening of gas valve until pilot flame is proven and stops gas flow on ignition failure.
    b. Flame rollout switch: Installed on burner box and prevents operation.
    c. Vent safety shutoff sensor: Temperature sensor installed on draft hood and prevents operation, manual reset.
    d. Limit Control: Fixed stop at maximum permissible setting, de-energizes burner on excessive bonnet temperature, automatic resets.
13. Supply Fan: Centrifugal type rubber mounted with direct drive with adjustable variable pitch motor pulley.
14. Motor:
    a. 1750 rpm single-speed, permanently lubricated, hinge mounted.
15. Air Filters: 1 inch (25 mm) thick glass fiber, disposable type arranged for easy replacement.
16. Operating Controls:
    a. Room Thermostat: Cycles burner to maintain room temperature setting.
    b. Supply Fan Control: Energize from bonnet temperature independent of burner controls, with adjustable timed off delay and fixed timed on delay, with manual switch for continuous fan operation. Provide continuous low speed fan operation.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions and requirements of authorities having jurisdiction.

B. Install in accordance with NFPA 90A.

C. Install gas fired furnaces in accordance with NFPA 54.

D. Provide vent connections in accordance with NFPA 211.

END OF SECTION

SECTION 235533
FUEL-FIRED UNIT HEATERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Gas fired unit heaters.

1.02 RELATED REQUIREMENTS

A. Section 235100 - Breechings, Chimneys, and Stacks.

1.03 REFERENCE STANDARDS

A. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

B. ASHRAE Std 103 - Method of Testing for Annual Fuel Utilization Efficiency of Residential Central Furnaces and Boilers; 2022.

C. NFPA 54 - National Fuel Gas Code; 2024.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

F. NFPA 211 - Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances; 2024.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's literature and data indicating rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.

C. Shop Drawings: Indicate assembly, required clearances, and locations and sizes of field connections.

PART 2 PRODUCTS

2.01 GAS FIRED UNIT HEATERS

A. Manufacturers:
   1. Trane
   2. Modine Manufacturing Company
   3. Sterling HVAC/Mestek Technology, Inc
   4. Reznor/Thomas & Betts Corporation

B. Unit Heaters: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, heat exchanger, burner, controls, and accessories:
   1. Heating: Natural gas fired.
   2. Discharge Louvers: Individually adjustable horizontal and vertical louvers to match cabinet finish.

C. Cabinet: Galvanized steel with baked enamel finish, easily removed and secured access doors, glass fiber insulation and reflective liner.

D. Supply Fan: Propeller type with direct drive, variable pitch motor pulley.

E. Heat Exchanger: Aluminized steel welded construction.

F. Gas Burner:
   1. Atmospheric type with adjustable combustion air supply.
   2. Gas valve, two stage provides 100 percent safety gas shut-off; 24 volt combining pressure regulation, safety pilot, manual set (On-Off), pilot filtration, automatic electric valve.
   3. Electronic pilot ignition, with electric spark igniter.

G. Gas Burner Safety Controls:
   1. Thermocouple Sensor: Prevents opening of gas valve until pilot flame is proven and stops gas flow on ignition failure.
   2. Vent Safety Shutoff Sensor: Temperature sensor installed on draft hood and prevents operation, manual reset.

H. Operating Controls:
   1. Room Thermostat: Cycles burner to maintain room temperature setting.

I. Performance:
   1. Ratings: Energy Efficiency Rating (EER)/Coefficient of Performance (COP) not less than requirements of ASHRAE Std 90.1 I-P; seasonal efficiency to ASHRAE Std 103.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that space is ready for installation of units and openings are as indicated on shop drawings.

B. Verify that proper power supply is available.

C. Verify that proper fuel supply is available for connection.

3.02 INSTALLATION

A. Install in accordance with NFPA 90A.

B. Install gas fired units in accordance with NFPA 54 and applicable codes.

C. Provide vent connections in accordance with NFPA 211.

END OF SECTION

SECTION 237413
PACKAGED OUTDOOR CENTRAL-STATION AIR-HANDLING UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

1.02 RELATED REQUIREMENTS

A. Section 230548 - Vibration and Seismic Controls for HVAC.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.

C. Shop Drawings: Indicate capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Carrier Global Corporation.

B. Trane Technologies, PLC

C. York, a brand of Johnson Controls International, PLC

D. AAON

E. Daikin

2.02 UNIT CONSTRUCTION

A. General
   1. Packaged rooftop units cooling, heating capacities, and efficiencies are AHRI Certified within scope of AHRI Standard 210-240 for 6 to 25 Tons and ANSIZ21.47 and 10 CFR Part 431 pertaining to Commercial Warm Air Furnaces (all gas heating units).
   2. Convertible airflow.
   3. Symbio controls operating range is from 0-125.0 F from factory; if designing for cooling mode operation below 40.0 F ambient temp, add low ambient kit to assure continuous and reliable operation, fan and blower rotation, and control sequence before leaving the factory.
   4. Factory assembled, internally wired, fully charged with R-454B, and 100 percent run tested to check cooling.
   5. Colored and numbered wiring internal to the unit for simplified identification.
   6. Unit shall be furnished with a leak detection system from the factory. The leak detection system shall consist of one or more refrigerant detection sensors. When the system detects a leak, the unit controller shall initiate mitigation actions.

B. Casing
   1. Zinc coated, heavy gauge, galvanized steel.
   2. Weather resistant pre-painted metal with galvanized substrate.
   3. Meets ASTM B117, 672 hour salt spray test.
   4. Removable single side maintenance access panels.
   5. Lifting handles in maintenance access panels (can be removed and reinstalled by removing fasteners while providing a water and air tight seal).
   6. Exposed vertical panels and top covers in the indoor air section insulated with a cleanable foil-faced, fire-retardant permanent, odorless glass fiber material.

7. Base pan shall have no penetrations within the perimeter of the curb other than the raised 1 inch high downflow supply/return openings to provide an added water integrity precaution, if the condensate drain backs up.
8. Base of the unit insulated with 1/8 inch, foil-faced, closed-cell insulation.
9. Unit base provisions for forklift and/or crane lifting on three sides of unit.

C. Hail Guards:
1. Provide condenser coil protection.

D. Microchannel Coils
1. Optimal heat transfer performance due to flat, streamlined tubes with small ports, and metallurgical tube-to-fin bond.
2. Reduce system refrigerant charge by up to 50% leading to better compressor reliability.
3. Compact all-aluminum microchannel coils reduce the unit weight.
4. Recyclable all aluminum coils All aluminium construction minimizes galvanic corrosion.
5. Strong aluminum brazed structure provides better fin protection.
6. Flat streamlined tubes more dust resistant and easy to clean.
7. Coils leak tested at the factory to ensure the pressure integrity.

E. Compressors:
1. All units have direct-drive, hermetic, scroll type compressors with centrifugal type oil pumps.
2. Suction gas-cooled motor with voltage utilization range of plus or minus 10 percent of unit nameplate voltage.
3. Internal overloads standard with scroll compressors.
4. All units have dual compressors.
5. Three stages of cooling available on 6 to 17.5 tons units and four stages of cooling available on 20 and 25 tons units.

F. Filters:
1. Two inch standard filters shall be factory supplied on all units.

G. Freezestat:
1. Utilized as a safety device.
2. Opens to prevent freezing temperatures on evaporator coil.
3. Temperature will need to rise to 50°F before closing.
4. Utilized in low airflow or high outside air applications (cooling only).

H. Gas Heating Section:
1. The heating section shall have a progressive tubular heat exchanger with corrosion-resistant aluminized steel tubes and burners as standard on all models.
2. Stainless steel heat exchanger with 409 stainless steel tubes and 439 stainless steel burners shall be optional.
3. Induced draft combustion blower shall be used to pull the combustion products through the firing tubes.
4. Heater shall use a direct spark ignition (DSI) system.
5. On initial call for heat, the combustion blower shall purge the heat exchanger for 20 seconds before ignition.
6. After three unsuccessful ignition attempts, entire heating system shall be locked out until manually reset at the thermostat/zone sensor.
7. Units shall be suitable for use with natural gas or propane (field-installed kit).

I. Indoor Fan:
1. Direct drive plenum fan design - 6 to 25 tons units.
2. Plenum fan design - backward-curved fan wheel along with an external rotor direct drive variable speed indoor motor.
3. Supply fan speed adjustments can be made using the Symbio 700 or Mobile App.
4. Motors are thermally protected.

5. Variable speed direct drive motors are high efficiency - 6 to 25 tons.

J. Heat Exchanger:
   1. Compact cabinet features a tubular heat exchanger in low, medium and high heat capacities.
   2. Corrosion-resistant aluminized steel tubes and burners are standard on all models.
   3. Induced draft blower to pull the gas mixture through the burner tubes.
   4. Direct spark ignition and a flame sensor as a safety device to validate the flame.

K. Roof Curb:
   1. Designed to mate with the units horizontal supply and return.
   2. Provide support and a water tight installation when installed properly.
   3. Shall allow field-fabricated rectangular supply/return ductwork to be connected directly to the curb.
   4. Curb shall be installed directly on concrete pad.

L. Through-the-Base Electrical with Disconnect Switch:
   1. 3-pole, molded case, disconnect switch with provisions for through-the-base electrical connections.
   2. Disconnect switch installed within unit in a water tight enclosure.
   3. Wiring provided from the switch to the unit high voltage terminal block.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.02 SYSTEM STARTUP

A. Prepare and start equipment. Adjust for proper operation.

END OF SECTION

SECTION 238239
UNIT HEATERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electric Unit Heater.

B. Electric Duct Heaters.

1.02 RELATED REQUIREMENTS

A. Section 233100 - HVAC Ducts and Casings.

1.03 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

B. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

C. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2024.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

PART 2 PRODUCTS

2.01 ELECTRIC UNIT HEATER

A. Manufacturers:
   1. Marley Engineered Products
   2. Indeeco
   3. TPI

B. Back Box:
   1. The back box shall be designed as a recesses rough-in box in either masonry or frame installations and is also used when sureface mounting frames are used in surface mounting installations. The back box shall be heavy gauge galvanized steel and shall contain knockouts through which power leads enter.

C. Inner Frame Assembly:
   1. The heater assembly, which fits into the back box, shall consist of a heavy guage steel panel to which all of the operational parts of the heater are mounted. The inner frame assembly shall be completely pre-wired.

D. Heating Element:
   1. The heating element shall be of the non-glowing design consisting of an 80/20 nickel-chromium resistance wire enclosed in a steel sheath to which plate fins are copper brazed. The element shall cover the entire air discharge area to ensure uniform heating of all discharged air. It shall be warrantied for 5 years.

E. Motor and Controls:
   1. The fan motor shall be totally enclosed, impedance protected, permanently lubricated and with a totally enclosed rotor. Fan control shall be of the bi-metallic, snap-action type and shall activate fan after heating element reaches operating temperature, and continue to operate the fan after the termostat is satified and all heated air has been discharged.

F. Surface Mounting Frame:
   1. The surface mounting frame shall be of heavy gauge steel designed to mount around the back box for a finished surface installation. Slot knock outs shall be provided for power supply conduit.

G. Front Cover:

1. The louvered front cover shall be of heavy gauge steel with a powder paint finish. A plug bottom will be provided to replace the thermostat knob and render the unit tamper-resistant.

2.02 ELECTRIC DUCT HEATERS

A. Manufacturers:
   1. Neptronic
   2. Indeeco
   3. TPI

B. Refer to Electric Duct Heater Schedule for further requirements.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions and requirements of authorities having jurisdiction.

B. Install in accordance with NFPA 90A.

C. Install gas fired furnaces in accordance with NFPA 54.

D. Provide vent connections in accordance with NFPA 211.

END OF SECTION

SECTION 260519
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Single conductor building wire.

B. Wiring connectors.

1.02 RELATED REQUIREMENTS

A. Section 260513 - Medium-Voltage Cables: Cables and terminations for systems 601 V through 35,000 V.

B. Section 260526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.

C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013 (Reapproved 2018).

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2023.

C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010, with Editorial Revision (2020).

D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2020).

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

F. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; 2021.

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.

I. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.

J. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.

K. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.

L. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.

1.05 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

D. Comply with NEMA WC 70.

E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

G. Conductor Material:
   1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
   2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
   3. Tinned Copper Conductors: Comply with ASTM B33.

H. Minimum Conductor Size:
   1. Branch Circuits: 12 AWG.
      a. Exceptions:
         1) 20 A, 120 V circuits longer than 75 feet (23 m): 10 AWG, for voltage drop.
         2) 20 A, 120 V circuits longer than 150 feet (46 m): 8 AWG, for voltage drop.
   2. Control Circuits: 14 AWG.

I. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

J. Conductor Color Coding:
   1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
   2. Color Coding Method: Integrally colored insulation.
   3. Color Code:
      a. 240/120 V, 1 Phase, 3 Wire System:
         1) Phase A: Black.
         2) Phase B: Red.
         3) Neutral/Grounded: White.
      b. 208Y/120 V, 3 Phase, 4 Wire System:
         1) Phase A: Black.
         2) Phase B: Red.
         3) Phase C: Blue.
      c. Neutral/Grounded: White
      d. Equipment Ground, All Systems: Green.
      e. For control circuits, comply with manufacturer's recommended color code.

2.03 SINGLE CONDUCTOR BUILDING WIRE

A. Description: Single conductor insulated wire.

B. Conductor Stranding:
   1. Feeders and Branch Circuits:
      a. Size 10 AWG and Smaller: Solid.
      b. Size 8 AWG and Larger: Stranded.

C. Insulation Voltage Rating: 600 V.

D. Insulation:

1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2.

2.04 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

B. Wiring Connectors for Splices and Taps:
   1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
   2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.

C. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F (105 degrees C) for standard applications and 302 degrees F (150 degrees C) for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.

D. Mechanical Connectors: Provide bolted type or set-screw type.

E. Compression Connectors: Provide circumferential type or hex type crimp configuration.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that work likely to damage wire and cable has been completed.

B. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

C. Verify that field measurements are as indicated.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Circuiting Requirements:
   1. Unless dimensioned, circuit routing indicated is diagrammatic.
   2. When circuit destination is indicated without specific routing, determine exact routing required.
   3. Arrange circuiting to minimize splices.
   4. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.

B. Install products in accordance with manufacturer's instructions.

C. Perform work in accordance with NECA 1 (general workmanship).

D. Installation in Raceway:
   1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
   2. Pull all conductors and cables together into raceway at same time.
   3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
   4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

E. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

F. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.

G. Install conductors with a minimum of 12 inches (300 mm) of slack at each outlet.

H. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

I. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

J. Make wiring connections using specified wiring connectors.
   1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
   2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
   3. Do not remove conductor strands to facilitate insertion into connector.
   4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
   5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
   6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

K. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.

L. Insulate ends of spare conductors using vinyl insulating electrical tape.

M. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

END OF SECTION

SECTION 260526
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Grounding and bonding requirements.

B. Conductors for grounding and bonding.

C. Connectors for grounding and bonding.

D. Ground rod electrodes.

1.02 RELATED REQUIREMENTS

A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.

B. Section 265600 - Exterior Lighting: Additional grounding and bonding requirements for pole-mounted luminaires.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

B. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; 2022.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.

1.05 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

A. Do not use products for applications other than as permitted by NFPA 70 and product listing.

B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

D. Grounding Electrode System:
   1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
      a. Provide continuous grounding electrode conductors without splice or joint.
      b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
   2. Concrete-Encased Electrode:
      a. Provide connection to concrete-encased electrode consisting of not less than 20 feet (6.0 m) of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.

3. Ground Ring:
   a. Provide a ground ring encircling the building or structure consisting of bare copper conductor not less than 2 AWG in direct contact with earth, installed at a depth of not less than 30 inches (750 mm).
4. Ground Rod Electrode(s):
   a. Space electrodes not less than 10 feet (3.0 m) from each other and any other ground electrode.

E. Separately Derived System Grounding:
1. Separately derived systems include, but are not limited to:
   a. Transformers (except autotransformers such as buck-boost transformers).
   b. Generators, when neutral is switched in the transfer switch.
2. Outdoor Source: Where the source of the separately derived system is located outside the building or structure supplied, provide connection to grounding electrode at source in accordance with NFPA 70.
3. Provide system bonding jumper to connect system grounded conductor to equipment ground bus. Make connection at same location as grounding electrode conductor connection. Do not make any other connections between neutral (grounded) conductors and ground on load side of separately derived system disconnect.
4. Where the source and first disconnecting means are in separate enclosures, provide supply-side bonding jumper between source and first disconnecting means.

F. Bonding and Equipment Grounding:
1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.

G. Pole-Mounted Luminaires: Also comply with Section 265600.

2.02 GROUNDING AND BONDING COMPONENTS

A. General Requirements:
1. Provide products listed, classified, and labeled as suitable for the purpose intended.
2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 260526:
1. Use insulated copper conductors unless otherwise indicated.
   a. Exceptions:
      1) Use bare copper conductors where installed underground in direct contact with earth.
      2) Use bare copper conductors where directly encased in concrete (not in raceway).

C. Connectors for Grounding and Bonding:
1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.

2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.

D. Ground Rod Electrodes:
1. Comply with NEMA GR 1.
2. Material: Copper-bonded (copper-clad) steel.
3. Size: 3/4 inch (19 mm) diameter by 10 feet (3.0 m) length, unless otherwise indicated.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
1. Outdoor Installations: Unless otherwise indicated, install with top of rod 6 inches (150 mm) below finished grade.

D. Make grounding and bonding connections using specified connectors.
1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

END OF SECTION

SECTION 260529
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.02 RELATED REQUIREMENTS

A. Section 26 05 33.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.

B. Section 26 05 33.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.

1.03 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2019.

D. MFMA-4 - Metal Framing Standards Publication 2004.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 5B - Strut-Type Channel Raceways and Fittings Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, non-penetrating rooftop supports, and post-installed concrete and masonry anchors.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
   2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
   3. 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 10%. Include consideration for vibration, equipment operation, and shock loads where applicable.
   4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
   5. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
   6. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
      a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.

b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
2. Conduit Clamps: Bolted type unless otherwise indicated.
3. Manufacturers:
a. Cooper Crouse-Hinds, a division of Eaton Corporation
b. Erico International Corporation
c. Thomas & Betts Corporation

C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.

D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
1. Comply with MFMA-4.
2. Channel (Strut) Used as Raceway (only where specifically indicated): Listed and labeled as complying with UL 5B.
3. Channel Material:
a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
4. Minimum Channel Thickness: Steel sheet, 12 gage, 0.1046 inch.
5. Minimum Channel Dimensions: 1-5/8 inch width by 13/16 inch height.
6. Manufacturers:
a. Cooper B-Line, a division of Eaton Corporation
b. Thomas & Betts Corporation
c. Unistrut, a brand of Atkore International Inc

E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
1. Minimum Size, Unless Otherwise Indicated or Required:
a. Equipment Supports: 1/2 inch diameter.
b. Single Conduit up to 1 inch (27 mm) trade size: 1/4 inch diameter.
c. Single Conduit larger than 1 inch (27 mm) trade size: 3/8 inch diameter.
d. Trapeze Support for Multiple Conduits: 3/8 inch diameter.
e. Outlet Boxes: 1/4 inch diameter.
f. Luminaires: 1/4 inch diameter.

F. Non-Penetrating Rooftop Supports for Low-Slope Roofs: Steel pedestals with thermoplastic or rubber bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified.
1. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
2. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
3. Mounting Height: Provide minimum clearance of 6 inches under supported component to top of roofing.
4. Manufacturers:
a. Cooper B-Line, a division of Eaton Corporation
b. Erico International Corporation

G. Anchors and Fasteners:
1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.

3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
4. Hollow Masonry: Use toggle bolts.
5. Hollow Stud Walls: Use toggle bolts.
6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
7. Sheet Metal: Use sheet metal screws.
8. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
    a. Comply with MFMA-4.
    b. Channel Material: Use galvanized steel.
    c. Manufacturer: Same as manufacturer of metal channel (strut) framing system.
9. Manufacturers - Mechanical Anchors:
    a. Hilti, Inc
    b. Powers Fasteners, Inc: www.powers.com/#sle.
    c. Simpson Strong-Tie Company Inc

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.

F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

G. Equipment Support and Attachment:
    1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
    2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
    3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
    4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

H. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.

I. Secure fasteners according to manufacturer's recommended torque settings.

J. Remove temporary supports.

END OF SECTION

SECTION 260533.13
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Galvanized steel rigid metal conduit (RMC).

B. Liquidtight flexible metal conduit (LFMC).

C. Rigid polyvinyl chloride (PVC) conduit.

D. High-density polyethylene (HDPE) conduit.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Concrete encasement of conduits.

B. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Cable assemblies consisting of conductors protected by integral metal armor.

C. Section 260526 - Grounding and Bonding for Electrical Systems.

D. Section 260533.16 - Boxes for Electrical Systems.

E. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2020.

B. ASTM F2160 - Standard Specification for Solid Wall High Density Polyethylene (HDPE) Conduit Based on Controlled Outside Diameter (OD); 2016.

C. ASTM F2176 - Standard Specification for Mechanical Couplings Used on Polyethylene Conduit, Duct and Innerduct; 2017.

D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

E. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2020.

F. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); 2017.

G. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.

H. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; 2020.

I. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2021.

J. NEMA TC 7 - Solid-Wall Coilable and Straight Electrical Polyethylene Conduit; 2021.

K. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

L. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.

M. UL 360 - Liquid-Tight Flexible Metal Conduit; Current Edition, Including All Revisions.

N. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.

O. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.

P. UL 651A - Schedule 40 and 80 High Density Polyethylene (HDPE) Conduit; Current Edition, Including All Revisions.

Q. UL 2419 - Outline of Investigation for Electrically Conductive Corrosion Resistant Compounds; Current Edition, Including All Revisions.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70, manufacturer's instructions, and product listing.

B. Unless otherwise indicated and where not otherwise restricted, use conduit types indicated for specified applications. Where more than one listed application applies, comply with most restrictive requirements. Where conduit type for particular application is not specified, use galvanized steel rigid metal conduit.

C. Underground:
   1. Exterior, Direct-Buried: Use rigid PVC conduit.

D. Embedded Within Concrete:
   1. Within Slab on Grade: Not permitted.
   2. Within Concrete Duct Bank: Use rigid PVC conduit.

E. Exposed, Exterior, Subject to Physical Damage: Use galvanized steel rigid metal conduit (RMC).

F. Flexible Connections to Vibrating Equipment:
   1. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit (LFMC).

G. Exposed, Interior, Subject to Physical Damage: Use intermediate metal conduit (IMC).
   1. Locations subject to physical damage include, but are not limited to:
      a. Where exposed below 8 feet, except within electrical and communication rooms or closets.

H. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).

2.02 CONDUIT - GENERAL REQUIREMENTS

A. Comply with NFPA 70.

B. Provide conduit, fittings, supports, and accessories required for complete raceway system.

C. Provide products listed, classified, and labeled as suitable for purpose intended.

D. Minimum Conduit Size, Unless Otherwise Indicated:
   1. Branch Circuits: 3/4-inch (21 mm) trade size.
   2. Underground, Exterior: 1-inch (27 mm) trade size.

E. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

B. Fittings:
   1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6.
   2. Material: Use steel or malleable iron.
   3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.04 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.

B. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.

2. Material: Use steel or malleable iron.

2.05 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

A. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.

B. Fittings:
   1. Manufacturer: Same as manufacturer of conduit to be connected.
   2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.06 ELECTRICAL METALLIC TUBING (EMT)

A. Manufacturers:
   1. Allied Tube & Conduit
   2. Republic Conduit
   3. Wheatland Tube, a Division of Zekelman Industries

B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

C. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.
   3. Connectors and Couplings: Use compression (gland) type.
      a. Do not use indenter type connectors and couplings.
   4. Damp or Wet Locations (where permitted): Use fittings listed for use in wet locations.
   5. Embedded Within Concrete (where permitted): Use fittings listed as concrete-tight. Fittings that require taping to be concrete-tight are acceptable.

2.07 INTERMEDIATE METAL CONDUIT (IMC)

A. Manufacturers:
   1. Allied Tube & Conduit
   2. Republic Conduit
   3. Wheatland Tube, a Division of Zekelman Industries

B. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.

C. Fittings:
   1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.
   3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted

2.08 ACCESSORIES

A. Conduit Joint Compound: Corrosion-resistant, electrically conductive compound listed as complying with UL 2419; suitable for use with conduit to be installed.

B. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.

C. Pull Strings: Use nylon or polyester tape with average breaking strength of not less than 1,250 lbf (5.6 kN).

D. Duct Bank Spacers: Nonmetallic; designed for maintaining conduit/duct spacing for concrete encasement in open trench installation; suitable for conduit/duct arrangement to be installed.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install conduit in accordance with NECA 1.

C. Galvanized Steel Rigid Metal Conduit (RMC): Install in accordance with NECA 101.

D. Intermediate Metal Conduit (IMC): Install in accordance with NECA 101.

E. Rigid Polyvinyl Chloride (PVC) Conduit: Install in accordance with NECA 111.

F. Liquidtight Flexible Nonmetallic Conduit (LFNC): Install in accordance with NECA 111.

G. Conduit Routing:

H. Conduit Support:
   1. Secure and support conduits in accordance with NFPA 70 using suitable supports and methods approved by authorities having jurisdiction; see Section 260529.

I. Connections and Terminations:
   1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
   2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
   3. Use suitable adapters where required to transition from one type of conduit to another.
   4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
   5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
   6. Provide insulating bushings, insulated throats, or listed metal fittings with smooth, rounded edges at conduit terminations to protect conductors.
   7. Secure joints and connections to provide mechanical strength and electrical continuity.

J. Underground Installation:
   1. Provide trenching and backfilling.

K. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
   1. Where conduits are subject to earth movement by settlement or frost.

L. Conduit Sealing:
   1. Use foam conduit sealant to prevent entry of moisture and gases. This includes, but is not limited to:
      a. Where conduits may transport moisture to contact live parts.
   2. Where conduits cross barriers between areas of potential substantial temperature differential, use foam conduit sealant at accessible point near penetration to prevent condensation. This includes, but is not limited to:
      a. Where conduits pass from outdoors into conditioned interior spaces.

M. Provide grounding and bonding; see Section 260526.

3.02 FIELD QUALITY CONTROL

A. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

B. Correct deficiencies and replace damaged or defective conduits.

END OF SECTION

SECTION 260533.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches (1,650 cu cm), including those used as junction and pull boxes.

B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches (1,650 cu cm).

C. Underground boxes/enclosures.

1.02 RELATED REQUIREMENTS

A. Section 260526 - Grounding and Bonding for Electrical Systems.

B. Section 260529 - Hangers and Supports for Electrical Systems.

C. Section 260533.13 - Conduit for Electrical Systems:
   1. Conduit bodies and other fittings.

D. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

E. Section 262726 - Wiring Devices:

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.

D. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.

E. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013 (Reaffirmed 2020).

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. SCTE 77 - Specifications for Underground Enclosure Integrity; 2023.

H. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

I. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

J. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.

K. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures, boxes for hazardous (classified) locations, floor boxes, and underground boxes/enclosures.

1.05 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 BOXES

A. General Requirements:

1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
3. Provide products listed, classified, and labeled as suitable for the purpose intended.
4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches (1,650 cu cm), Including Those Used as Junction and Pull Boxes:
1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
3. Use cast iron boxes or cast aluminum boxes where exposed galvanized steel rigid metal conduit is used.
4. Use suitable masonry type boxes where flush-mounted in masonry walls.
5. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
6. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
7. Wall Plates: Comply with Section 262726.

C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
2. NEMA 250 Environment Type, Unless Otherwise Indicated:
   a. Indoor Clean, Dry Locations: Type 1, painted steel.
   b. Outdoor Locations: Type 3R, painted steel.
3. Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
   a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
4. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.

D. Underground Boxes/Enclosures:
1. Description: In-ground, open bottom boxes furnished with flush, non-skid covers with legend indicating type of service and stainless steel tamper resistant cover bolts.
2. Size: As indicated on drawings.
3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 12 inches (300 mm).
4. Applications:
   a. Sidewalks and Landscaped Areas Subject Only to Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77 Tier 8 load rating.
   b. Do not use polymer concrete enclosures in areas subject to deliberate vehicular traffic.
5. Polymer Concrete Underground Boxes/Enclosures: Comply with SCTE 77.
   a. Combination fiberglass/polymer concrete boxes/enclosures are acceptable.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Box Supports:
   1. Secure and support boxes in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
   2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.

E. Install boxes plumb and level.

F. Install boxes as required to preserve insulation integrity.

G. Underground Boxes/Enclosures:
   1. Install enclosure on gravel base, minimum 6 inches (150 mm) deep.
   2. Install additional bracing inside enclosures in accordance with manufacturer's instructions to minimize box sidewall deflections during backfilling. Backfill with cover bolted in place.

H. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

I. Close unused box openings.

J. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

K. Provide grounding and bonding in accordance with Section 260526.

END OF SECTION

SECTION 260553
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical identification requirements.

B. Identification nameplates and labels.

C. Underground warning tape.

D. Warning signs and labels.

1.02 RELATED REQUIREMENTS

A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

1.03 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

B. NFPA 70E - Standard for Electrical Safety in the Workplace; 2024.

C. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

1.05 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

A. Identification for Equipment:
   1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
      a. Switchgear:
         1) Identify voltage and phase.
         2) Use identification nameplate to identify main and tie devices.
         3) Use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
      b. Panelboards:
         1) Identify ampere rating.
         2) Identify voltage and phase.
         3) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
      c. Transformers:
         1) Identify kVA rating.
   2. Service Equipment:
      a. Use identification nameplate to identify each service disconnecting means.
   3. Use voltage marker to identify highest voltage present for each piece of electrical equipment.
   4. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70 including but not limited to the following.
      a. Service equipment.

5. Arc Flash Hazard Warning Labels: Use warning labels to identify arc flash hazards for electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized.
   a. Minimum Size: 3.5 by 5 inches (89 mm by 127 mm).
   b. Legend: Include orange header that reads "WARNING", followed by the word message "Arc Flash and Shock Hazard; Appropriate PPE Required; Do not operate controls or open covers without appropriate personal protection equipment; Failure to comply may result in injury or death; Refer to NFPA 70E for minimum PPE requirements" or approved equivalent.
6. Use warning labels to identify electrical hazards for equipment, compartments, and enclosures containing exposed live parts or exposed conductors operating at over 600 V nominal with the word message "DANGER; HIGH VOLTAGE; KEEP OUT".
7. Use warning labels, identification nameplates, or identification labels to identify electrical hazards for equipment where multiple power sources are present with the word message "DANGER; Hazardous voltage; Multiple power sources may be present; Disconnect all electric power including remote disconnects before servicing" or approved equivalent.

B. Identification for Conductors and Cables:
   1. Color Coding for Power Conductors 600 V and Less: Comply with Section 260519.

C. Identification for Devices:
   1. Use identification label or engraved wallplate to identify serving branch circuit for all receptacles.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:
   1. Materials:
      a. Indoor Clean, Dry Locations: Use plastic nameplates.
      b. Outdoor Locations: Use stainless steel or aluminum nameplates suitable for exterior use.
   2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch (1.6 mm); engraved text.
   3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.
   4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.
   5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch (25 mm) high; Four, located at corners for larger sizes.

B. Identification Labels:
   1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
   2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Format for Equipment Identification:
   1. Minimum Size: 1 inch (25 mm) by 2.5 inches (64 mm).
   2. Legend:
      a. Equipment designation or other approved description.
   3. Text: All capitalized unless otherwise indicated.
   4. Minimum Text Height:
      a. Equipment Designation: 1/2 inch (13 mm).
      b. Other Information: 1/4 inch (6 mm).
   5. Color:
      a. Normal Power System: White text on black background.

b. Emergency Power System: White text on red background.

D. Format for Receptacle Identification:
1. Minimum Size: 3/8 inch (10 mm) by 1.5 inches (38 mm).
2. Legend: Power source and circuit number or other designation indicated.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 3/16 inch (5 mm).
5. Color: Black text on clear background.

2.03 UNDERGROUND WARNING TAPE

A. Materials: Use foil-backed detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.

B. Foil-backed Detectable Type Tape: 3 inches (76 mm) wide, with minimum thickness of 5 mil (0.1 mm), unless otherwise required for proper detection.

C. Legend: Type of service, continuously repeated over full length of tape.

D. Color:
1. Tape for Buried Power Lines: Black text on red background.
2. Tape for Buried Communication, Alarm, and Signal Lines: Black text on orange background.

2.04 WARNING SIGNS AND LABELS

A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.

B. Warning Signs:
1. Materials:
a. Outdoor Locations: Use factory pre-printed rigid aluminum signs.
2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.
3. Minimum Size: 7 by 10 inches (178 by 254 mm) unless otherwise indicated.

C. Warning Labels:
1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
3. Minimum Size: 2 by 4 inches (51 mm by 102 mm) unless otherwise indicated.

PART 3 EXECUTION

3.01 PREPARATION

A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
1. Surface-Mounted Equipment: Enclosure front.
2. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
3. Elevated Equipment: Legible from the floor or working platform.
4. Branch Devices: Adjacent to device.
5. Interior Components: Legible from the point of access.
6. Conductors and Cables: Legible from the point of access.
7. Devices: Outside face of cover.

C. Install identification products centered, level, and parallel with lines of item being identified.

D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.

E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

F. Install underground warning tape above buried lines with one tape per trench at 3 inches (75 mm) below finished grade.

G. Secure rigid signs using stainless steel screws or rivets.

H. Mark all handwritten text, where permitted, to be neat and legible.

END OF SECTION

SECTION 262416
PANELBOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Branch panelboards.

B. Overcurrent protective devices for panelboards.

1.02 RELATED REQUIREMENTS

A. Section 260526 - Grounding and Bonding for Electrical Systems.

B. Section 260529 - Hangers and Supports for Electrical Systems.

C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

D. Section 264300 - Surge Protective Devices.

1.03 REFERENCE STANDARDS

A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; 2013e, with Amendments (2022).

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

C. NECA 407 - Standard for Installing and Maintaining Panelboards; 2015.

D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.

E. NEMA PB 1 - Panelboards; 2011.

F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 1000 Volts or Less; 2023.

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

I. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

J. UL 67 - Panelboards; Current Edition, Including All Revisions.

K. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.

C. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.

1.05 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. ABB (GE)

B. Eaton

C. Square D (Schneider Electric)

2.02 PANELBOARDS - GENERAL REQUIREMENTS

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
   1. Altitude: Less than 6,600 feet (2,000 m).
   2. Ambient Temperature:
      a. Panelboards Containing Circuit Breakers: Between 23 degrees F (-5 degrees C) and 104 degrees F (40 degrees C).

C. Short Circuit Current Rating:
   1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.

D. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.

E. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.

F. Bussing: Sized in accordance with UL 67 temperature rise requirements.
   1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
   2. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.

G. Conductor Terminations: Suitable for use with the conductors to be installed.

H. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
   1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
      a. Outdoor Locations: Type 3R.
   2. Boxes: Galvanized steel unless otherwise indicated.
      a. Provide wiring gutters sized to accommodate the conductors to be installed.
   3. Lockable Doors: All locks keyed alike unless otherwise indicated.

I. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

J. Surge Protective Devices: Where factory-installed, internally mounted surge protective devices are provided in accordance with Section 264300, list and label panelboards as a complete assembly including surge protective device.

2.03 BRANCH PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:
   1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
   2. Main and Neutral Lug Type: Mechanical.

C. Bussing:
   1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
   2. Phase and Neutral Bus Material: Tin-plated Copper.
   3. Ground Bus Material: Aluminum or copper.

D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.

E. Enclosures:

1. Provide surface-mounted or flush-mounted enclosures as indicated.
2. Provide clear plastic circuit directory holder mounted on inside of door.

2.04 OVERCURRENT PROTECTIVE DEVICES

A. Molded Case Circuit Breakers:
   1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
   2. Interrupting Capacity:
      a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
         1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
         2) 14,000 rms symmetrical amperes at 480 VAC.
      b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
   3. Conductor Terminations:
      a. Provide mechanical lugs unless otherwise indicated.
      b. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
   4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
      a. Provide field-adjustable magnetic instantaneous trip setting for circuit breaker frame sizes 225 amperes and larger.
   5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive panelboards.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.

D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

E. Provide required support and attachment.

F. Install panelboards plumb.

G. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.

H. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches (2000 mm) above the floor or working platform.

I. Provide minimum of six spare 1 inch (27 mm) trade size conduits out of each flush-mounted panelboard stubbed into accessible space above ceiling and below floor.

J. Provide grounding and bonding in accordance with Section 260526.

K. Install all field-installed branch devices, components, and accessories.

L. Provide filler plates to cover unused spaces in panelboards.

END OF SECTION

SECTION 262726
WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Receptacles.

B. Wall plates and covers.

1.02 RELATED REQUIREMENTS

A. Section 260526 - Grounding and Bonding for Electrical Systems.

B. Section 260533.16 - Boxes for Electrical Systems.

C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. FS W-C-596 - Connector, Electrical, Power, General Specification for; 2014h, with Amendments (2017).

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

C. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.

D. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2020).

E. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2021.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.

H. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.

I. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

1.05 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Products: Listed, classified, and labeled as suitable for the purpose intended.

PART 2 PRODUCTS

2.01 WIRING DEVICES - GENERAL REQUIREMENTS

A. Provide wiring devices suitable for intended use with ratings adequate for load served.

B. Wiring Device Applications:
   1. Receptacles Installed Outdoors or in Damp or Wet Locations: Use weather-resistant GFCI receptacles with weatherproof covers.

C. Wiring Device Finishes:
   1. Provide wiring device finishes as described below, unless otherwise indicated.
   2. Wiring Devices Installed in Wet or Damp Locations: Gray with weatherproof cover.

2.02 RECEPTACLES

A. Manufacturers:
   1. Hubbell
   2. Pass & Seymour (Legrand)

B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
   2. NEMA configurations specified are according to NEMA WD 6.

C. Convenience Receptacles:
   1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
      a. Basis of Design: Hubbell HBL5362

D. GFCI Receptacles:
   1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
   2. Standard GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
      a. Basis of Design: Hubbell GFR20
   3. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations.
      a. Basis of Design: Hubbell GFRWR20

2.03 WALL PLATES AND COVERS

A. Wall Plates: Comply with UL 514D.
   1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
   2. Screws: Metal with slotted heads finished to match wall plate finish.

B. Weatherproof Receptacle Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

PART 3 EXECUTION

3.01 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of wiring devices provided under this section.

C. Install wiring devices in accordance with manufacturer's instructions.

D. Where required, connect wiring devices using pigtails not less than 6 inches (150 mm) long. Do not connect more than one conductor to wiring device terminals.

E. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.

F. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

G. Install wiring devices plumb and level with mounting yoke held rigidly in place.

H. Install wall switches with OFF position down.

I. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.

J. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or

improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

K. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

END OF SECTION

SECTION 329219 - SEEDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division Specification sections, and the Approved DNR Land Disturbance Permit, apply to the Work specified in this Section.

1.2 DESCRIPTION OF WORK

A. The contractor shall be responsible for reseeding all disturbed soft-scape areas excavated for the installation of new buried natural gas piping. Refer to drawings for pipe routes and lengths.

B. Furnish all materials, labor, equipment and services necessary to perform all Work.

C. Work included in this Section includes clearing of weeds, seed bed preparation, installation of erosion control fabric and seeding operations required for seeding of the areas shown on Drawings.

1.3 SPECIFICATIONS AND STANDARDS

A. U.S. Department of Agriculture: SRA 156 U.S. Department of Agriculture, Rules and Regulations under the Federal Seed Act.

B. American Joint Committee on Horticultural Nomenclature Standard: 1942 Edition Standardized Plant Names.

PART 2 - PRODUCTS

2.1 SEED

A. All seed shall be furnished in sealed, standard containers, unless otherwise approved. Seed which has become wet, moldy, or otherwise damaged will not be acceptable.

B. Each container of seed shall be fully labeled in accordance with the Federal Seed Act and seed certifications shall be signed and made part of seed invoices.

C. Seed shall be Fescue, 97 percent pure live seed

D. Invoices and tags for seed shall show type furnished. Upon acceptance of the seeded areas, a final check of total quantities of seed used will be made against total area seeded and if minimum rates of application or specified quantities have not been met, the Architect will require distribution of additional quantities of these materials to make up minimum application specified.

2.2 FERTILIZER

A. Fertilizer shall be uniform in composition, free-flowing, suitable for application with approved equipment and delivered to the site unopened in original containers each bearing the

manufacturer's guaranteed analysis and in conformity with state fertilizer laws. Fertilizer shall contain the following minimum percentage of plant food by weight.

1. 12 percent available nitrogen
2. 12 percent available phosphoric acid
3. 12 percent available potash

B. Fertilizer application rates shall be 600 pounds per acre with a minimum of_____lbs applied.

C. Invoices for fertilizer shall show grade furnished. Upon acceptance of the seeded areas, a final check of total quantities of fertilizer used will be made against total area seeded and if minimum rates of application or specified quantities have not been met, the Architect will require distribution of additional quantities of these materials to make up minimum application specified.

2.3 EROSION CONTROL FABRIC

A. Fabric shall be "Soil Saver" as is distributed by Jim Walls Company in Dallas, Texas (214) 239-8577; or "Curlex Blankets" as is distributed by Americal Excelsior Company in North Kansas City, Missouri (816) 842-3034; or approved equal.

2.4 STAPLES

A. Staples shall be a No. 11 gauge steel wire formed into a "U" shape, 6 inches long.

PART 3 - EXECUTION

3.1 GROUND PREPARATION

A. General: the ground areas are to be seeded and fertilized as indicated on the Drawings and/or as specified herein. Equipment necessary for the proper preparation of the ground surface and for handling and placing all required materials shall be on hand, in good condition and shall be approved before the Work is started.

B. Clearing: Prior to tillage, seeding or other specified operations, all vegetation which might interfere with the indicated treatment of the areas shall be mowed, grubbed, raked and the debris removed from the site. Prior to or during grading and tillage operations, the ground surface shall be cleared of materials which might hinder final operations. Areas which have been disturbed shall be finish graded and/or developed as indicated on the Drawings or as specified.

C. Tillage: After the areas required to be seeded have been brought to the finish grades as specified, they shall be thoroughly tilled to a depth of at least 6 inches by plowing, disking, harrowing or other approved methods until the condition of the soil is acceptable to the Architect. Work shall be performed only during period when beneficial results are likely to be obtained. When conditions are such by reason of drought, excessive moisture, or other factors that satisfactory results are not likely to be obtained, Work shall be stopped. Work shall be resumed only when desired results are likely to be obtained.

D. Leveling: Any undulations or irregularities in the surface resulting from tillage, fertilizing or other operations shall be leveled with a float drag before seeding operations are begun.

E. Fertilizing: Fertilizer shall be distributed uniformly at the rate previously specified per 1,000 square feet over the areas to be seeded and shall be incorporated into the soil to a depth of at least 3 to 4 inches by disking, harrowing or other approved methods. The incorporation of fertilizer may be a part of the tillage operation hereinbefore specified. Distribution by means of an approved seed drill equipped to sow seed and distribute fertilizer at the same time will not be accepted. Fertilizer shall be incorporated into the soil a minimum of 10 days before seed is planted.

F. Inspection: A minimum of 48 hours prior notice must be given to the Construction Administrator before fertilizing may commence.

G. Planting Time: All seeding Work shall be done between the dates of April 1 to May 15 for spring planting and from August 15 to October 15 for fall planting except as otherwise directed in writing by the Construction Administrator.

H. Planting Condition: No planting shall be done until a permanent source of water is available at the site for use by the Owner.

3.2 SEEDING

A. General: Prior to seeding, any previously prepared seedbed areas compacted or damaged by interim rains, traffic, or other cause shall be reworked to restore the ground condition previously specified. Seed shall be planted by drill seeding.

B. Drill Seeding: Seed shall be uniformly drilled to an average depth of ½ inch and at the rate of 8 pounds per 1,000 square feet using equipment having drills not more than 6 ½ inches apart. Row markers shall be used with the drill seeder.

C. Rolling: Immediately after seeding, except for slopes 3 horizontal to 1 vertical and greater, the entire area shall be firmed with a roller not exceeding 90 pounds for each foot of roller width. Do not roll areas seeded with seed drills equipped with rollers.

D. Inspection: A minimum of 48 hours prior notice must be given to the Construction Administrator before seeding may commence.

3.3 INSTALLATION OF EROSION CONTROL FABRIC

A. Fabric shall be rolled out in place. Fabric shall be applied without stretching and shall lie smoothly but loosely on the soil surface. The Contractor shall refer to the Drawings for details of fabric fastening.

B. Application of the erosion control fabric shall occur the same day that the seeding of an area has taken place.

C. Fabric shall completely cover all areas which are shown on the Drawings to be protected from erosion. After fabric installation, the entire area shall be rolled with a smooth roller weighing between 200 to 250 pounds. After rolling, the fabric shall be in intimate contact with the soil surface at all points. Any clods, etc., which hold the fabric off the ground should be removed. The fabric shall be forced down into any depressions and held there with a staple.

3.4 MAINTENANCE

A. General: The project areas shall be kept clean at all times and care shall be taken that use of the premises shall not be unduly hampered by Work herein specified. The intent of this Section is to ensure a healthy, well-established turf, and prevent soil erosion in compliance with the Land Disturbance Permit issued by the Missouri Department of Natural Resources.

B. Responsibility: The Owner shall be responsible for maintenance of all seeded areas upon completion of seeding and general acceptance by the Construction Administrator.

C. Damage: Damage to seeded areas during the project shall be repaired by the persons responsible for causing such damage.

3.5 GENERAL ACCEPTANCE

A. The Construction Administrator shall make an inspection of the seeded areas upon completion of seeding. Seeded areas shall be considered acceptable if the specified quantities of fertilizer & seed have been properly applied.

3.6 GUARANTEE

A. The Contractor is responsible for the proper application of the fertilizer & seeding. Watering, weeding, re-seeding, and mowing will be the responsibility of the Owner after proper application of the seed.

END OF SECTION 329219