PROJECT MANUAL

PROJECT NAME:

DOC NCF CRC Boiler Replacement

PROJECT ADDRESS:
307 S 60th Ave W
Newton, Iowa 50208

PROJECT DATE: November 16, 2024

OWNER:
Iowa Department of Administrative Services
109 Southeast 13th Street
Des Moines, Iowa 50319

Department of Administrative Services

OWNER PROJECT NUMBER: 9404.00

OWNER REQUEST FOR BID NUMBER: RFB 940400-02

CONSTRUCTION MANAGER:
Boyd Jones
11204 Aurora Ave.
Urbandale, IA 50322

CONSTRUCTION MANAGER PROJECT NUMBER: 22-008-9370

ARCHITECT:
Innovative Engineers, Inc.
2871 Heinz Rd. Suite B.
Iowa City, IA 52240

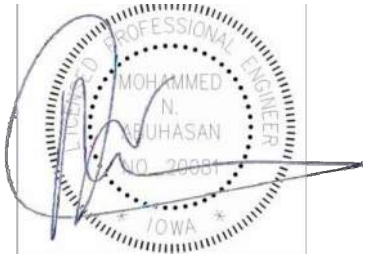
ARCHITECT PROJECT NUMBER: 101323

SECTION 10 7

SEALS PAGE

I hereby certify that the portion of this technical submission described below was prepared by me or under my direct supervision and responsible charge.

Discipline:_ Mechanical & Electrical_____ Stamp:



Company Name:_ Innovative Engineers, Inc._____

Address: 2871 Heinz Rd Suite B, Iowa City, IA 52240

Telephone: 319-855-4115_____

Name:_ Mohammed Abu-Hasan, PE_____

Responsibility: Mechanical & Electrical

License#:_20081_____ _____

I hereby certify that the portion of this technical submission described below was prepared by me or under my direct supervision and responsible charge.

Discipline:_____ Stamp:

Company Name:_____

Address:_____

Telephone:_____

Name:_____Responsibility:_____

License#:_____

END OF SECTION

TABLE OF CONTENTS

1.04 DIVISION 23 – Heating, Ventilating and Air Conditioning (HVAC)

A.	23 0500	Common Work Results for HVAC
B.	23 0505	Selective Demolition for Heating, Ventilation and Air Conditions (HVAC)
C.	23 0513	Common Motor Requirements for HVAC Equipment
D.	23 0515	Common Installation Requirements for HVAC Pipework
E.	23 0517	Pipe Welding
F.	23 0519.13	Thermometers and Pressure Gauges – Piping Systems
G.	23 0520	Piping Specialties for HVAC Piping
H.	23 0523.02	Valves – Cast Iron
I.	23 0523.05	Butterfly Valves
J.	23 0529	Hangers and Supports for HVAC Piping and Equipment
K.	23 0553.01	Mechanical Identification
L.	23 0593	Testing, Adjusting and Balancing for HVAC
M.	23 0719	HVAC Piping Insulation
N.	23 0802	Cleaning and Start-Up of Mechanical Piping Systems
O.	23 0923	Sequence of Operation
P.	23 1123	Facility Fuel Gas Piping
Q.	23 2123	Hydronic Pumps
R.	23 5200	Condensing Hot Water Boilers

1.05 DIVISION 26 – ELECTRICAL

A.	26 0500	Common Work Results for Electrical

1.06 DIVISION 31 – EARTHWORK

A	31 2000	Earthwork

END OF SECTION

SECTION 115

LIST OF DRAWING SHEETS

DRAWINGS

1.01	**SHEET**	**TITLE**
A.	G00	Cover Sheet & Drawing Index
B.	G01	CRC Boiler Replacement Site Plan
C.	M01	Mechanical Demolition Plan
D.	M02	Mechanical Plans
E.	M03	Mechanical Details
F.	M04	Mechanical Details / Schedules
G.	E01	Electrical Demolition Plan
H.	E02	Electrical Plan
I.	E03	Electrical Notes, Details & Project Photos

END OF SECTION

SECTION 116

BID SUBMITTAL CHECKLIST

PART 1 - **GENERAL**

1.01 BID SUBMITTAL CHECKLIST

A. The Bidder is responsible to see that the bid is submitted online at IMPACS Electronic Procurement System on or before the due date and time specified. Late bids shall not be accepted.
B. Bids shall be typewritten or in ink. All information requested shall accompany the bid. All blocks shall be completed. Errors shall be lined out and initialed.
C. The right is reserved to reject any or all bids. The State may waive minor deficiencies or informalities in the best interest of the State of Iowa.
D. A properly prepared and submitted bid document is the bidder' s responsibility.
E. Bids cannot be changed after the bid opening.
F. In all cases, no verbal communications by any party will override written communications from the issuing office.
G. The Bid Form shall be completed in full and signed and submitted by an officer of the bidder with authority to bind in a contract.
H. If Bid Bond is called for, it shall accompany the Bid submission.
I. If Non-discrimination Clause information is called for, it shall accompany the Bid submission
J. If Targeted Small Business Pre-bid Contact information is called for, it shall accompany the Bid submission.
K. If Certificate of Site Visit form is called for, it shall accompany the Bid submission.

PART 2 - **PRODUCTS – NOT USED**

PART 3 - **EXECUTION – NOT USED**

END OF SECTION

SECTION 1 113

NOTICE TO BIDDERS

RFB #940400-02

The Iowa Department of Administrative Services will be receiving bids for Boiler Replacement and removal of existing fuel storage tank at Newton Correctional Facility in Newton, IA 50208.

The Iowa Department of Administrative Services anticipates construction to begin on January 2025 and end June 2025.

Bids must be received no later than 2:00 pm, Thursday, December 12, 2024. Late bids will not be considered. Bids shall be submitted on IMPACS Electronic Procurement System. The Bid shall be accompanied by a Bid Security as set forth in the Instructions to Bidders in the amount of 5% of the total bid amount. Each bid shall be accompanied by a bid bond, cashier' s check or a certified check drawn upon a solvent bank chartered under the laws of the United States of America.

Bid Opening
The time and place of bid opening will be held at meet.google.com/pcf-rsbe-osh and teleconference number 1-443-620-8589 Pin: 902746932# at 3:00 pm on December 12, 2024.

The Iowa Department of Administrative Services reserves the right to reject any and all bids, and to waive irregularities and to accept a bid that is deemed in the best interest of the State of Iowa.

Bidders must comply with all affirmative action/equal employment opportunity provisions of the State of Iowa and the Federal Government.

This project is exempt from Iowa Sales Tax. Davis Bacon Wages will not apply to this project.

Questions must be submitted by 2:00 pm, December 5, 2024 to the Issuing Officer.

Bidding documents may stipulate a specific product. Substitute product will be considered if a written request is received by 2:00 pm, December 12, 2024, prior to bid opening. Substitution requests will be considered for all products per Section 01 2500 Substitution Procedures, even if the specification does not include a statement such as " or equal," " equal to," " equivalent to," or " basis of design," unless otherwise noted.

An **optional** Pre-Bid meeting will be held on Tuesday, December 3, 2024, at 10:00 am at Newton Correctional Facility at 307 S 60th Ave W, Newton, Iowa 50208. This meeting is not mandatory but is highly recommended.

Bidding Documents, /including drawing sheets bearing the project name 9404.00 DOC NCF CRC Boiler Replacement, Dated 11/16/24 and the Project Manual prepared by Innovative Engineers, Inc dated 11/16/24, may be obtained from Rapids Reproduction by visiting www.rapidsrepro.com or by calling (515) 251-32222 on Wednesday, December 11, 2024.

For further information regarding this project contact:
Michael Bradbury – Issuing Officer
Phone: 515-823-9327
E-Mail: construction.procurement@iowa.gov

END OF SECTION

SECTION 1 113

INSTRUCTIONS TO BIDDERS

RFB #940400-02

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Project Description
B. Owner
C. State Agency Representatives and Contacts
D. Proposal Form and Submissions
E. Taxes
F. Alternate Bids
G. Drawings
H. Bid Security
I. Due Date and Time for Receipt of Bids
J. Commencement and Completion Date
K. Site Visit
L. Pre-bid Meeting
M. Questions
N. Addenda and Interpretations of the Contract Documents
O. Substitutions
P. Obligation of Bidder
Q. Public Records and Requests for Confidential Treatment
R. Withdrawal of Bid
S. Bid Closing
T. Basis of Bids
U. Informalities/Rejection of Bids
V. Consideration of Bids
W. Preference
X. Qualifications
Y. Insurance
Z. Form of Agreement between Owner and Contractor
AA. Execution of Contract
BB. Laws and Regulations
CC. Contract Documents and Order of Precedence
DD. Conditions of the Work
EE. Subcontracts
FF. Project Manual/Drawings

1.02 PROJECT DESCRIPTION

A. Project Description: Boiler Replacement and removal of existing fuel storage tank at Newton Correctional Facility in Newton, IA 50208.

1.03 OWNER

A. State of Iowa, Department of Administrative Services, 109 SE 13th St, Des Moines, IA 50319

1.04 STATE AGENCY REPRESENTATIVES AND CONTACTS

A. PURCHASING AGENT: Purchasing Agent – Michael Bradbury, State of Iowa, Department of Administrative Services, Hoover State Office Building, 3rd floor, 1305 East Walnut Street, Des Moines, IA 50319-0105, Phone: 515-823-9327; email: construction.procurement@iowa.gov

B. OWNER REPRESENTATIVE: Brad Tonyan, State of Iowa, Department of Administrative Services, 109 SE 13th Street, Des Moines, IA 50319, Phone: 515-360-7718; email: brad.tonyan@iowa.gov

C. ON-SITE COORDINATOR: Justin Thomas, Plant Operations Manager 3, Newton Correctional Facility, 307 South 60th Avenue W, Newton, IA 50208, Phone: 641-791-1684; email: justin.thomas@iowa.gov

D. CONSTRUCTION MANAGER CONTACT: Rob Greiner, Project Manager, Boyd Jones 11204 Aurora Ave., Urbandale, Iowa 50322, Phone: 515-650-7777 rgreiner@boydjones.biz and Mike Hoover, Superintendent, Boyd Jones, 11204 Aurora Ave., Urbandale, Iowa 50322, Phone: 515-408-7705; e-mail: mhoover@boydjones.biz

E. DESIGN PROFESSIONAL CONTACT: Mohammed Abu-Hasan, Innovative Engineers Inc., 2871 Heinz Rd. Suite B, Iowa City, IA 52240, Phone: 319-855-4115; email: mabuhasan@innovateengineersinc.com

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 PROPOSAL FORM AND SUBMISSION

A. A properly prepared and submitted bid is the bidder' s responsibility. Bids are to be made in accordance with these Instructions to Bidders and items included on the Bid submission. Failure to comply may be cause for rejection.

B. The Bid is to consist of the required Bid information, together with the other information specified below to be submitted with the Bid, in which copies are included with these Bidding Documents.
   1. The total bid package submitted is required to include the following:
      a. An online submission including:
         1) Required Bid Form (To be uploaded online)
         2) Required Non-discrimination Clause Information
         3) Required Targeted Small Business Pre-bid Contact Information
         4) Bid Security (documentation provided by Bidder) (To be uploaded online) (Required)
         5) Certification of Site Visit (To be uploaded online if Pre-Bid is Mandatory)

C. Include the amount for performing all work described in the drawings and specifications for Base Bid and for each Alternate Bid requested.

D. Acknowledge receipt of all Addenda issued, where so indicated on the Bid Form

E. All required information to be submitted, by an officer of the company having authority to bind the company in a contract.

F. Commencement of the work of the contract shall begin with the Contractor' s receipt of a fully executed contract (signed by both parties).

G. The Owner reserves the right to award a contract for Base Bid only, or for Base Bid in combination with any, or all, identified Alternate Bids. The Owner reserves the right to award a contract for individual Bid Packages, or any combination of Bid Packages. Each Bidder must comply with all of the General Requirements of the project and any requirements of the Project manual that apply to their scope of work.

H. The company's Federal I.D. Number and the Iowa Contractors Registration Number shall be included in the Bid Form.

I. Unless indicated otherwise, the Bid shall be for a single responsibility contract for all work as indicated on the Drawings and specified in the Project Manual, and shall be a lump sum amount. If no change in the Base Bid amount is required with respect to consideration of a particular Alternate Bid, enter "No Change" in the blank for that Alternate Bid.

J. Where so requested, provide Unit Prices for the designated types of work and in the units specified, in which the Unit Prices would be used as adjustments to the quantities described in

the instructions as the basis for the Base Bid and any Alternate Bid work. A Unit Price would be applicable in the event the Owner should request additional work of that type beyond the extent and quantity that has been established as the scope of the work by graphic delineation and notations on the Drawings, or by otherwise stipulating in the Bidding Documents a numerical quantity of the work, for the Bidder' s use in determining the lump sum bid amount for the Base Bid and any requested Alternate Bid containing such work. The Unit Prices shall also be used to adjust the Contract Amount for actual quantities of work involved when the work subject to Unit Price adjustment differs by being less in quantity than that contemplated by the original scope of work for the respective Base Bid or Alternate Bid.

K. Completed State of Iowa Nondiscrimination Clause information and Subcontractor Targeted Small Business Enterprise Pre-Bid Contact Information, included in these Bidding Documents, are to accompany the Bid submission. Bidders shall comply with all affirmative action/equal opportunity provisions of State and Federal laws. The Owner seeks to provide opportunities for Targeted Small Businesses in accordance with the provisions of Chapter 73 of the Code of Iowa.

L. All Bid information is to be submitted online. Any required Bid Security shall be provided, in the form and amount specified elsewhere in these Instructions to Bidders, at the time of submission of the Bid. When a site visit is mandatory as specified elsewhere in these Instructions to Bidders, and a Certificate of Site Visit is required to be submitted with the Bid as evidence of such visit having occurred for purposes of observing the conditions of the site and the work proposed therein, the Certificate shall be uploaded with the bid submission.

3.02 TAXES

A. In accordance with Section 423 of the Code of Iowa and 701-19 of the Iowa Administrative Rules, Iowa Construction Sales Tax Exemption Certificates for this project will be issued. Do not include Iowa sales tax or use tax, or any local option sales tax, on construction materials in determining your bid prices. The successful Contractor will be required to notify the Department of Administrative Services project manager of all Subcontractors within forty -eight (48) hours after the published date and time by which bids must be submitted. Information on the Contractor and each Subcontractor shall include the firms' name, address, contact person, federal tax identification number, and the Iowa contractor registration number. For the Contractor and each Subcontractor, designate the type of trade or category of work that is to be provided on the project. The Construction Manager for the Department of Administrative Services must be informed when any Subcontractor is added to the project. Following receipt of the information, the Construction Manager for the Department of Administrative Services will arrange to have an authorization letter and certificate (please see sample, included in the Project Manual) issued on behalf of the Contractor and each Subcontractor and will forward the documents to the Contractor for distribution and use by each in purchasing construction materials for this project. Certificates issued for this project shall be used for tax-exempt purchasing construction materials for this project only.

3.03 ALTERNATE BIDS

A. Bidders are to bid **all** Alternates requested on the Bid Form. Alternates quoted will be reviewed and accepted or rejected at the option of the Department of Administrative Services. Accepted Alternates will be identified in the Owner-Contractor agreement. Indicate the price for Alternates described, as shown on the Drawings and specified in the Project Manual, and identify in the correct location on the Bid Form.

3.04 DRAWINGS AND PROJECT MANUAL

A. Drawings and Project Manual are specified in the Notice to Bidders or any extension thereof made by Addendum.

3.05 BID SECURITY

A. Each Bid shall be accompanied by Bid Security.

B. The Bid Security shall be in the form of a Bid Bond, Certified check, or Cashier ' s check in an amount not less than five percent (5%) of the maximum value of the Bid, including any additive Alternates. NOTE: Checks other than Certified checks and Cashier ' s checks will not be accepted. Bonds shall be issued by a bonding company licensed to transact business in the State of Iowa. The Attorney in Fact who signs the Bond shall file with the Bond a certified and effectively dated copy of their Power of Attorney. The Bid Security shall be made payable to the Iowa Department of Administrative Services and shall accompany the Bid. If a Bid Bond is not used, copies of Certified checks or Cashier' s checks must be uploaded and hand delivered, in a sealed envelope, or mailed upon request. The Bid Security shall serve as a guarantee that a Bidder who is offered a contract will enter into an Agreement with the State of Iowa and will file an approved surety company' s Performance Bond, Payment Bond and the Insurance Certificates as evidence of the required Insurance prior to execution of the contract. The governmental entity shall retain the bid security furnished by the successful bidder until the approved contract form has been fully executed, a bond has been filed by the bidder guaranteeing the performance of the contract, and the contract and bond have been approved by the governmental entity. The provisions of chapter 573, where applicable, apply to contracts awarded under this chapter. The governmental entity shall promptly return the checks or bidder's bonds of unsuccessful bidders to the bidders once the Notice of Intent to Award is issued.

3.06 DUE DATE AND TIME FOR RECEIPT OF BIDS

A. Properly completed Bids shall be submitted online through IMPACS Electronic Procurement System, no later than the time and date specified in the Notice to Bidder or any extension thereof made by Addendum. Written, emailed, oral or telephonic Bids are invalid, and will not receive consideration. The Bidder shall assume full responsibility for the timely online submission of the Bid. Late bids will not be accepted.

3.07 COMMENCEMENT AND COMPLETION DATES

A. Commencement of the Work of the Contract shall be the day of receipt by the selected Contractor of the fully-executed contract. Final completion of the Work of the contract shall be acknowledged as a part of the Contractor' s proposal.

3.08 SITE VISIT

A. A site visit by the prospective bidder is highly recommended at the time of the Pre-Bid Meeting of this project.

3.09 PRE-BID MEETING

A. Pre-Bid Meeting will be specified in the Notice to Bidders or any extension thereof made by Addendum.

3.10 QUESTIONS

A. Questions on this project may be raised and discussed at the time of the Pre-Bid Meeting or by submitting in writing to the issuing officer as specified in the Notice to Bidders or any extension thereof made by Addendum.

3.11 ADDENDA AND INTERPRETATIONS OF THE CONTRACT DOCUMENTS

A. Any person contemplating submitting a proposal for the proposed Contract, who is in doubt as to the true meaning of any part of the Bidding Documents, shall submit a written request for an interpretation thereof. The person submitting a request will be responsible for its prompt delivery. Every request for such interpretation should reference the Bid Number specified in the Bidding Documents, and shall be made in writing (email preferred). Questions shall be submitted to the

previously identified Purchasing Agent for the Department of Administrative Services. To be given consideration, requests shall be received as specified in the Notice to Bidders or any extension thereof made by Addendum. Replies, which revise or correct the Bidding Documents, or provide necessary clarifications, will be issued in the form of a written Addendum to the Bidding Documents. Interpretations, corrections or changes of the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely upon such interpretations, corrections, or changes. The Bidder is to include any resultant cost changes in the Bid Sum. Addenda will be posted electronically at the respective bid site where the bid is initially posted. Acknowledgment by the Bidder of each issued Addendum shall be noted in the location so indicated on the Bid. All Addenda issued shall become part of the Contract Documents.

3.12 SUBSTITUTIONS

A. Where the Bidding Documents stipulate a specific product be provided by naming one or more manufacturer and model, a substitute product will be considered when a written request is received as specified in the Notice to Bidders or any extension thereof made by Addendum prior to bid opening. Substitution requests will be considered for all products per Section 01 2500 Substitution Procedures, even if the specification does not include a statement such as "or equal," "equal to," "equivalent to," or "basis of design," unless otherwise noted. Substitution requests shall be emailed to the Issuing Officer at the email address provided in Instructions to Bidders Section 1.04.

3.13 OBLIGATION OF BIDDER

A. It shall be the responsibility of each Bidder contemplating the submission of a Bid for the proposed Contract to fully acquaint himself/herself with conditions at the work site, project requirements, and to become acquainted thoroughly with the work, and all conditions that may be related to it. No considerations or revision in the contract price or scope of the project will be considered by the Owner for any item that could have been revealed by a thorough on-site inspection and examination.

B. By submission of a Bid, it shall be understood that the Bidder assures that he/she has reviewed and is thoroughly familiar with the project requirements, contract conditions and supplementary conditions, the drawings, specifications, addenda, and that the bidder is aware of the conditions existing at the site that may relate to the work of this project. Failure of any Bidder to examine any form, document, or other instrument shall in no way relieve the Bidder from any obligation in respect to his/her Bid.

3.14 PUBLIC RECORDS AND REQUESTS FOR CONFIDENTIAL TREATMENT

A. The Agency's release of public records is governed by Iowa Code chapter 22. Contractors are encouraged to familiarize themselves with Chapter 22 before submitting a Proposal. The Agency will copy and produce public records upon request as required to comply with Chapter 22 and will treat all information submitted by a Contractor as non-confidential records unless Contractor requests specific parts of the Proposal be treated as confidential at the time of the submission as set forth herein AND the information is confidential under Iowa or other applicable law.

B. A Contractor requesting confidential treatment of specific information must: (1) fully complete Form 22 (Available at https://das.iowa.gov/sites/default/files/procurement/pdf/Form%2022-ConfidentialityRequest-RFB.pdf), (2) identify the request in the transmittal letter with the Contractor's Proposal, (3) conspicuously mark the outside of its Proposal as containing confidential information, (4) mark each page upon which confidential information appears, and (5) submit a "Public Copy" from which the confidential information has been excised.

C. Form 22 will not be considered fully complete unless, for each confidentiality request, the Contractor: (1) enumerates the specific grounds in Iowa Code chapter 22 or other applicable law that supports treatment of the material as confidential, (2) justifies why the material should be maintained in confidence, (3) explains why disclosure of the material would not be in the best interest of the public, and (4) sets forth the name, address, telephone, and e-mail for the person

authorized by Contractor to respond to inquiries by the Agency concerning the confidential status of such material.

D. The Public Copy from which confidential information has been excised is in addition to the number of copies requested in Section 3 of this RFP. The confidential material must be excised in such a way as to allow the public to determine the general nature of the material removed and to retain as much of the Proposal as possible.

E. **Failure to request information be treated as confidential as specified herein shall relieve Agency and State personnel from any responsibility for maintaining the information in confidence. Contractors may not request confidential treatment with respect to pricing information and transmittal letters. A contractor' s request for confidentiality that does not comply with this section or a contractor's request for confidentiality on information or material that cannot be held in confidence as set forth herein are grounds for rejecting contractor' s Proposal as non-responsive. Requests to maintain an entire Proposal as confidential will be rejected as non-responsive.**

F. If Agency receives a request for information that Contractor has marked as confidential and if a judicial or administrative proceeding is initiated to compel the release of such material, Contractor shall, at its sole expense, appear in such action and defend its request for confidentiality. If Contractor fails to do so, Agency may release the information or material with or without providing advance notice to Contractor and with or without affording Contractor the opportunity to obtain an order restraining its release from a court possessing competent jurisdiction. Additionally, if Contractor fails to comply with the request process set forth herein, if Contractor ' s request for confidentiality is unreasonable, or if Contractor rescinds its request for confidential treatment, Agency may release such information or material with or without providing advance notice to Contractor and with or without affording Contractor the opportunity to obtain an order restraining its release from a court possessing competent jurisdiction.

3.15 WITHDRAWAL OF BID

A. A Bid may be modified or withdrawn only before the time and date for receipt of Bids. Said request for modification or withdrawal of a bid must be completed online through IMPACS Electronic Procurement System. A Bid shall remain valid for consideration by the Owner for the following period(s) of time after the date specified for receipt of Bids, or until such time following that period that the apparent low bidder requests in writing that the Bid be withdrawn, after which the Bid may be withdrawn without forfeiture of any required Bid Security. The Bid shall be valid for not less than thirty (30) calendar days after the date Bids are specified to be due. With the approval of the Department of Administrative Services, a bid may be withdrawn after opening, but only if the bidder provides prompt written notification that adequately documents the commission of an honest error that may cause undue financial loss.

3.16 BID OPENING

A. All bids received on or before the due date and time specified in the Notice to Bidder or any extension thereof made by Addendum will be opened and the name of the Bidder and the amount of their Bid will be announced.

3.17 BASIS OF BIDS

A. The Bidder shall include all additional documents or appendices that are requested to be submitted concurrent with the Bid submission; failure to comply may be cause for rejection.

B. In accordance with Iowa law, Section 8A.311: A bidder, to be considered for an award of a state construction contract, shall disclose to the state agency awarding the contract the names of all subcontractors and suppliers who will work on the project being bid, within forty -eight (48) hours after the published date and time by which bids must be submitted. A bidder shall not replace a subcontractor or supplier disclosed without the approval of the state agency awarding the contract.

1. A bidder, prior to an award or who is awarded a state construction contract, shall disclose all of the following, as applicable:

a. If a subcontractor or supplier disclosed (under the preceding) by a bidder is replaced, the reason for replacement and the name of the new subcontractor or supplier;
b. If the cost of work to be done by a subcontractor or supplier is changed or if the replacement of a subcontractor or supplier results in a change in the cost, the amount of the change in cost.
c. Any reduction in subcontractor or supplier price as a result of the change, if the change is approved by the Owner, shall be deducted from the Trade Contract via a deductive Change Order. Any such changes, if approved by the Owner, which result in an increase in the Trade Contract Price shall be borne by the Trade Contractor.

C. The Bidder is specifically advised that any person, firm or other party to whom it is proposed to award a subcontract under this contract must:
1. Be registered in the State of Iowa and have an Iowa Contractor' s Registration number, and
2. Be acceptable to the Owner.

3.18 INFORMALITIES/ REJECTION OF BIDS

A. The Iowa Department of Administrative Services reserves the right to waive any irregularities or informalities and to enter into a Contract with a Bidder, or to reject any or all bids as it deems to be in the best interest of the State, without penalty.

3.19 CONSIDERATION OF BIDS

A. It is the intent of the Department of Administrative Services to award a Contract to the lowest responsible Bidder, provided the Bid has been submitted in accordance with the requirements of the Bidding Documents and is determined to be compliant with all Bidding Requirements, and does not exceed the funds available for construction.

B. Bidder is to bid on each Alternate Bid requested. Failure to do so may result in disqualification of the bid. The Department of Administrative Services reserves the right to accept any, or no, Alternate Bid. Alternate Bids may be considered in any order or combination, and the low successful Bidder will be determined on the basis of the sum of the Base Bid and the Alternate(s) accepted at the time of the Contract award.

C. In evaluating Bids, any proposal offered by a Bidder for an alternate design, or for materials other than those shown or specified for the Base Bid or for Alternate Bid construction under the proposed Construction Documents or called for by any issued Addenda to those Construction Documents, will not be considered in determining the low successful Bidder. However, the Department of Administrative Services reserves the right to consider any such Bidder -proposed (Contractor' s Alternate) alternate designs or materials with the low successful Bidder, after the low successful Bidder is determined in the manner described above (A and B).

D. Notice of Intent to Award the Bid(s) will be sent to all Respondents submitting a timely Bid and may be posted at the website shown on the RFB cover sheet. Negotiation and execution of the Contract(s) shall be completed no later than fifteen (15) days from the date of the Notice of Intent to Award or such other time as designated by Agency. If the successful Bidder fails to negotiate and deliver an executed Contract, including all required documents such as payment and performance bonds and insurance certificate, by that date, the Agency, in its sole discretion, may cancel the award and award the Contract to the remaining Bidder the Agency believes will provide the best value to the State.

3.20 PREFERENCE

A. By virtue of statutory authority, a preference shall be given to Iowa domestic labor, products produced and provisions grown within the state of Iowa, in accordance with the provisions of Chapter 73, Code of Iowa and any amendments thereto.

B. Enforcement of reciprocal resident bidder preference and resident labor force preference codified at Iowa Code Section 73A.21.
1. NOTICE: Failure on the part of the bidder to carefully read the following paragraphs and to provide the information requested below may make the bidder's bid materially nonresponsive

and therefore ineligible for contract award. Violations of Iowa Code Section 73A.2l may, among other things, result in civil penalties assessed by the Commissioner of the Division of Labor of Iowa Workforce Development. The bidder should seek out the advice of an attorney if he or she has questions about Iowa Code Section 73A.21. As a part of the competitive procurement of contracts for Public Improvements that must be awarded to the low bidder (if the bid is responsive and the bidder is deemed responsible), Public Bodies shall allow a preference to Resident Bidders if a Nonresident Bidder places a bid for the contract for the Public Improvement and that Nonresident Bidder's state or foreign country gives resident bidders of that state or foreign country a preference (including a labor force preference or any type of preferential treatment). The preference allowed, or reciprocally applied, shall be equal to the preference given or required by the state or foreign country in which the Nonresident Bidder is a resident bidder.

"Public Body" means the State of Iowa (and its agencies) and any of its political subdivisions, including school districts, public utilities, and the state board of regents.

"Public Improvement" means a building or other construction work to be paid for in whole or in part by the use of funds of the State of Iowa, its agencies, and any of its political subdivisions and includes road construction, reconstruction, and maintenance projects. "Resident Bidder" means a person or entity authorized to transact business in of the State of Iowa and having a place of business for transacting business within the State of Iowa at which it is conducting and has conducted business for at least three years prior to the date of the first advertisement for the public improvement. Note, however, that if a nonresident bidder's state or foreign country has a more stringent definition of a resident bidder, the more stringent definition is applicable as to bidders from that state or foreign country. "Nonresident Bidder" means a person or entity who does not meet the definition of a resident bidder.

C. Nonresident bidders shall be required to certify on the Bid submission, where so indicated, the state or foreign country in which the firm is a resident, and if that state or foreign country uses a percentage for in-state bidders and the amount of the preference.

D. If it is determined that this may cause denial of federal funds which would otherwise be available, or would otherwise be inconsistent with requirements of federal law, this section shall be suspended, but only to the extent necessary to prevent denial of the funds or to eliminate the inconsistency with federal requirements.

3.21 QUALIFICATIONS

A. In accordance with Iowa Code 26.9(2) and 26.16, no potential bidder shall be required to provide confidential or proprietary information or meet any class requirements as a precondition to submitting a responsive bid. However, as noted in Iowa Code 26.9(2), the lowest responsive bidder may be required to provide additional information to verify responsibility prior to and as a condition of obtaining final award of the contract. Any qualification requirements contained in any bid document indicates only preferred qualifications, not a precondition to bid, and the lowest responsive bidder' s qualifications will be evaluated individually based on all information provided.

B. The Owner may make such investigations as he or she deems necessary to determine the ability of the awarded Bidder to perform the required work, and the awarded Bidder shall furnish to the Owner all such information and data for this purpose. The Owner reserves the right to rescind any awarded Bid if the evidence submitted by, or in investigation of, such Bidder fails to satisfy the Owner that the Bidder is properly qualified to carry -out the obligations of the Contract and to complete the Work contemplated therein.

C. Bidders shall be registered as a Construction Contractor with the Labor Commissioner, Iowa Workforce Development Department, as required by Chapter 91C of the Code of Iowa. Bidder' s Iowa Contractor Registration Number shall be included in the location provided in the Bid Form.

D. Non-resident corporations submitting bids must be in compliance with Section 490.1501 of the Code of Iowa and legally authorized thereby to carry-on such business in the State of Iowa as is required by the Contract Documents.

E. An out-of-state Bidder, if awarded a contract, will be required to submit evidence of authorization to do business in the State of Iowa.

3.22 INSURANCE

A. Insurance Requirements
   1. The Contractor shall maintain in effect, with insurance companies of recognized responsibility, at its expense, insurance covering its work of the type and in amounts required by this Contract. The Contractor' s insurance shall, among other things, insure against any loss or damage resulting from the Contractor' s performance of this Contract. All such insurance policies shall remain in full force and effect for the entire life of this Contract and shall not be canceled or changed except after thirty (30) days written notice to the Owner.
   2. **Amounts of Insurance Required – Refer to ConsensusDOCS 802 (see template in Project Manual)**

B. Certificates of Coverage
   1. Certificates of the insurance described above shall be submitted to the Owner before starting any construction activities and shall be subject to approval by the Owner. The Contractor shall provide certificates for the insurance required. The insurer shall state in the certificate that no cancellation of the insurance will be made without at least thirty (30) days prior written notice to the Contractor. Upon receipt of any notice of cancellation or alteration, Contractor shall within ten (10) days procure other policies of insurance, similar in all respects to the policy or policies, about to be canceled or altered, and, if the Contractor fails to provide, procure, and deliver acceptable policies of insurance, or satisfactory evidence thereof, in accordance with the terms hereof then, at the Owner' s option, Owner may obtain such insurance at the cost and expense of Contractor, without the need of any notice to Contractor.

C. No Limitation of Liability
   1. Acceptance of the insurance certificates by the Owner shall not act to relieve the Contractor of any obligation under this Contract. All insurance policies and certificates shall be issued only by companies authorized to transact business in the State of Iowa. It shall be the responsibility of the Contractor to keep the respective insurance policies and coverages current and in force during the life of this agreement.
   2. A Sample Certificate of Insurance is attached for reference following this Section.

3.23 FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

A. The Agreement for the Work will be written on ConsensusDOCS 802 Form of Agreement between Owner and Contractor (sample of the document with modifications incorporated is bound in this Project Manual).

3.24 EXECUTION OF CONTRACT

A. Contract documents shall mean and include the following:
   1. Contract: ConsensusDOCS 802
   2. Performance and Payment Bonds
   3. Project Manual
   4. Drawings
   5. Numbered Addenda issued after initial publication of Bid Documents
   6. Numbered Modifications (Change Orders) issued after Contract is signed

3.25 LAWS AND REGULATIONS

A. The Bidder' s attention is directed to the fact that all applicable laws and regulations of Federal and State agencies having jurisdiction over the construction of this project shall apply to any contract resulting from this proposal, and it shall be deemed that those rules and regulations are made a part of such contract the same as if set forth in their entirety therein. By submitting a Bid, the Bidder confirms that he/she is familiar with and understands the Contractor ' s responsibility under all Federal and State of Iowa laws and regulations with respect to the Work described by the proposed Contract Documents.

3.26 CONTRACT DOCUMENTS AND ORDER OF PRECEDENCE

A. Where an irreconcilable conflict exists among Applicable Legal Requirements, this Contract, the specifications in the Materials and the Drawings, the earliest item mentioned in this sentence involving a conflict shall control over any later mentioned item or items subject to such conflict unless doing so would result in reducing the Bidder' s duty of care or obligations under this Contract, in which case the terms resulting in the highest requirements for Bidder performance shall control.

3.27 CONDITIONS OF THE WORK

A. Each bidder must fully inform him/herself of the conditions under which the work is to be performed at the site of the work, the obstacles which may be encountered, and all other relevant matters concerning the work to be performed. Failure to do so will not relieve a successful bidder of the obligation to furnish all material and labor necessary to carry out the provisions of the contract. When a site visit is required by provisions located elsewhere in these Instructions to Bidders, as a site tour in conjunction with a mandatory Pre-Bid Meeting, it shall be the Bidder' s responsibility to fulfill this obligation as a condition of bidding the Work described in the Bidding Documents.

B. No allowance will be made for any additional compensation by reason of any matter or condition with which the bidder might have fully informed him/herself, but failed to do so prior to bidding. Insofar as possible, the Contractor and all subcontractors shall employ such methods or means in carrying out the work so as not to cause any interruption of, or interference with, the work of any other subcontractor or trade.

3.28 SUBCONTRACTS

A. The Prime Contractor shall be responsible for notifying all subcontractors and suppliers and informing them that they are bound in each case by all applicable provisions of the bidding information and those of the proposed Form of Agreements as defined in the Contract Documents.

END OF SECTION

SECTION 00 2113.1

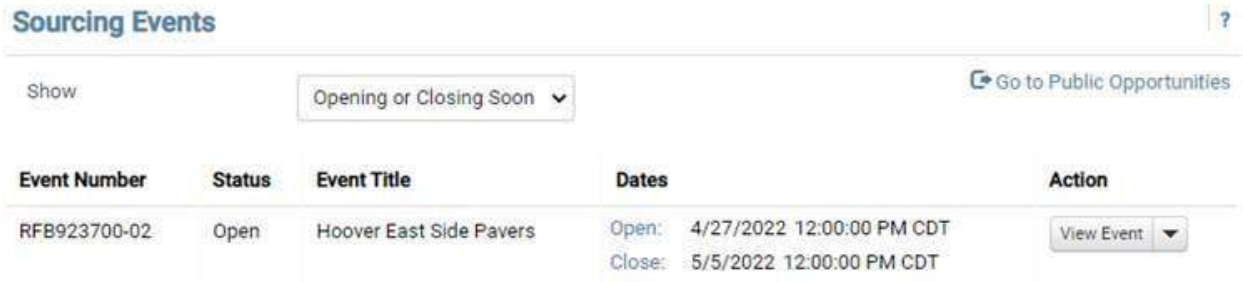
IMPACS Public Construction Bidders User Guide

Public construction bids must be submitted on-line at IMPACS Electronic Procurement System.

Bidders must be registered in IMPACS to submit a Bid.

To create an account, enter your email address and click on " Next" and click " Create Account" . Bidder must enter all fields noted with * including legal company name, contact first and last name, phone number, confirm email address, password, re-enter password, select account recovery question including answer, confirm answer, select box accepting websites use terms and conditions and select security check box " I' m not a robot" .

On the IMPACS Electronic Procurement System Customer Portal Home page, Bidder selects " View Event" in the Sourcing Events section.



Bidders can view event details including description, prerequisites, buyer attachments, questions and answers.

To submit a Bid, Bidder must select **" Yes, I intend to Bid"** . Bidder must complete the following sections.

Prerequisites - Bidder must complete all prerequisites.

- Bidder must upload a file of the Bid Security/Bond for 5% of total Bid Amount and certify that if they are awarded the construction contract they will enter into the contract at the Bid Amount submitted.
- Bidder must upload the completed and signed Bid Form.
  NOTE: Bids are to be entered on the Bid Form only; not in the IMPACS. As a result, IMPACS will display a bid amount of $0.

Questions - Bidder must complete all questions.

Review & Submit - Bidder must select the certification box certifying that the statements and information in response are true and correct to the best of their knowledge and belief.

SECTION 00 2113.2

SAMPLE

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): xx/xx/xxxx

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Agent's Name Agent's Address	CONTACT NAME: Agent's Information PHONE (A/C, No, Ext): FAX (A/C, No): E-MAIL ADDRESS:
INSURED Trade Contractor's Name Trade Contractor's Mailing Address	INSURER(S) AFFORDING COVERAGE / NAIC # INSURER A: Company A(AM Best Rated A/VI or Better) — Admitted Carriers INSURER B: INSURER C: INSURER D: INSURER E: INSURER F:

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS (Minimum)	
* A	COMMERCIAL GENERAL LIABILITY CLAIMS-MADE [X] OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: POLICY [X] PRO-JECT [ ] LOC OTHER:	X	X	#TBD- CGL	3/1/17	3/1/18	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$ 1,000,000 $ $ $1,000,000 $2,000,000 $1,000,000
B	AUTOMOBILE LIABILITY [X] ANY AUTO ALL OWNED AUTOS HIRED AUTOS SCHEDULED AUTOS NON-OWNED AUTOS	X	X	#TBD-AL	3/1/17	3/1/18	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$ 1,000,000 amount varies based on paragraph 10.2.2 of the ConsensusDocs 802 contract
C	UMBRELLA LIAB [X] OCCUR EXCESS LIAB [ ] CLAIMS-MADE DED RETENTION $	X	X	#TBD-UMB	3/1/17	3/1/18	EACH OCCURRENCE AGGREGATE	$10,000,000 $
D	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y / N [ ] (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N/A	X	#TBD-WC	3/1/17	3/1/18	[X] PER STATUTE [ ] OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	 $500,000 $500,000 $500,000
* E	Owners Contrators Protective Liability			#TBD-OCP	3/1/17	3/1/18	*Limits equal to CGL (or) as required by owner (Note- Would be either CGL or OCP, not both)	

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Additional Insured on a Primary & Non-Contributory basis (CGL;AL;UMB/Excess) in favor of : (Owner) Iowa Department of Administrative Services (DAS), Officers, Directors, Members, Consultants, Agents, and Employees.
Waiver of Subrogation (CGL;AL;WC/EL;UMB/Excess) in favor of: (Owner) Iowa Department of Administrative Services (DAS), Officers, Directors, Members, Consultants, Agents, and Employees.

Project XXXX.XX (Number varies by project)

CERTIFICATE HOLDER	CANCELLATION
Iowa Department of Administrative Services (DAS) 109 SE 13th Street Des Moines, IA 50319	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE Signature

ACORD 25 (2014/01) The ACORD name and logo are registered marks of ACORD

CERTIFICATE OF SITE VISIT

This is certification that

_____

(Name of Person)
As authorized representative of:

_____

(Name of Firm)

_____

(Firm' s Address)
Visited the job site for verification of the conditions for the:

_____

(Name of Project)
On

_____

(Date of Visit)

_____

(Signature of Owner' s Representative or designated site authority)

Attention: This Certification of Site Visit must be completed and submitted with your bid package. If multiple locations are involved, provide a separate form for each location.

SECTION 00 3113

PRELIMINARY SCHEDULE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Preliminary Construction Schedule
B. Schedule Durations

1.02 PRELIMINARY SCHEDULE

A. A preliminary schedule has been identified by the Owner for the implementation of the Project. Refer to the schedule following this Section for references to anticipated milestones and construction duration.
B. Each step of the Preliminary Schedule is subject to receipt of acceptable bids, Owner's decision process and date of commencement.
C. A proposed construction schedule shall be submitted by all Trade Contractors to the Construction Manager no later than 48 hours prior to the pre-construction meeting. A revised Construction Schedule will be submitted by the Construction Manager once all preliminary schedules are reviewed and approved by the Owner.
D. The final construction schedule will be established post award of bids with the cooperation of all contractors.

1.03 SCHEDULE DURATIONS

A. Anticipated Notice of Intent to Award – 12/20/24
B. Anticipated Date of Commencement – 01/06/25
C. Substantial Completion by – 6/6/25

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

SECTION 312 6
EXISTING HAZARDOUS MATERIAL INFORMATION

PART 1 - GENERAL

1.01 EXISTING HAZARDOUS MATERIAL INFORMATION

A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information, but are not a warranty of existing conditions.

B. Related Requirements:

1. Section 3.12 " Hazardous Materials" in the ConsensusDocs 802 contract for notification requirements if materials suspected of containing hazardous materials are encountered.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

SECTION 313 6
GEOTECHNICAL DATA

PART 1 - GENERAL

1.01 GEOTECHNICAL DATA

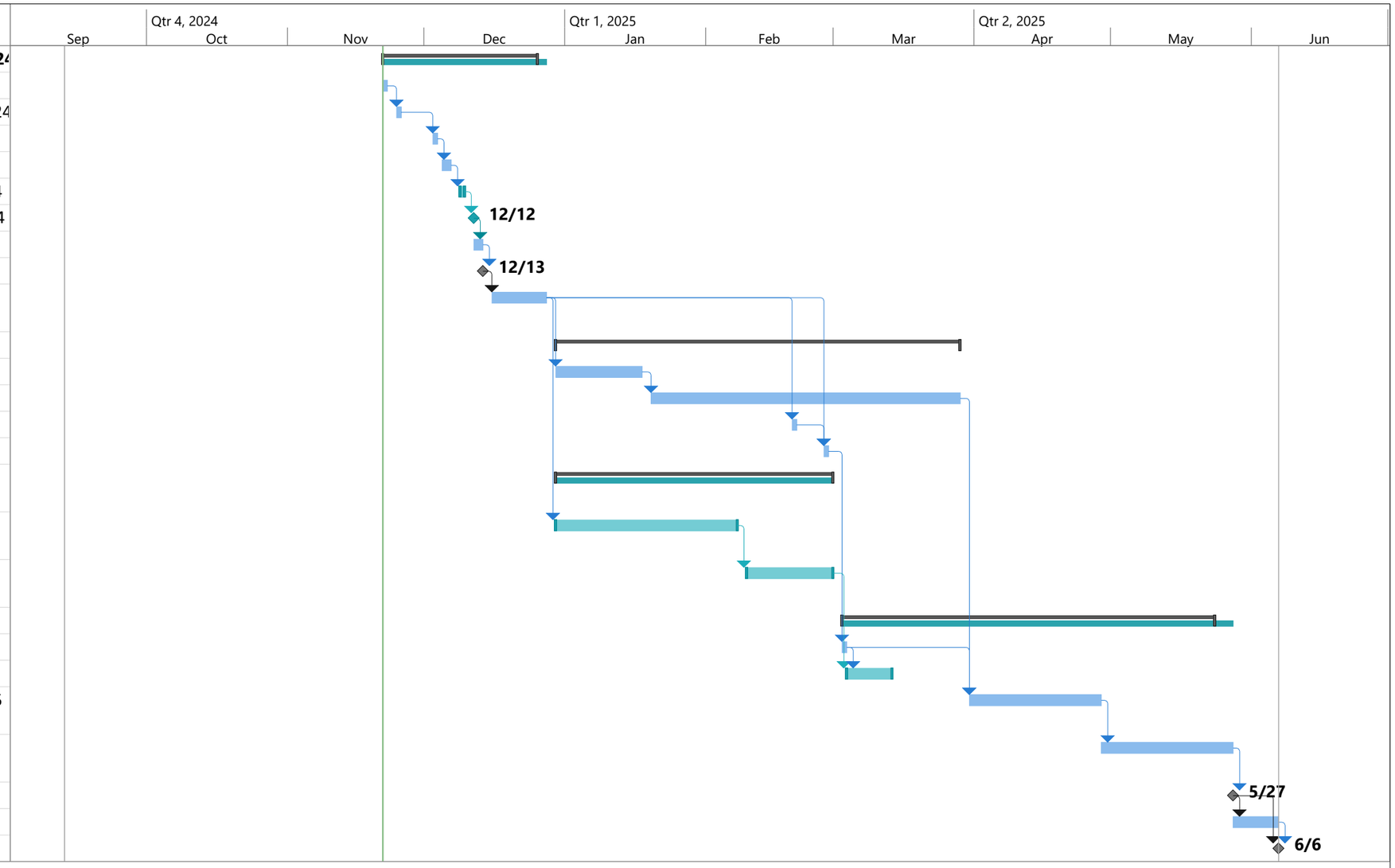
A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information, but are not a warranty of existing conditions.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

ID	Task Name	Duration	Start	Finish
1	**Bidding**	**24 days**	**Fri 11/22/24**	**Wed 12/25/24**
2	TSB Issuance	1 day	Fri 11/22/24	Fri 11/22/24
3	Public Issuance	1 day	Mon 11/25/24	Mon 11/25/24
4	Pre-Bid Meeting	1 day	Tue 12/3/24	Tue 12/3/24
5	Questions Due	2 days	Thu 12/5/24	Fri 12/6/24
6	Final Addenda Issued	1 day	Mon 12/9/24	Mon 12/9/24
7	Close Date/Bids Due	0 days	Thu 12/12/24	Thu 12/12/24
8	Evaluation of Bids	2 days	Thu 12/12/24	Fri 12/13/24
9	NOI	0 days	Fri 12/13/24	Fri 12/13/24
10	Trade Contractor Contracts	10 days	Mon 12/16/24	Fri 12/27/24
11	**Pre-Construction**	**65 days**	**Mon 12/30/24**	**Fri 3/28/25**
12	Submittals	15 days	Mon 12/30/24	Fri 1/17/25
13	Material Procurement	50 days	Mon 1/20/25	Fri 3/28/25
14	Scheduling Meeting	1 day	Thu 2/20/25	Thu 2/20/25
15	Kick-Off Meeting	1 day	Thu 2/27/25	Thu 2/27/25
16	**Construction UST Tank Removal**	**45 days**	**Mon 12/30/24**	**Fri 2/28/25**
17	DNR Removal Notification	30 days	Mon 12/30/24	Fri 2/7/25
18	UST Tank Removal / Backfill	15 days	Mon 2/10/25	Fri 2/28/25
19	**Construction**	**60 days**	**Mon 3/3/25**	**Fri 5/23/25**
20	Mobilization	1 day	Mon 3/3/25	Mon 3/3/25
21	Propane Tank	8 days	Tue 3/4/25	Thu 3/13/25
22	Construction Duration Phase 1	21 days	Mon 3/31/25	Mon 4/28/25
23	Construction Duration Phase 2	21 days	Tue 4/29/25	Tue 5/27/25
24	Substantial Completion	0 days	Tue 5/27/25	Tue 5/27/25
25	Project Close-Out	8 days	Wed 5/28/25	Fri 6/6/25
26	Final Completion	0 days	Fri 6/6/25	Fri 6/6/25



Project: 9404.00
Tentative Preliminary Schedule
To be discussed with awarded c

Task	Project Summary	Manual Task	Start-only	Deadline
Split	Inactive Task	Duration-only	Finish-only	Progress
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress
Summary	Inactive Summary	Manual Summary	External Milestone	

SECTION 314 3
PERMIT APPLICATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Permit Application Information
B. Licenses, Permits, and Related Inspections

1.02 PERMIT APPLICATION INFORMATION

A. State Building Code Plan Review: The plan review and inspections for this project have been applied for by the Architect. Please contact your inspector prior to construction and occupancy.
B. State Building Code Energy Review: The energy code review and inspections for this project have been applied for by the Architect. Please contact your inspector prior to construction and occupancy.
C. Boiler Permit and Inspections: Trade Contractor is responsible for permits and inspections.
D. Water Heater Permit and Inspections: Trade Contractor is responsible for permits and inspections.
E. Electrical Permit and Inspections: Trade Contractor is responsible for permits and inspections.
F. Elevator Permit and Inspections: Trade Contractor is responsible for permits and inspections.
G. Fuel Tank Permit and Inspections: Trade Contractor is responsible for permits and inspections.
H. Propane Tank Inspections: Trade Contractor is responsible for permits and inspections.
I. Other Applicable inspections: Trade Contractor is responsible for any other applicable project specific permits and inspections.

1.03 LICENSES, PERMITS, AND RELATED INSPECTIONS

A. The Bidder shall comply with all codes, laws, ordinances, rules and regulations of any public authority having jurisdiction that bears on the performance of its work. All construction, materials and methods shall comply with the State Building Codes, except where plans and specifications establish a higher standard.

PART 2 - PRODUCTS – NOT USED
PART 3 - EXECUTION – NOT USED

END OF SECTION

SECTION 00 4116

BID FORM

The Bid Form must be submitted online through the State' s IMPACS Electronic Procurement System.

RFB #940400-01

BID FORM for CONSTRUCTION CONTRACT
For
Newton Correctional Facility
307 S 60th Ave W, Newton, IA 50208
Project 9404.00

Iowa Department of Administrative Services
Hoover State Office Building, Level 3
1305 East Walnut Street
Des Moines, Iowa 50319-0105

The following information is to be completed and submitted with your bid..

1. Bid Form - Completed and Signed (to be uploaded with bid submission)
2. Non Discrimination Clause Information
3. Contractor Targeted Small Business Enterprise Pre-Bid Contract Information
4. Bid Security – 5% of total Bid amount (to be uploaded with bid submission)

Authorized Representative:
The undersigned Bidder, in response to your Request for Bid for construction of the above project, having examined the Drawings, Specifications, and other Bidding Documents dated August 27, 2024 and Addenda issued and acknowledged below as received and being familiar with all the conditions surrounding the construction of the proposed project including the availability of materials and labor, hereby proposes to furnish all labor, materials, equipment and supplies to perform all work to construct the project in strict accordance with the proposed Contract Documents, within the time and at the prices stated below. Prices are to cover all expenses incurred in performing the work required under the proposed Contract Documents, of which this bid is a part.

Bidder acknowledges receipt of the following Addenda which are a part of the Bidding Documents and for which any effect on cost of the Work is included in the bid amounts indicated:

Number _____ _____ _____ _____ _____

Dated _____ _____ _____ _____ _____

Note that the State of Iowa is exempt from State and Local sales and use taxes (including local option and school option) for this project. Taxes on construction materials shall NOT be included in the bid amounts.

Amounts shall be indicated in both words and figures. In case of discrepancy, the amount indicated in words shall govern.

BID PACKAGES:

BID PACKAGE #01

Boiler Replacement:

- Removal and Replacement of two (2) boilers and associated equipment in separate phases to keep one (1) boiler live during construction.
- Include removal and replace mechanical housekeeping pads. Reinforced, formed, cast in place concrete per specifications.

Underground Storage Tank (UST) Removal:

- Removal of Underground storage tank per DNR specifications including compacted backfill per SUDAS requirements for structural backfill.
- Include in bid removal and proper disposal of existing 8,600 gallons (plus or minus 100 gallons) of existing fuel contained in the existing tank.
- Include demolition and removal of existing concrete slab over existing underground storage tank.
- Include required DNR soil / water testing.
- Include compacted backfill of suitable material to existing grade elevation.

Propane Tank:

1. Provide and install complete 12K propane tank for back-up fuel source system for new boilers.
2. Used Propane tank is acceptable. “White” in color. Reconditioned tank with a minimum 20-year warranty.
3. Provide all labor, materials, and equipment for a complete and operational system meeting all applicable codes, State Fire Marshal recommendations, and approved structural review.
4. Include all code / State Fire Marshal required safety devices including but not limited traffic protections, fencing, etc.
5. Include minimum 5,000 gallons of liquid propane fill for startup and testing requirements.

Bidder proposes and agrees to perform all work as described in the Construction Documents for the sum of:

_____

_____Dollars

($_____).

Bid Alternates #01:

Remove Control Systems from base bid:

System and Provider Name: _____

_____Dollars

($_____).

Bid Alternates #02:

Liquid Propane Tank Size (Identify New or Used):

System and Provider Name: _____

_____Dollars

($_____).

UNIT PRICES:

UNIT 01 – Replacement Valve

Description: Cost to include one (1) additional 4" diameter replacement valve

_____
_____Dollars
($_____).

UNIT 02 – Bollard

Description: Cost to provide and install additional bollard beyond quantity shown per bid documents.

_____
_____Dollars
($_____).

UNIT 03 – Structural Backfill

Description: Cost to include one (1) cubic yard of structural backfill material for new propane tank (as required).

_____
_____Dollars
($_____).

UNIT 04 – Removal of Contaminated Excavated Material

Description: Complete cost to include one (1) cubic yard of Contaminated Excavated Material removal / disposal.

_____
_____Dollars
($_____).

UNIT 05 – Liquid Propane

Description: Cost per gallon for liquid propane over initial 5,000 gallons.

_____
_____Dollars
($_____).

Bidder hereby certifies that:

1. This bid is genuine and is not made in the interest of or on behalf of any undisclosed person, firm or corporation;
2. Bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid; Bidder has not solicited or induced any person, firm or corporation to refrain from bidding; and Bidder has not sought by collusion to obtain any advantage over any other bidder or over the Owner.
3. Bidder hereby certifies that the Bidder is registered with the Iowa Labor Commissioner as a Contractor as required by Chapter 91C, Code of Iowa.
4. Bidder agrees to comply with all Federal and State Affirmative Action/Equal Employment Opportunity requirements concerning fair employment and will not discriminate between or among them by reason of race, color, religion, sex, national origin or physical handicap.
5. All construction under this Contract shall conform to the requirements of the *Iowa State Building Code*.
6. Bidder agrees that this bid shall remain valid and shall not be withdrawn for a period of thirty (30) calendar days after the date for receipt of bids.
7. Bidder agrees that if written notice of acceptance of this bid is mailed, emailed, or delivered to the undersigned within thirty (30) days after the date in which bids are due, or at any time thereafter before it is withdrawn, the undersigned will sign and return the Contract Agreement, prepared in accord with the Bidding Documents and this bid as accepted; and will also provide proof of insurance coverage and required surety bonds.
8. Bidder understands that the Owner reserves the right to reject any and all bids, and to waive irregularities or informalities and enter into a contract for the work, as the Owner deems to be in the best interest of the State.
9. Bidder understands that the Owner reserves the right to accept any, or no, Alternate Bid, if requested, and that the Alternate Bids may be considered in any order or combination, and the low Bidder shall be determined on the basis of the sum of the base bid and any Alternate(s) accepted.

Subcontractors:
The Trade Contractor must identify all Subcontractors and Suppliers within 48 hours of the published date and time for which bids must be submitted, in accordance with Iowa Code Section 8A311, as amended by House File 646 in 2011. Subcontractors and suppliers may not be changed without the approval of the Owner. Requests for changing a Subcontractor or supplier must identify the reason for the proposed change, the name of the new Subcontractor or supplier, and the change in the subcontractor or supplier price as a result of the change. Any reduction in subcontractor or supplier price as a result of the change, if the change is approved by the Owner, shall be deducted from the Trade Contract Price via a deductive Change Order. Any such changes, if approved by the Owner, which result in an increase in the Trade Contract Price shall be borne by the Trade Contractor.

Enforcement of Reciprocal Resident Bidder Preference, per Iowa Code 73A.21.

All bidders shall either check the box next to "Resident Bidder" or check the box next to "Nonresident Bidder" and by doing so and signing thereafter certifies and attests to the same. All information requested must be provided. Seek out the advice of an attorney if you have questions.

"Resident Bidder" means a person or entity authorized to transact business in of the State of Iowa and having a place of business for transacting business within the State of Iowa at which it is conducting and has conducted business for at least three years prior to the date of the first advertisement for the public improvement. Note, however, that if a nonresident bidder's state or foreign country has a more stringent definition of a resident bidder, the more stringent definition is applicable as to bidders from that state or foreign country.

☐ Resident Bidder
Name of Resident Bidder: _____

By: _____
Authorized Agent and Signatory of Resident Bidder

OR:

☐ Nonresident Bidder
Name of Nonresident Bidder: _____

Name of State or Foreign Country of Nonresident Bidder: _____

Particularly identify and describe any preference, labor preference, or any other type of preferential treatment, in effect in the nonresident bidder' s state or foreign country at the time of this bid:

_____
_____
_____

NOTICE: Nonresident Bidders domiciled in a state or country with a resident labor force preference shall make and keep, for a period of not less than three years, accurate records of all workers employed on the public improvement. The records shall include each worker' s name, address, telephone number when available, social security number, trade classification, and the starting ending time of employment.

By:_____
Authorized Agent and Signatory of Nonresident Bidder
Bid Form shall be signed by an officer of the company with authority to bind in a contract.
Notice of acceptance of this bid, or request for additional information by the Department of Administrative Services, may be addressed to the undersigned at the address set forth below:

Legal Name of Firm: _____

Date: _____

Signature of Bidder: _____

Title: _____

Typed Name of Signatory: _____

Email: _____

Business Address:

_____
_____
_____

Telephone Number:_____ Fax Number: _____

Federal Tax Identification Number: _____

Iowa Contractor Registration Number: _____

Bidder Safety Manager Name:_____

For an out-of-state Bidder, Bidder certifies that the Resident Preference given by the State or Foreign Country of Bidder' s residence,_____, is_____%.

END OF SECTION

SECTION 00 4116.01

NON-DISCRIMINATION CLAUSE

This Section is for informational purposes only. All information will be submitted online through the State' s IMPACS Electronic Procurement System.

PART 1 - GENERAL

All contractors, subcontractors, vendors and suppliers of goods and services doing business with the State of Iowa and value of said business equals or exceeds $10,000 annually, agree as stated below.

1.01 NONDISCRIMINATION CLAUSE

A. The contractor, subcontractor, vendor and supplier of goods and services will not discriminate against an employee or applicant for employment because of race, creed, color, sex, national origin, ancestry, religion, economic status, age, disability, political opinion, or affiliations of an applicant or employee based upon the nature of the job occupation. The contractor, subcontractor, vendor and supplier will develop an Affirmative Action Program to insure that applicants are employed and that employees are treated during employment without regard to their race, creed, color, sex, national origin, ancestry, religion, economic status, age, disability, political opinions or affiliations. Such action shall include, but not be limited to the following:
   1. Employment.
   2. Upgrading.
   3. Demotion or transfer.
   4. Recruitment and advertising.
   5. Layoff or termination.
   6. Rates of pay or other forms of compensation.
   7. Selection for training, including apprenticeship.

B. The contractor, subcontractor, vendor and supplier of goods and services will, in all solicitations or advertisements for employees, state that all qualified applicants will receive consideration for employment without regard to race, creed, color, sex, national origin, ancestry, religion, economic status, age, disability, political opinion or affiliations.

C. The contractor, subcontractor, vendor and supplier or their collective bargaining representative will send to each labor union or representative or workers with which they have a collective bargaining agreement or other contract or understanding, a notice advising the said labor union or workers' representative of the contractor' s commitments under this section.

D. The contractor, subcontractor, vendor and supplier of goods and services will comply with all published rules, regulations, directives and orders of the State of Iowa Affirmative Action Program Contract Compliance Provisions.

E. The contractor, subcontractor, vendor and supplier of goods and services will furnish and file compliance reports within such time and upon such forms as provided by the Equal Employment Opportunity Officer, said forms may elicit information as to the policies, procedures, patterns, and practices of each subcontractor as state as the contractor themselves and said contractor, subcontractor, vendor and supplier will permit access to their employment books, records and accounts to the State' s Equal Employment Opportunity Officer, for the purpose of investigation to ascertain compliance with this Contract and with rules regulations of the State' s Affirmative Action Program.

F. In the event of the contractor' s noncompliance with the nondiscrimination clauses of this Contract or with any of such rules, regulations and orders; this Contract may be canceled, terminated or suspended in whole or in part and the Contractor may be declared ineligible for further contracts in accordance with procedures authorized by the State of Iowa.

G. The contractor, subcontractor, vendor and supplier of goods and services will include, or incorporate by reference, the provisions of the nondiscrimination clause in every contract, subcontract or purchase order unless exempted by the rules, regulations or orders of the State' s Affirmative Action Program, and will provide in every subcontract or purchase order that said provisions will be binding upon each contractor, subcontractor or seller.

H. The parties agree to comply with "Compliance with the Law; Nondiscrimination in Employment" of the current Terms and Conditions at the award of this contract. Current Terms and Conditions may be found on the following web site and are, by this reference, made a part of this Agreement. https://das.iowa.gov/procurement/terms-and-conditions

I. We certify and recognize that we are morally and legally committed to nondiscrimination in employment. Any person who applies for employment with our company will not be discriminated against because of race, creed, color, sex, national origin, ancestry, religion, economic status, age or disabilities, unless disabilities are based upon the nature of the job occupation.

PART 2 - PRODUCTS – NOT USED PART 3 - EXECUTION – NOT USED

END OF SECTION

SECTION 00 4116.02
TARGETED SMALL BUSINESS INFORMATION
This Section is for informational purposes only. All information will be submitted online through the State' s IMPACS Electronic Procurement System.

PART 1 - GENERAL

1.01 TARGETED SMALL BUSINESS INFORMATION

A. Subcontractor Targeted Small Business Enterprise Pre-Bid Contact Information, including subcontractor and dollar amount to be subcontracted, is to accompany the Bid submission. Bidders shall comply with all affirmative action/equal opportunity provisions of State and Federal laws. The Owner seeks to provide opportunities for Targeted Small Businesses in accordance with the provisions of Chapter 73 of the Code of Iowa.

B. Search the Targeted Small Business Directory for certified State of Iowa Targeted Small Businesses.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

IOWA DEPARTMENT OF ADMINISTRATIVE SERVICES
SUBCONTRACTOR
TARGETED SMALL BUSINESS ENTERPRISE
PRE-BID CONTRACT INFORMATION

CONTRACTOR	**BID NO.**	**PAGE #**

(to be completed by bidder)

You are requested to provide the information on this form showing your targeted Small Business enterprises contacts made prior to your bid submission. This information is subject to verification and confirmation. NOTE: The Department of General Services will not regard your acceptance or use of a low quote or bid from a non-targeted Small Business Enterprise on any subcontract item as evidence itself of any lack of good faith effort to solicit targeted Small Business Enterprise subcontractors on this project. However, every effort shall be made to solicit quotes or bids on as many subcontractable items as necessary to evidence affirmative action in contracting.

TABLE OF INFORMATION SHOWING BIDDER'S PRE-BID TARGETED SMALL BUSINESS ENTERPRISE CONTACTS

SUBCONTRACTOR	TSB	DATES CONTACTED	QUOTES RECEIVED		QUOTATION USED IN BID	
			YES/NO	DATES	YES/NO	DOLLAR AMOUNT PROPOSED TO BE SUBCONTRACTED

Total dollar amount proposed to be subcontracted to TSB on this project $ _____
List items to be subcontracted. *(If more space is needed, use reverse side.)*

SECTION 00 4313
BID SECURITY FORMS

PART 1 - GENERAL
1.01 BID SECURITY FORMS

A. A Bid Bond form will be required on this project. An amended ConsensusDocs 262 is attached for reference following this page. ConsensusDocs bid bond form is not required (other standard forms are acceptable to the State of Iowa).

PART 2 - PRODUCTS – NOT USED
PART 3 - EXECUTION – NOT USED

END OF SECTION

CONSENSUSDOCS 262

BID BOND

(AMENDED BY STATE OF IOWA)

This document was developed through a collaborative effort of organizations representing a wide cross-section of the design and construction industry. The organizations endorsing this document believe it represents a fair allocation of risk and responsibilities for all project participants.

Endorsing organizations recognize that this document must be reviewed and adapted to meet specific needs and applicable laws. This document has important legal and insurance consequences. You are encouraged to consult legal, insurance and surety advisors before completing or modifying this document. The software includes a notes section indicating where information is to be inserted to complete this document. Further information and endorsing organizations' perspectives are available at www.consensusdocs.org/guidebook.

For Use with ConsensusDOCS 200, Standard Form of Agreement and General Conditions Between Owner and Constructor (Where the Contract Price is a Lump Sum) and ConsensusDOCS 500, Standard Agreement and General Conditions Between Owner and Construction Manager.

The Trade Contractor, _____ (the "Trade Contractor") has submitted a Bid to the Owner, _____, (the "Owner") for the _____ (the "Project") in accordance with the Bidding Documents, including Drawings and Specifications prepared by _____ (the "Design Professional").

By virtue of this Bid Bond (the "Bond"), the Constructor as Principal and _____ as Surety ("Surety"), are bound to the Owner as Obligee in the maximum amount _____, Dollars ($_____) (the "Bond Sum"). The Constructor and Surety hereby bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein.

1. If the Obligee shall accept the bid of the Constructor, the Constructor shall enter into an Agreement with the Obligee in accordance with the terms of such Bid.

2. Constructor shall procure such bond or bonds as are specified in the Contract Documents for the faithful performance of the Work and for the prompt payment of labor and materials furnished in the performance of the Work.

3. If the Constructor fails to enter such Agreement and give such bonds, the Constructor shall pay to the Obligee the difference between the amount of Constructor's bid and the amount of such agreement the Obligee in good faith executes with another Party to perform the Work covered by Constructor's Bid, not to exceed the Bond Sum stated above.

4. If the Constructor shall fulfill its obligation under Articles 1 through 3, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

This Bond is entered into as of _____ (date)

SURETY: _____ (seal)

BY: .....

Print Name: _____

Print Title: _____ (Attach Power of Attorney)

Witness: .....

(Additional signatures, if any, appear on attached page)

Constructor: _____ (seal)

BY: .....

Print Name: _____

Print Title: _____

Witness: .....

(Additional signatures, if any, appear on attached page)

SECTION 00 5200
AGREEMENT FORM

PART 1 - GENERAL

1.01 AGREEMENT FORM

A. The Form of Agreement to be used on this project is a modified ConsensusDocs 802. A sample is attached following this page.

PART 2 - PRODUCTS – NOT USED
PART 3 - EXECUTION – NOT USED

END OF SECTION

00 5200 - Sample

ConsensusDocs 802

STANDARD FORM OF AGREEMENT BETWEEN OWNER AND TRADE CONTRACTOR

(Where the Construction Manager Is the Owner's Agent)

ConsensusDocs

TABLE OF ARTICLES

This Agreement has important legal and insurance consequences. Consultations with an attorney and with insurance and surety consultants are encouraged with respect to its completion or modification. Notes indicate where information is to be inserted to complete this Agreement.

ARTICLE 1 AGREEMENT

This Trade Contractor Agreement is made effective as of the XX day of Month, Year, by and between the

OWNER

State of Iowa - DAS, Department of Administrative Services ("DAS"). DAS's principal office is located: 109 SE 13th Street, Des Moines, IA 50319-0120.

and the

TRADE CONTRACTOR
Contractor Name
Address
City, State, Zip

for work in connection with the following

PROJECT
XXXX.XX - Project Name

The CONSTRUCTION MANAGER is
Construction Manager Name
Address
City, State, Zip

The DESIGN PROFESSIONAL for the Project is
Designer Name
Address
City, State, Zip

Notice to the Parties shall be given at the above addresses.

ARTICLE 2 GENERAL PROVISIONS

2.1 RELATIONSHIP OF PARTIES The Owner and the Trade Contractor agree to proceed with this Agreement on the basis of mutual trust, good faith and fair dealing and shall cooperate with each other and with the Construction Manager and Design Professional in furthering the Owner's interests. The Trade Contractor shall use its diligent efforts to perform the work in an expeditious manner consistent with the Trade Contract Documents. The Owner and the Trade Contractor will endeavor to promote harmony and cooperation among all Project participants.

2.1.1 The Owner and the Trade Contractor shall perform their obligations with integrity, ensuring at a minimum that

2.1.1.1 conflicts of interest shall be avoided or disclosed promptly to the other Party; and

2.1.1.2 the Trade Contractor and the Owner warrant that they have not and shall not pay nor receive any contingent fees or gratuities to or from the other Party, including its agents, officers and employees, Subcontractors or others for whom they may be liable, to secure preferential

treatment.

2.2 PROJECT ORGANIZATION This Agreement is for the performance of work described herein in connection with the construction of the Project. The Owner also may enter into separate agreements with other trade contractors for other portions of the Project. The Owner has entered or will enter into a Construction Management Agreement with the Construction Manager, and a design agreement with the Design Professional.

2.3 INDEPENDENT CONTRACTOR The Trade Contractor represents that it is an independent contractor and that its performance of the Trade Contract Work it shall act as an independent contractor. Neither Trade Contractor nor any of its agents or employees shall act on behalf of the Owner except as provided in this Agreement or unless authorized in writing by the Owner.

2.4 CONSTRUCTION MANAGER IS OWNER'S AGENT The Construction Manager will represent the Owner as its agent in the administration and management of this Agreement. Any instructions, reviews, approvals, orders or directions given to the Trade Contractor by the Construction Manager will be given on behalf of and as agent for the Owner. The Trade Contractor shall be obligated to respond or perform as if the same were given directly by the Owner. The Trade Contractor shall communicate and provide all requests and concerns regarding the Trade Contract Work to the Construction Manager. The Trade Contractor shall provide copies to the Construction Manager of all notices to the Owner required by and regarding this Agreement.

2.5 CONSTRUCTION MANAGER NOT IN PRIVITY WITH TRADE CONTRACTOR This Agreement shall not give the Trade Contractor any claim or right of action against the Construction Manager. The Trade Contractor and its subcontractors shall not be beneficiaries of any obligations of the Construction Manager. This Agreement shall not create a contractual relationship between any parties except the Owner and the Trade Contractor.

2.5 A NO THIRD-PARTY BENEFICIARY There are no third-party beneficiaries of this Agreement.

2.6 DESIGN PROFESSIONAL The Owner, through its Design Professional, shall provide all architectural and engineering design services necessary for the completion of the Work, except the following:

No exceptions

The Trade Contractor shall not be required to provide professional services which constitute the practice of architecture or engineering except as otherwise provided in section 3.15.

2.6.1 The Owner shall obtain from the Design Professional either a license for Trade Contractor and Subcontractors to use the design documents prepared by the Design Professional or ownership of the copyrights for such design documents, and shall defend, indemnify and hold harmless the Trade Contractor against any suits or claims of infringement of any copyrights or licenses arising out of the use of the design documents. To the extent portions of this paragraph are in conflict with SF 396 (codified at Iowa Code Section 537A.5) said portions are void and unenforceable.

2.7 EXTENT OF AGREED ENT This Agreement is solely for the benefit of the Parties, represents the entire integrated agreement between the Parties, and supersedes all prior negotiations, representations and agreements, either written or oral. This Agreement and each and every provision is for the exclusive benefit of the Owner and the Trade Contractor and not for the benefit of any third party except to the extent expressly provided in this Agreement. In the event of conflict between this Agreement and any of the Exhibits or any other documents incorporated into this Agreement, the terms and provisions of this Agreement shall control.

2.8 DEFINITIONS

2.8.1 Agreement means this ConsensusDocs 802 Standard Form of Agreement Between Owner and Trade Contractor (Where the Construction Manager is the Owner's Agent), as modified by the Parties, and Exhibits and Attachments made part of this Agreement upon its execution.

2.8.2 Design Professional means the Architect, Design Professional or Engineer identified in ARTICLE 1 and its consultants, retained by Owner to perform design services for the Project, and licensed in the State in which the Project is located. The use of the term Design Professional in this Agreement is for convenience and is not intended to imply or infer that the individual or entity named in ARTICLE 1 will provide design professional services in a discipline in which it is not licensed.

2.8.3 Construction Manager means the Construction Manager identified in ARTICLE 1 and its authorized representative.

2.8.4 The Construction Schedule is the document initially prepared by and updated by the Construction Manager and approved by the Owner that indicates proposed activity sequences, durations, or milestone dates for such activities as receipt and approval of pertinent information, issuance of the Construction Documents, the preparation and processing of shop drawings and samples, delivery of materials or equipment requiring long-lead-time procurement, Owner's occupancy requirements and estimated dates of Substantial Completion and Final Completion of the Project.

2.8.5 The term Day shall mean calendar day unless otherwise specifically defined.

2.8.6 Final Completion occurs on the date when the Trade Contractor's obligations under this Agreement are complete and accepted by the Owner and final payment becomes due and payable, as established in ARTICLE 6. This date shall be confirmed by a Certificate of Final Completion signed by the Owner and the Trade Contractor.

2.8.7 A Hazardous Material is any substance or material identified now or in the future as toxic or hazardous under any federal, state or local law or regulation, or any other substance or material which may be considered hazardous or otherwise subject to statutory or regulatory requirements governing handling, disposal or clean-up.

2.8.8 A Material Supplier is a person or entity retained by the Trade Contractor to provide material or equipment for the Trade Contract Work. This definition is not intended to, and shall not be interpreted to, expand or modify the definition(s) of materials or material suppliers contained in Iowa Code Chapter 573.

2.8.9 Others means other contractors, material suppliers, and persons at the Worksite who are not employed by the Trade Contractor or Subcontractors.

2.8.10 The term Overhead shall mean a) payroll costs and other compensation of Trade Contractor employees in the Trade Contractor's principal and branch offices; b) general and administrative expenses of the Trade Contractor's principal and branch offices including deductibles paid on any insurance policy and c) the Trade Contractor's capital expenses, including interest on capital used for the Work.

2.8.11 Owner is the person or entity identified in ARTICLE 1 as Owner, and includes the Owner's representative.

2.8.12 The Project, as identified in ARTICLE 1, is the building, facility or other improvements for which the Trade Contractor is to perform the Trade Contract Work.

2.8.13 A Subcontractor is a person or entity retained by the Trade Contractor as an independent contractor to provide the labor, materials, equipment or services necessary to complete a specific

portion of the Work. This definition is not intended to, and shall not be interpreted to, expand or modify the definition(s) of materials or material suppliers contained in Iowa Code Chapter 573.

2.8.14 2.8.14 Per Iowa Code Section 26.13, "substantially completed" means the first date on which any of the following occurs:(1) Completion of the Project (or Trade Contract Work, in the case of the multiple Trade Contractors) or when the Project (or Trade Contract Work in the case of multiple Trade Contractors) has been substantially completed in general accordance with the terms and provisions of the contract. (2) The work on the Project (or Trade Contract Work in the case of multiple Trade Contractors) or on the designated portion is substantially completed in general accordance with the terms of the contract so that the State Iowa can occupy or utilize the Project or designated portion of the Project for its intended purpose. 3) The Project (or Trade Contract Work in the case of multiple Trade Contractors) is certified as having been substantially completed by either of the following: (a) the architect or engineer authorized to make such certification (which is defined in this Agreement as the Design Professional). (b) The authorized contract representative (which is defined in this Agreement as the Owner's Representative). (4) The State of Iowa is occupying or utilizing the Project (or Trade Contract Work in the case of multiple Trade Contractors) for its intended purpose. This subparagraph shall not apply to highway, bridge, or culvert projects.

2.8.15 Terrorism means a violent act, or an act that is dangerous to human life, property or infrastructure, that is committed by an individual or individuals and that appears to be part of an effort to coerce a civilian population or to influence the policy or affect the conduct of any government by coercion. Terrorism includes, but is not limited to, any act certified by the United States government as an act of terrorism pursuant to the Terrorism Risk Insurance Act, as amended.

2.8.16 A Trade Contract Change Order is a written order signed by the Owner and the Trade Contractor after execution of this Agreement, indicating changes in the scope of the Trade Contract Work, the Trade Contract Price or Trade Contract Time, including substitutions proposed by the Trade Contractor and accepted by the Owner. Trade Contract Change Orders shall be executed using the ConsensusDOCS 813 Trade Contract Change Order (CM as Owner's Agent) form document with exhibits attached as necessary.

2.8.17 The Trade Contract Documents consist of this Agreement (as modified), the drawings, specifications, addenda issued prior to execution of this Agreement, approved submittals, information furnished by the Owner under subsection 4.1.3, the bid documents, other documents listed in this Agreement and any modifications issued after execution.

2.8.18 The Trade Contract Price is the amount indicated in section 7.1 of this Agreement.

2.8.19 The Trade Contract Time is the period between the Date of Commencement and Final Completion.

2.8.20 Trade Contract Work means the construction and services provided by the Trade Contractor.

2.8.20.1 Changed Work means work that is different from the original scope of Trade Contract Work; or work that changes the Trade Contract Price or Trade Contract Time.

2.8.20.2 Defective Work is any portion of the Trade Contract Work that is not in conformance with the Trade Contract Documents.

2.8.21 The Trade Contractor is the person or entity identified in ARTICLE 1 and includes the Trade Contractor's Representative.

2.8.22 The term Work means the construction and services necessary or incidental to fulfill the Trade

Contractors' obligations for the Project. The Work may refer to the whole Project or only a part of the Project.

2.8.23 Worksite means the geographical area at the location of the Project as identified in ARTICLE 1 where the Trade Contract Work is to be performed.

ARTICLE 3 TRADE CONTRACTOR'S OBLIGATIONS

3.1 GENERAL RESPONSIBILITIES

3.1.1 RESPONSIBILITIES The Trade Contractor shall provide all of the labor, materials, equipment and services necessary to complete the Trade Contract Work, all of which shall be provided in full accord with or as reasonably inferable from the Trade Contract Documents as being necessary to produce the indicated results.

3.1.2 The Trade Contractor shall be responsible for the supervision and coordination of the Trade Contract Work, including the construction means, methods, techniques, sequences and procedures utilized, unless the Trade Contract Documents give other specific instructions. In such case, the Trade Contractor shall not be liable to the Owner for damages resulting from compliance with such instructions unless the Trade Contractor recognized and failed to timely report to the Owner any error, inconsistency, omission or unsafe practice that it discovered in the specified constructionmeans, methods, techniques, safety, sequences or procedures.

3.1.3 The Trade Contractor shall perform Trade Contract Work only within locations allowed by the Trade Contract Documents, applicable permits and applicable local law.

3.2 COOPERATION WITH WORK OF OWNER AND OTHERS

3.2.1 The Owner may perform work at the Worksite directly or by Others. Any agreements with Others to perform construction or operations related to the Project shall include provisions pertaining to insurance, indemnification, waiver of subrogation, coordination, interference, clean up and safety which are substantively the same as the corresponding provisions of this Agreement.

3.2.2 In the event that the Owner elects to perform work at the Worksite directly or by Others, the Trade Contractor and the Owner shall, with the assistance of the Construction Manager, coordinate the activities of all forces at the Worksite and agree upon fair and reasonable schedules and operational procedures for Worksite activities. The Owner shall require each separate contractor to cooperate with the Trade Contractor and assist with the coordination of activities and the review of construction schedules and operations. The Trade Contract Price and Trade Contract Time shall be equitably adjusted, as mutually agreed by the Parties, for subsequent changes made necessary by the coordination of construction activities, and the Trade Contactor's construction schedule and the Construction Schedule shall be revised accordingly. The Trade Contractor, Owner and Others shall adhere to the revised Construction Schedule until it may subsequently be revised.

3.2.3 With regard to the work of the Owner and Others, the Trade Contractor shall (a) proceed with the Trade Contract Work in a manner which does not hinder, delay or interfere with the work of the Owner or Others or cause the work of the Owner or Others to become defective, (b) afford the Owner or Others reasonable access for introduction and storage of their materials and equipment and performance of their activities, and (c) coordinate the Trade Contractor's construction and operations with theirs as required by this section.

3.2.4 Before proceeding with any portion of the Trade Contract Work affected by the construction or operations of the Owner or Others, the Trade Contractor shall give the Owner and Construction

Manager prompt written notification of any defects the Trade Contractor discovers in their work which will prevent the proper execution of the Trade Contract Work. The Trade Contractor's obligations in this section do not create a responsibility for the work of the Owner or Others, but are for the purpose of facilitating the Trade Contract Work. If the Trade Contractor does not notify the Owner and Construction Manager of patent defects interfering with the performance of the Trade Contract Work, the Trade Contractor acknowledges that the work of the Owner or Others is not defective and is acceptable for the proper execution of the Trade Contract Work. Following receipt of written notice from the Trade Contractor of defects, the Owner, through the Construction Manager, shall promptly inform the Trade Contractor what action, if any, the Trade Contractor shall take with regard to the defects.

3.3 RESPONSIBILITY FOR PERFORMANCE

3.3.1 In order to facilitate its responsibilities for completion of the Work in accordance with and as reasonably inferable from the Trade Contract Documents, prior to commencing the Work the Trade Contractor shall examine and compare the drawings and specifications with information furnished by the Owner pursuant to subsection 4.1.3, relevant field measurements made by the Trade Contractor and any visible conditions at the Worksite affecting the Trade Contract Work.

3.3.2 If in the course of the performance of the obligations in subsection 3.3.1 the Trade Contractor discovers any errors, omissions or inconsistencies in the Contract Documents, the Trade Contractor shall promptly report them to the Owner and Construction Manager. It is recognized, however, that the Trade Contractor is not acting in the capacity of a licensed design professional, and that the Trade Contractor's examination is to facilitate construction and does not create an affirmative responsibility to detect errors, omissions or inconsistencies or to ascertain compliance with applicable laws, building codes or regulations. Following receipt of written notice from the Trade Contractor of defects, the Owner shall promptly inform the Trade Contractor what action, if any, the Trade Contractor shall take with regard to the defects.

3.3.3 The Trade Contractor shall have no liability for errors, omissions or inconsistencies discovered under subsections 3.3.1 and 3.3.2 unless the Trade Contractor fails to report a recognized problem to the Owner and Construction Manager.

3.3.4 The Trade Contractor may be entitled to additional costs or time if there are changes in the scope of the Trade Contract Work that increase the cost of the Work or increase the number of days required to perform the Work, respectively, because of clarifications or instructions arising out of the Trade Contractor's reports described in the three preceding Subsections.

3.4 CONSTRUCTION PERSONNEL AND SUPERVISION

3.4.1 The Trade Contractor shall provide competent supervision for the performance of the Trade Contract Work. Before commencing the Trade Contract Work, Trade Contractor shall notify Owner and Construction Manager in writing of the name and qualifications of its proposed superintendent(s) and project manager so Owner and Construction Manager may review the individual's qualifications. If, for reasonable cause, the Owner or Construction Manager refuses to approve the individual, or withdraws its approval after once giving it, Trade Contractor shall name a different superintendent or project manager for Owner's and Construction Manager's review. Any disapproved superintendent shall not perform in that capacity thereafter at the Worksite.

3.4.2 The Trade Contractor shall be responsible to the Owner for acts or omissions of parties or entities performing portions of the Trade Contract Work for or on behalf of the Trade Contractor or any of its Subcontractors.

3.4.3 The Trade Contractor shall permit only qualified persons to perform the Trade Contract Work. The

Trade Contractor shall enforce safety procedures, strict discipline and good order among persons performing the Trade Contract Work. If the Owner or Construction Manager determines that a particular person does not follow safety procedures, or is unfit or unskilled for the assigned work, the Trade Contractor shall immediately reassign the person on receipt of the Owner's or Construction Manager's written notice to do so.

3.4.4 TRADE CONTRACTOR'S REPRESENTATIVE The Trade Contractor's authorized representative is . The Trade Contractor's representative shall possess full authority to receive instructions from the Owner and to act on those instructions. The Trade Contractor shall notify the Owner and the Construction Manager in writing of a change in the designation of the Trade Contractor's representative. The Trade Contractor's representative is also authorized to bind the Trade Contractor in all matters relating to this Agreement including, without limitation, all matters requiring the Trade Contractor's approval, authorization, or written notice. The Trade Contractor's representative is also authorized to resolve disputes in accordance with Section 12.2 of this Agreement.

3.5 MATERIALS FURNISHED BY THE OWNER OR OTHERS

3.5.1 In the event the Trade Contract Work includes installation of materials or equipment furnished by the Owner or Others, it shall be the responsibility of the Trade Contractor to examine the items so provided and thereupon handle, store and install the items, unless otherwise provided in the Trade Contract Documents, with such skill and care as to provide a satisfactory and proper installation. Loss or damage due to acts or omissions of the Trade Contractor shall be the responsibility of the Trade Contractor and may be deducted from any amounts due or to become due the Trade Contractor. Any defects discovered in such materials or equipment shall be reported at once to the Owner and Construction Manager. Following receipt of written notice from the Trade Contractor of defects, the Owner shall promptly inform the Trade Contractor what action, if any, the Trade Contractor shall take with regard to the defects.

3.6 TESTS AND INSPECTIONS

3.6.1 The Trade Contractor shall schedule all required tests, approvals and inspections of the Trade Contract Work or portions thereof at appropriate times so as not to delay the progress of the Trade Contract Work or other work related to the Project. The Trade Contractor shall give proper notice to the Construction Manager and to all required parties of such tests, approvals and inspections. If feasible, the Owner and Others may timely observe the tests at the normal place of testing. Except as provided in subsection 3.6.3, the Owner shall bear all expenses associated with tests, inspections and approvals required by the Trade Contract Documents, which, unless otherwise agreed to, shall be conducted by an independent testing laboratory or entity retained by the Owner. Unless otherwise required by the Trade Contract Documents, required certificates of testing, approval or inspection shall be secured by the Trade Contractor and promptly delivered to the Owner and Construction Manager.

3.6.2 If the Owner, Construction Manager or appropriate authorities determine that tests, inspections or approvals in addition to those required by the Trade Contract Documents will be necessary, the Trade Contractor shall arrange for the procedures and give timely notice to the Owner, Construction Manager and Others who may observe the procedures. Costs of the additional tests, inspections or approvals are at the Owner's expense except as provided in subsection 3.6.3.

3.6.3 If the procedures described in subsections 3.6.1 and 3.6.2 indicate that portions of the Trade Contract Work fail to comply with the Trade Contract Documents, the Trade Contractor shall be responsible for costs of correction and retesting.

3.7 WARRANTY

3.7.1 The Trade Contract Work shall be executed in accordance with the Trade Contract Documents in a workmanlike manner. The Trade Contractor warrants that all materials and equipment shall be furnished in sufficient quantities to facilitate the proper and expeditious execution of the Trade Contract Work and shall be new unless otherwise specified, of good quality, in conformance with the Trade Contract Documents, and free from defective workmanship and materials. At the Owner's or Construction Manager's request, the Trade Contractor shall furnish satisfactory evidence of the quality and type of materials and equipment furnished. The Trade Contractor further warrants that the Trade Contract Work shall be free from material defects not intrinsic in the design or materials required in the Trade Contract Documents. The Trade Contractor's warranty does not include remedies for defects or damages caused by normal wear and tear during normal usage, use for a purpose for which the Project was not intended, improper or insufficient maintenance, modifications performed by the Owner or Others, or abuse. The Trade Contractor's warranty pursuant to this section shall commence on the Date of Substantial Completion.

3.7.2 The Trade Contractor shall obtain from its Subcontractors and material suppliers any special or extended warranties required by the Trade Contract Documents. All such warranties shall be listed in an attached Exhibit to this Agreement.

3.8 CORRECTION OF TRADE CONTRACT WORK WITHIN ONE YEAR

3.8.1 If, prior to Substantial Completion and within one year after the date of Substantial Completion of the Trade Contract Work, any Defective Work is found, the Owner shall promptly notify the Trade Contractor in writing. Unless the Owner provides written acceptance of the condition, the Trade Contractor shall promptly correct the Defective Work at its own cost and time and bear the expense of additional services required for correction of any Defective Work for which it is responsible. If within the one-year correction period the Owner discovers and does not promptly notify the Trade Contractor or give the Trade Contractor an opportunity to test or correct Defective Work as reasonably requested by the Trade Contractor, the Owner waives the Trade Contractor's obligation to correct that Defective Work as well as the Owner's right to claim a breach of the warranty with respect to that Defective Work.

3.8.2 With respect to any portion of Trade Contract Work first performed after Substantial Completion, the one-year correction period shall be extended by the period of time between Substantial Completion and the actual performance of the later Trade Contract Work. Correction periods shall not be extended by corrective work performed by the Trade Contractor.

3.8.3 If the Trade Contractor fails to correct Defective Work within a reasonable time after receipt of written notice from the Owner prior to final payment, the Owner may correct it in accordance with the Owner's right to carry out the Trade Contract Work in section 11.2. In such case, an appropriate Trade Contract Change Order shall be issued deducting the cost of correcting such deficiencies from payments then or thereafter due the Trade Contractor. If payments then or thereafter due Trade Contractor are not sufficient to cover such amounts, the Trade Contractor shall pay the difference to the Owner.

3.8.4 If after the one-year correction period but before the applicable limitation period the Owner discovers any Defective Work, the Owner shall, unless the Defective Work requires emergency correction, promptly notify the Trade Contractor. If the Trade Contractor elects to correct the Defective Work, it shall provide written notice of such intent within fourteen (14) Days of its receipt of notice from the Owner. The Trade Contractor shall complete the correction of Defective Work within a time frame mutually agreed upon by the Trade Contractor and the Owner. If the Trade Contractor does not elect to correct the Defective Work, the Owner may have the Defective Work corrected by itself or Others and charge the Trade Contractor for the reasonable cost of the correction and other directly related

expenses. Owner shall provide Trade Contractor with an accounting of correction costs it incurs.

3.8.5 If the Trade Contractor's correction or removal of Defective Work causes damage to or destroys other completed or partially completed Work or existing buildings, the Trade Contractor shall be responsible for the cost of correcting the destroyed or damaged property.

3.8.6 The one-year period for correction of Defective Work does not constitute a limitation period with respect to the enforcement of the Trade Contractor's other obligations under the Trade Contract Documents.

3.8.7 Prior to final payment, at the Owner's option and with the Trade Contractor's agreement, the Owner may elect to accept Defective Work rather than require its removal and correction. In such case the Contract Price shall be equitably adjusted for any diminution in the value of the Project caused by such Defective Work. Before the Owner accepts any such change it must be documented in writing with a Change Order signed by both the Trade Contractor and Owner.

3.9 CORRECTION OF COVERED TRADE CONTRACT WORK

3.9.1 On request of the Owner or Construction Manager, Trade Contract Work that has been covered without a requirement that it be inspected prior to being covered may be uncovered for the Owner's or Construction Manager's inspection. The Owner shall pay for the costs of uncovering and replacement if the Work proves to be in conformance with the Trade Contract Documents, or if the defective condition was caused by the Owner or Others. If the uncovered Trade Contract Work proves to be defective, the Trade Contractor shall pay the costs of uncovering and replacement.

3.9.2 If contrary to specific requirements in the Trade Contract Documents or contrary to a specific request from the Owner or Construction Manager, a portion of the Trade Contract Work is covered, the Owner or Construction Manager, by written request, may require the Trade Contractor to uncover the Trade Contract Work for the Owner's or Construction Manager's observation. In this circumstance the Trade Contract Work shall be uncovered and recovered at the Trade Contractor's expense and with no adjustment to the Trade Contract Time. Costs incurred by the Owner as a direct result of the above shall be deducted from the Trade Contract Price.

3.10 SAFETY OF PERSONS AND PROPERTY

3.10.1 SAFETY PRECAUTIONS AND PROGRAMS The Trade Contractor shall have overall responsibility for safety precautions and programs in the performance of the Trade Contract Work. While this section establishes the responsibility for safety between the Owner and Trade Contractor, it does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with the provisions of applicable laws and regulations.

3.10.2 The Trade Contractor shall seek to avoid injury, loss or damage to persons or property by taking reasonable steps to protect:

3.10.2.1 its employees and other persons at the Worksite;

3.10.2.2 materials and equipment stored at on-site or off-site locations for use in the Trade Contract Work; and

3.10.2.3 property located at the site and adjacent to Trade Contract Work areas, whether or not the property is part of the Trade Contract Work.

3.10.3 TRADE CONTRACTOR'S SAFETY REPRESENTATIVE The Trade Contractor's Worksite Safety Representative is who shall act as the Trade Contractor's authorized safety representative with a duty

to prevent accidents in accordance with subsection 3.10.2 If no individual is identified in this section, the authorized safety representative shall be the Trade Contractor's Representative. The Trade Contractor shall report immediately in writing to the Owner and Construction Manager all recordable accidents and injuries occurring at the Worksite. When the Trade Contractor is required to file an accident report with a public authority, the Trade Contractor shall furnish a copy of the report to the Owner and Construction Manager.

3.10.4 The Trade Contractor shall provide the Owner and Construction Manager with copies of all notices required of the Trade Contractor by law or regulation. The Trade Contractor's safety program shall comply with the requirements of governmental and quasi-governmental authorities having jurisdiction.

3.10.5 Damage or loss not insured under property insurance which may arise from the Trade Contract Work, to the extent caused by the negligent acts or omissions of the Trade Contractor, or anyone for whose acts the Trade Contractor may be liable, shall be promptly remedied by the Trade Contractor.

3.10.6 If the Owner or Construction Manager deems any part of the Trade Contract Work or Worksite unsafe, the Owner or Construction Manager, without assuming responsibility for the Trade Contractor's safety program, may require the Trade Contractor to stop performance of the Trade Contract Work or take corrective measures satisfactory to the Owner, or both. If the Trade Contractor does not adopt corrective measures, the Owner may perform them and deduct their cost from the Trade Contract Price. The Trade Contractor agrees to make no claim for damages, for an increase in the Trade Contract Price or for a change in the Trade Contract Time based on the Trade Contractor's compliance with the Owner's or Construction Manager's reasonable request.

3.11 EMERGENCIES

3.11.1 In an emergency, the Trade Contractor shall act in a reasonable manner to prevent personal injury or property damage. Any change in the Trade Contract Price or Trade Contract Time resulting from the actions of the Trade Contractor in an emergency situation shall be determined as provided in ARTICLE 8.

3.12 HAZARDOUS MATERIALS

3.12.1 The Trade Contractor shall not be obligated to commence or continue Trade Contract Work until any Hazardous Material discovered at the Worksite has been removed, rendered or determined to be harmless by the Owner as certified by an independent testing laboratory and approved by the appropriate government agency.

3.12.2 If after the commencement of the Trade Contract Work a Hazardous Material is discovered at the Worksite, the Trade Contractor shall be entitled to immediately stop Trade Contract Work in the affected area. The Trade Contractor shall report the condition to the Owner, the Construction Manager, and, if required, the government agency with jurisdiction.

3.12.3 The Trade Contractor shall not be required to perform any Trade Contract Work relating to or in the area of Hazardous Material without written mutual agreement.

3.12.4 The Owner shall be responsible for retaining an independent testing laboratory to determine the nature of the Hazardous Material encountered and whether the material requires corrective measures or remedial action. Such measures shall be the sole responsibility of the Owner, and shall be performed in a manner minimizing any adverse effects upon the Trade Contract Work. The Trade Contractor shall resume Trade Contract Work in the area affected by any Hazardous Material only upon written agreement between the Parties after the Hazardous Material has been removed or rendered harmless

and only after approval, if necessary, of the governmental agency with jurisdiction.

3.12.5 If the Trade Contractor incurs additional costs or is delayed due to the presence or remediation of Hazardous Material, the Trade Contractor shall be entitled to an equitable adjustment in the Trade Contract Price or the Trade Contract Time.

3.12.6 To the extent not caused by the negligent acts or omissions of the Trade Contractor, its Subcontractors and Sub-subcontractors, and the agents, officers, directors and employees of each of them, the Owner shall defend, indemnify and hold harmless the Trade Contractor, its Subcontractors and Sub-subcontractors, and the agents, officers, directors and employees of each of them, from and against any and all direct claims, damages, losses, costs and expenses, including but not limited to attorney's fees, costs and expenses incurred in connection with any dispute resolution process, to the extent permitted pursuant to section 6.6, arising out of or relating to the performance of the Trade Contract Work in any area affected by Hazardous Material. To the extent portions of this paragraph are in conflict with SF 396 (codified at Iowa Code Section 537A.5) said portions are void and unenforceable.

3.12.7 MATERIALS BROUGHT TO THE WORKSITE

3.12.7.1 Material Safety Data (MSD) sheets as required by law and pertaining to materials or substances used or consumed in the performance of the Trade Contract Work, whether obtained by the Trade Contractor, Subcontractors, the Owner or Others, shall be maintained at the Worksite by the Trade Contractor and made available to the Owner, Construction Manager, Subcontractors and Others.

3.12.7.2 The Trade Contractor shall be responsible for the proper delivery, handling, application, storage, removal and disposal of all materials and substances brought to the Worksite by the Trade Contractor in accordance with the Trade Contract Documents and used or consumed in the performance of the Trade Contract Work.

3.12.7.3 The Trade Contractor shall indemnify and hold harmless the Owner, Construction Manager, their agents, officers, directors and employees, from and against any and all claims, damages, losses, costs and expenses, including but not limited to attorney's fees, costs and expenses incurred in connection with any dispute resolution procedure, arising out of or relating to the delivery, handling, application, storage, removal and disposal of all materials and substances brought to the Worksite by the Trade Contractor in accordance or not in accordance with the Trade Contract Documents. To the extent portions of this paragraph are in conflict with SF 396 (codified at Iowa Code Section 537A.5) said portions are void and unenforceable.

3.12.8 The terms of this section shall survive the completion of the Trade Work or any termination of this Agreement.

3.13 SUBMITTALS

3.13.1 The Trade Contractor shall submit to the Construction Manager, and the Design Professional, for review and approval all shop drawings, samples, product data and similar submittals required by the Trade Contract Documents. Submittals may be submitted in electronic form if required in accordance with ConsensusDocs 200.2 and subsection 4.4.1. The Trade Contractor shall be responsible to the Owner for the accuracy and conformity of its submittals to the Trade Contract Documents. The Trade Contractor shall prepare and deliver its submittals in a manner consistent with the Construction Schedule and in such time and sequence so as not to delay the performance of the Trade Contract Work or the work of the Owner and Others. When the Trade Contractor delivers its submittals the Trade Contractor shall identify in writing for each submittal all changes, deviations or substitutions from the requirements of the Trade Contract Documents. The review and approval of any Trade Contractor

submittal shall not be deemed to authorize changes, deviations or substitutions from the requirements of the Trade Contract Documents unless express written approval is obtained from the Owner specifically authorizing such deviation, substitution or change. To the extent a change, deviation or substitution causes an impact to the Contract Price or Contract Time, such approval shall be promptly memorialized in a Change Order. Further, the Construction Manager and Design Professional shall not make any change, deviation or substitution through the submittal process without specifically identifying and authorizing such deviation to the Trade Contractor. In the event that the Trade Contract Documents do not contain submittal requirements pertaining to the Trade Contract Work, the Trade Contractor agrees upon request to submit in a timely fashion to the Construction Manager and the Design Professional for review and approval any shop drawings, samples, product data, manufacturers' literature or similar submittals as may reasonably be required by the Owner, Construction Manager, or Design Professional.

3.13.2 The Owner shall be responsible for review and approval of submittals with reasonable promptness to avoid causing delay.

3.13.3 The Trade Contractor shall perform all Trade Contract Work strictly in accordance with approved submittals. Approval of shop drawings is not authorization to Trade Contractor to perform Changed Work, unless the procedures of ARTICLE 8 are followed. Approval does not relieve the Trade Contractor from responsibility for Defective Work resulting from errors or omissions of any kind on the approved Shop Drawings.

3.13.4 Record copies of the following, incorporating field changes and selections made during construction, shall be maintained by the Trade Contractor at the Project site and available to the Owner upon request: drawings, specifications, addenda, Trade Contract Change Order and other modifications, and required submittals including product data, samples and shop drawings.

3.13.5 No substitutions shall be made in the Trade Contract Work unless permitted in the Trade Contract Documents and then only after the Trade Contractor obtains approvals required under the Trade Contract Documents for substitutions. All such substitutions shall be promptly memorialized in a Change Order no later than seven (7) Days following approval by the Owner and, if applicable, provide for an adjustment in the Contract Price or Contract Time.

3.13.6 The Trade Contractor shall prepare and submit to the Construction Manager for submission to the Owner

(Check one only)

☒ final marked up as-built drawings

☐ updated electronic data, in accordance with ConsensusDocs 200.2 and section 4.4.1

☐ such documentation as defined by the Parties by attachment to this Agreement,

in general documenting how the various elements of the Trade Contract Work were actually constructed or installed.

3.14 PROFESSIONAL SERVICES

3.14.1 The Trade Contractor may be required to procure professional services in order to carry out its responsibilities for construction means, methods, techniques, sequences and procedures for such services specifically called for by the Contract Documents. The Trade Contractor shall obtain these professional services and any design certifications required from State of Iowa licensed design professionals. All drawings, specifications, calculations, certifications and submittals prepared by such

design professionals shall bear the signature and seal of such design professionals and the Owner and the Design Professional shall be entitled to rely upon the adequacy, accuracy and completeness of such design services. If professional services are specifically required by the Contract Documents, the Owner shall indicate all required performance and design criteria. The Trade Contractor shall not be responsible for the adequacy of such performance and design criteria. The Trade Contractor shall not be required to provide such services in violation of existing laws, rules and regulations in the jurisdiction where the Project is located.

3.15 WORKSITE CONDITIONS

3.15.1 WORKSITE VISIT The Trade Contractor acknowledges that it has visited, or has had the opportunity to visit, the Worksite to visually inspect the general and local conditions which could affect the Trade Contract Work.

3.15.2 CONCEALED OR UNKNOWN SITE CONDITIONS If the conditions at the Worksite are (a) subsurface or other concealed physical conditions which are materially different from those indicated in the Trade Contract Documents, or (b) unusual and unknown physical conditions which are materially different from conditions ordinarily encountered and generally recognized as inherent in Trade Contract Work provided for in the Trade Contract Documents, the Trade Contractor shall stop Trade Contract Work and give immediate written notice of the condition to the Owner, Construction Manager and the Design Professional. The Trade Contractor shall not be required to perform any work relating to the unknown condition without the written mutual agreement of the Parties. Any change in the Contract Price or the Contract Time as a result of the unknown condition shall be determined as provided in this article. The Trade Contractor shall provide the Owner and the Construction Manager with written notice of any claim as a result of unknown conditions within the time period set forth in section 8.4.

3.16 PERMITS AND TAXES

3.16.1 Trade Contractor shall give public authorities all notices required by law and, except for permits and fees which are the responsibility of the Owner pursuant to section 4.2, shall obtain and pay for all necessary permits, licenses and renewals pertaining to the Trade Contract Work. Trade Contractor shall provide to Owner copies of all notices, permits, licenses and renewals required under this Agreement.

3.16.2 Trade Contractor shall pay all applicable taxes legally enacted when bids are received or negotiations concluded for the Trade Contract Work provided by the Trade Contractor.

3.16.3 The Contract Price or Contract Time shall be equitably adjusted by Trade Contract Change Order for additional costs resulting from any changes in laws, ordinances, rules and regulations enacted after the date of this Agreement, including increased taxes.

3.16.3 (Deleted)

3.17 CUTTING, FITTING AND PATCHING

3.17.1 The Trade Contractor shall perform cutting, fitting and patching necessary to coordinate the various parts of the Trade Contract Work and to prepare its Trade Contract Work for the work of the Owner or Others.

3.17.2 Cutting, patching or altering the work of the Owner or Others shall be done with the prior written approval of the Owner. Such approval shall not be unreasonably withheld.

3.18 CLEANING UP

3.18.1 The Trade Contractor shall regularly remove debris and waste materials at the Worksite resulting

from the Trade Contract Work. Prior to discontinuing Trade Contract Work in an area, the Trade Contractor shall clean the area and remove all rubbish and its construction equipment, tools, machinery, waste and surplus materials. The Trade Contractor shall minimize and confine dust and debris resulting from construction activities. At the completion of the Trade Contract Work, the Trade Contractor shall remove from the Worksite all construction equipment, tools, surplus materials, waste materials and debris.

3.18.2 If the Trade Contractor fails to commence compliance with cleanup duties within two (2) business Days after written notification from the Owner or the Construction Manager of noncompliance, the Owner may implement appropriate cleanup measures without further notice and the cost shall be deducted from any amounts due or to become due the Trade Contractor in the next payment period.

3.19 ACCESS TO TRADE CONTRACT WORK The Trade Contractor shall facilitate the access of the Owner, Construction Manager, Design Professional and Others to Trade Contract Work in progress.

3.20 COST MONITORING The Trade Contractor shall provide the Construction Manager with cost monitoring information appropriate for the manner of Trade Contractor's compensation, to enable the Construction Manager to develop and track construction and project budgets, including amounts for work in progress, uncompleted work and proposed changes.

3.21 ROYALTIES, PATENTS AND COPYRIGHTS The Trade Contractor shall pay all royalties and license fees which may be due on the inclusion of any patented or copyrighted materials, methods or systems selected by the Trade Contractor and incorporated in the Trade Contract Work. The Trade Contractor shall defend, indemnify and hold the Owner harmless from all suits or claims for infringement of any patent rights or copyrights arising out of such selection. The Owner agrees to indemnify and hold the Trade Contractor harmless from any suits or claims of infringement of any patent rights or copyrights arising out of any patented or copyrighted materials, methods or systems specified by the Owner, Construction Manager and Design Professional. To the extent portions of this paragraph are in conflict with SF 396 (codified at Iowa Code Section 537A.5) said portions are void and unenforceable.

3.22 CONFIDENTIALITY The Owner shall treat as confidential information all of the Trade Contractor's estimating systems and historical and parameter cost data that may be disclosed to the Owner in connection with the performance of this Agreement if they are specified and marked as confidential and shall mark them. If a document is not marked as "Confidential" it will not be treated as such. Nothing contained herein, however, shall be interpreted in a manner that modifies or is in conflict with the purpose and application of the open records laws contained in the Code of Iowa.

ARTICLE 4 OWNER'S RESPONSIBILITIES

4.1 INFORMATION SERVICES

4.1.1 FULL INFORMATION Any information or services to be provided by the Owner shall be provided in a timely manner so as not to delay the Trade Contract Work.

4.1.2 FINANCIAL INFORMATION Upon the written request of the Trade Contractor, the Owner shall provide the Trade Contractor with evidence of Project financing. If requested in writing, evidence of such financing shall be a condition precedent to the Trade Contractor's commencing or continuing the Trade Contract Work. The Trade Contractor shall be notified by the Owner prior to any material change in Project financing.

4.1.3 WORKSITE INFORMATION Except to the extent that the Trade Contractor knows of any inaccuracy, the Trade Contractor is entitled to rely on Worksite information furnished by the Owner pursuant to this subsection. To the extent the Owner has obtained, or is required elsewhere in the

Trade Contract Documents to obtain, the following Worksite information, the Owner shall provide at the Owner's expense and with reasonable promptness:

4.1.3.1 information describing the physical characteristics of the site, including surveys, site evaluations, legal descriptions, data or drawings depicting existing conditions, subsurface conditions and environmental studies, reports and investigations;

4.1.3.2 tests, inspections and other reports dealing with environmental matters, Hazardous Material and other existing conditions, including structural, mechanical and chemical tests, required by the Trade Contract Documents or by law; and

4.1.3.3 any other information or services requested in writing by the Trade Contractor which are relevant to the Trade Contractor's performance of the Trade Contract Work and under the Owner's control. The information required by subsection 4.1.3 shall be provided in reasonable detail. Legal descriptions shall include easements, title restrictions, boundaries, and zoning restrictions. Worksite descriptions shall include existing buildings and other construction and all other pertinent site conditions. Adjacent property descriptions shall include structures, streets, sidewalks, alleys, and other features relevant to the Trade Contract Work. Utility details shall include available services, lines at the Worksite and adjacent and connection points. The information shall include public and private information, subsurface information, grades, contours, and elevations, drainage data, exact locations and dimensions, and benchmarks that can be used by the Trade Contractor in laying out the Trade Contract Work. The Trade Contractor shall in writing request from the Owner any information identified in Paragraph 4.1.3 that the Trade Contractor believes the Owner has obtained but has not provided to the Trade Contractor.

4.1.3.4 OWNER'S REPRESENTATIVE The Owner's representative is test. The Owner's representative shall have authority to bind the Owner in all matters relating to this Agreement including, without limitation, all matters requiring the Owner's approval, authorization or written notice. If the Owner changes its representative as listed above, the Owner shall notify the Trade Contractor in advance in writing. The Owner's Representative is also authorized to resolve disputes in accordance with Section 12.2 of this Agreement. The Construction Manager, while unauthorized to modify the Agreement or settle a dispute without the Owner's approval, however, does have the requisite authority to act as the Owner's agent throughout the construction of the Project in accordance with the contract between the Owner and the Construction Manager (ConsensusDOCS 801 as modified by the State of Iowa).

4.2 BUILDING PERMIT, FEES AND APPROVALS Except for those permits and fees related to the Trade Contract Work which are the responsibility of the Trade Contractor pursuant to subsection 3.16.1, the Owner shall secure and pay for all other permits, approvals, easements, assessments and fees required for the development, construction, use or occupancy of permanent structures or for permanent changes in existing facilities, including the building permit.

4.3 Deleted

4.4 TRADE CONTRACT DOCUMENTS Unless otherwise specified, Owner shall provide One (1) copies of the Trade Contract Documents to the Trade Contractor without cost. Additional copies will be provided to the Trade Contractor at cost. This paragraph is not intended to be in conflict with Iowa Code Section 26.3 requirement that a sufficient number of copies of the contract documents be made available to bidders without charge (but a deposit not to exceed $250 per set may be required). If the Trade Contractor was required to make a deposit for a set of Trade Contract Documents for purposes of bidding then the Trade Contractor may elect to have the deposit returned instead of being provided with an additional copy.

4.4.1 DIGITIZED DOCUMENTS If the Owner requires that the Owner, Design Professional, Construction Manager and Trade Contractor exchange documents and data in electronic or digital form, prior to any such exchange, the Owner, Design Professional, Construction Manager and Trade Contractor shall agree on a written protocol governing all exchanges in ConsensusDocs 200.2 or a separate Agreement, which, at a minimum, shall specify: (a) the definition of documents and data to be accepted in electronic or digital form or to be transmitted electronically or digitally; (b) management and coordination responsibilities; (c) necessary equipment, software and services; (d) acceptable formats, transmission methods and verification procedures; (e) methods for maintaining version control; (f) privacy and security requirements; and (g) storage and retrieval requirements. Except as otherwise agreed to by the Parties in writing, the Parties shall each bear their own costs as identified in the protocol. In the absence of a written protocol, use of documents and data in electronic or digital form shall be at the sole risk of the recipient.

4.5 OWNER'S CUTTING AND PATCHING Cutting, patching or altering the Trade Contract Work by the Owner or Others shall be done with the prior written approval of the Trade Contractor, which approval shall not be unreasonably withheld.

4.6 OWNER'S RIGHT TO CLEAN UP In case of a dispute between the Trade Contractor and Others with regard to respective responsibilities for cleaning up at the Worksite, the Owner may implement appropriate cleanup measures after two (2) business Days' notice and allocate the cost among those responsible during the following pay period.

4.7 COST OF CORRECTING DAMAGED OR DESTROYED WORK With regard to damage or loss attributable to the acts or omissions of the Owner or Others and not to the Trade Contractor, the Owner may either (a) promptly remedy the damage or loss or (b) accept the damage or loss. If the Trade Contractor incurs additional costs or is delayed due to such loss or damage, the Trade Contractor shall be entitled to an equitable adjustment in the Trade Contract Price or Trade Contract Time.

ARTICLE 5 SUBCONTRACTS

5.1 SUBCONTRACTORS The Trade Contract Work not performed by the Trade Contractor with its own forces shall be performed by Subcontractors.

5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE TRADE CONTRACT WORK

5.2.0 The Trade Contractor must identify all Subcontractors and suppliers within 48 hours of the published date and time for which bids must be submitted, in accordance with Iowa Code Section 8A.311, as amended by House File 646 in 2011. Subcontractors and suppliers may not be changed without the approval of the Owner. Requests for changing a Subcontractor or supplier must identify the reason for the proposed change, the name of the new Subcontractor or supplier, and the change in the subcontractor or supplier price as a result of the change. Any reduction in subcontractor or supplier price as a result of the change, if the change is approved by the Owner, shall be deducted from the Trade Contract Price via a deductive Change Order. Any such changes, if approved by the Owner, which result in an increase in the Trade Contract Price shall be borne by the Trade Contractor.

5.2.1 If the Owner has a reasonable objection to any proposed subcontractor or material supplier, the Owner shall notify the Trade Contractor in writing.

5.2.2 If the Owner has reasonably and promptly objected as provided in subsection 5.2.1, the Trade Contractor shall not contract with the proposed subcontractor or material supplier, and the Trade Contractor shall propose another Subcontractor acceptable to the Owner. To the extent the substitution results in an increase or decrease in the Trade Contract Price or Trade Contract Time, an appropriate

Trade Contract Change Order shall be issued as provided in ARTICLE 8.

5.3 BINDING OF SUBCONTRACTORS The Trade Contractor agrees to bind every Subcontractor (and require every Subcontractor to so bind its subcontractors) to all the provisions of this Agreement and the Trade Contract Documents as they apply to the Subcontractor's portion of the Trade Contract Work.

5.4 Deleted

5.5 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

5.5.1 If this Agreement is terminated, each subcontract agreement shall be assigned by the Trade Contractor to the Owner, subject to the prior rights of any surety, provided that:

5.5.1.1 this Agreement is terminated by the Owner pursuant to sections 11.3 or 11.4; and

5.5.1.2 the Owner accepts such assignment after termination by notifying the Subcontractor and Trade Contractor in writing, and assumes all rights and obligations of the Contractor pursuant to each subcontract agreement.

5.5.2 If the Owner accepts such an assignment, and the Work has been suspended for more than thirty (30) consecutive Days, following termination, if appropriate, the Subcontractor's compensation shall be equitably adjusted as a result of the suspension.

ARTICLE 6 TRADE CONTRACT TIME

6.1 PERFORMANCE OF THE TRADE CONTRACT WORK

6.1.1 DATE OF COMMENCEMENT The Date of Commencement is the date of Owner's written notice to proceed unless otherwise set forth below:

6.1.2 TIME Substantial Completion of the Trade Contract Work shall be achieved in XXX (XX) Days from the Date of Commencement. Unless otherwise specified in the Certificate of Substantial Completion, the Trade Contractor shall achieve Final Completion within 30 Days after the date of Substantial Completion, subject to adjustments as provided for in the Trade Contract Documents.

6.1.3 Time limits stated above are of the essence of this Agreement.

6.1.4 Unless instructed by the Owner in writing, the Trade Contractor shall not knowingly commence the Trade Contract Work before the effective date of insurance to be provided by the Trade Contractor and Owner as required by the Trade Contract Documents.

6.2 CONSTRUCTION SCHEDULE Prior to the commencement of the construction of the Trade Contract Work, the Trade Contractor shall submit a copy of its critical path method (CPM) construction schedule showing the completion of the Trade Contract Work within the allowable number of days identified above. The Trade Contractor shall regularly update its CPM construction schedule for the Trade Contract Work and promptly furnish the Construction Manager on an ongoing basis scheduling information requested by the Construction Manager for the Trade Contract Work. In consultation with the Trade Contractor, the Construction Manager shall incorporate the Trade Contract Work and work of other trade contractors into an overall Construction Schedule for the entire Project. The Trade Contractor shall be bound by the Construction. Nothing in this Trade Contractor Agreement shall relieve the Trade Contractor of any liability for any unexcused failure to comply with its original schedule, the Construction Schedule, or any completion dates. The Construction Manager shall have the right to coordinate the Trade Contractors, including the right, if necessary, to change the time, order and priority in which the various portions of the Trade Contract Work and the other work associated with the Project shall be performed.

6.3 DELAYS AND EXTENSIONS OF TIME

6.3.1 If the Trade Contractor is delayed at any time in the commencement or progress of the Work by any cause beyond the control of the Trade Contractor, the Trade Contractor shall be entitled to an equitable extension of the Trade Contract Time if the Trade Contractor is able to show that the critical path of the Trade Contract Work was delayed by causes beyond the control of the Trade Contractor. Examples of causes beyond the control of the Trade Contractor include, but are not limited to, the following: acts or omissions of the Owner, the Design Professional, Construction Manager or Others; changes in the Work or the sequencing of the Work ordered by the Owner, or arising from decisions of the Owner that impact the time of performance of the Work; transportation delays not reasonably foreseeable; labor disputes not involving the Trade Contractor; general labor disputes impacting the Project but not specifically related to the Worksite; fire; terrorism, epidemics, adverse governmental actions, unavoidable accidents or circumstances; adverse weather conditions not reasonably anticipated; encountering Hazardous Materials; concealed or unknown conditions; delay authorized by the Owner pending dispute resolution; and suspension by the Owner under section 11.1. The Trade Contractor shall submit any requests for equitable extensions of Contract Time in accordance with the provisions of ARTICLE 8.

6.3.2 In addition, if the Trade Contractor is able to show that it incurred additional costs because the critical path of the Trade Contract Work was delayed by acts or omissions of the Owner, the Design Professional, Construction Manager or Others, changes in the Work or the sequencing of the Work ordered by the Owner, or arising from decisions of the Owner that impact the time of performance of the Work, encountering Hazardous Materials, or concealed or unknown conditions, delay authorized by the Owner pending dispute resolution or suspension by the Owner under section 11.1, then the Trade Contractor shall be entitled to an equitable adjustment in the Trade Contract Price subject to section 6.6.

6.3.3 NOTICE OF DELAYS In the event delays to the Trade Contract Work are encountered for any reason, the Trade Contractor shall provide prompt written notice to the Owner and the Construction Manager of the cause of such delays after Trade Contractor first recognizes the delay. The Owner and Trade Contractor agree to undertake reasonable steps to mitigate the effect of such delays.

6.4 NOTICE OF DELAY CLAIMS If the Trade Contractor believes it is due an equitable extension of Trade Contract Time or an equitable adjustment in Trade Contract Price as a result of a delay described in subsection 6.3.1, the Trade Contractor shall give the Owner and the Construction Manager written notice of the claim in accordance with section 8.4. If the Trade Contractor causes delay in the completion of the Trade Contract Work, the Owner shall be entitled to recover its additional costs subject to subsection 6.6. The Owner shall process any such claim against the Trade Contractor in accordance with ARTICLE 8.

6.5 LIQUIDATED DAMAGES

6.5.1 SUBSTANTIAL COMPLETION The Owner and the Trade Contractor agree that this Agreement ☐ shall / ☒ shall not (indicate one) provide for the imposition of liquidated damages based on the Date of Substantial Completion.

6.5.1.1 The Trade Contractor understands that if the Date of Substantial Completion established by this Agreement, as may be amended by subsequent Trade Change Order, is not attained, the Owner will suffer damages which are difficult to determine and accurately specify. The Trade Contractor agrees that if the Date of Substantial Completion is not attained the Trade Contractor shall pay the Owner Zero Dollars and No Cents ($0.00) as liquidated damages and not as a penalty for each day that Substantial Completion extends beyond the Date of Substantial Completion. The liquidated damages provided herein shall be in lieu of all liability for any and all

extra costs, losses, expenses, claims, penalties and any other damages of whatsoever nature incurred by the Owner which are occasioned by any delay in achieving the Date of Substantial Completion.

6.5.2 FINAL COMPLETION The Owner and the Trade Contractor agree that this Agreement ☐ shall / ☒ shall not (indicate one) provide for the imposition of liquidated damages based on the Date of Final Completion.

6.5.2.1 The Trade Contractor understands that if the Date of Final Completion established by this Agreement, as may be amended by subsequent Trade Change Order is not attained, the Owner will suffer damages which are difficult to determine and accurately specify. The Trade Contractor agrees that if the Date of Final Completion is not attained the Trade Contractor shall pay the Owner Zero Dollars and No Cents ($0.00) as liquidated damages and not as a penalty for each day that Final Completion extends beyond the Date of Final Completion. The liquidated damages provided herein shall be in lieu of all liability for any and all extra costs, losses, expenses, claims, penalties and any other damages of whatsoever nature incurred by the Owner which are occasioned by any delay in achieving the Date of Final Completion.

6.5.3 OTHER LIQUIDATED DAMAGES The Owner and the Trade Contractor may agree upon the imposition of liquidated damages based on other project milestones or performance requirements. Such agreement shall be included as an exhibit to this Agreement.

6.6 LIMITED MUTUAL WAIVER OF CONSEQUENTIAL DAMAGES Except for damages mutually agreed upon by the Parties as liquidated damages in Section 6.5 and excluding losses covered by insurance required by the Trade Contract Documents, the Owner and the Trade Contractor agree to waive all claims against each other for any consequential damages that may arise out of or relate to this Agreement, except for those specific items of damages excluded from this waiver as mutually agreed upon by the Parties and identified below. The Owner agrees to waive damages including but not limited to the Owner's loss of use of the Project, any rental expenses incurred, loss of income, profit or financing related to the Project, as well as the loss of business, loss of financing, principal office overhead and expenses, loss of profits not related to this Project, loss of reputation, or insolvency. The Trade Contractor agrees to waive damages including but not limited to loss of business, loss of financing, principal office overhead and expenses, loss of profits not related to this Project, loss of bonding capacity, loss of reputation, or insolvency. The provisions of this section shall also apply to the termination of this Agreement and shall survive such termination.

6.6.1 The following items of damages are excluded from this mutual waiver: The provisions of this section shall also apply to the termination of this Agreement and shall survive such termination. The Owner and the Trade Contractor shall require similar waivers in contracts with Subcontractors and Others retained for the Project.

ARTICLE 7 TRADE CONTRACT PRICE

7.1 LUMP SUM As full compensation for performance by the Trade Contractor of the Work in conformance with the Contract Documents, the Owner shall pay the Trade Contractor the lump sum price of: XX dollars and XX cents ($XX.XX) . The lump sum price is hereinafter referred to as the Trade Contract Price, which shall be subject to increase or decrease as provided in article 8.

Lump Sum Price includes Base Bid of $X.XX and Alternate #XX for {alternate description} for $X.XX for a total Lump Sum Price of $X.XX.

7.2 ALLOWANCES

7.2.1 All allowances stated in the Trade Contract Documents shall be included in the Trade Contract Price. The Owner shall select allowance items in a timely manner so as not to delay the Trade Contract

Work.

7.2.2 Allowances shall include the costs of materials, supplies and equipment delivered to the Worksite, less applicable trade discounts and including requisite taxes, unloading and handling at the Worksite, and labor and installation, unless specifically stated otherwise. The Trade Contractor's Overhead and profit for the allowances shall be included in the Trade Contract Price, but not in the allowances. The Trade Contract Price shall be adjusted by Trade Contract Change Order to reflect the actual costs when they are greater than or less than the allowances.

ARTICLE 8 CHANGES

Changes in the Trade Contract Work that are within the general scope of this Agreement shall be accomplished, without invalidating this Agreement, by Trade Contract Change Order, and Trade Contract Interim Directed Change.

8.1 TRADE CHANGE ORDER

8.1.1 The Owner may order or the Trade Contractor may request changes in the Trade Contract Work or the timing or sequencing of the Trade Contract Work that impacts the Trade Contract Price or the Trade Contract Time. All such changes in the Trade Contract Work that affect Trade Contract Time or Trade Contract Price shall in the form of a Trade Contract Change Order. Any such requests for a change in the Trade Contract Price or the Trade Contract Time shall be processed in accordance with this article 8. Trade Contract Change Orders shall be executed on the ConsensusDOCS 813 - Trade Contract Change Order (CM as Owner's Agent) with attachments as necessary.

8.1.2 The Owner, with the assistance of the Construction Manager, and the Trade Contractor shall negotiate in good faith an appropriate adjustment to the Trade Contract Price or the Trade Contract Time and shall conclude these negotiations as expeditiously as possible. Acceptance of the Trade Contract Change Order and any adjustment in the Trade Contract Price or Trade Contract Time shall not be unreasonably withheld.

8.2 TRADE CONTRACT INTERIM DIRECTED CHANGE

8.2.1 The Construction Manager may issue a written Trade Contract Interim Directed Change signed by the Owner directing a change in the Trade Contract Work prior to reaching agreement with the Trade Contractor on the adjustment, if any, in the Trade Contract Price or the Trade Contract Time.

8.2.2 The Owner, with the assistance of the Construction Manager, and the Trade Contractor shall negotiate expeditiously and in good faith for appropriate adjustments, as applicable, to the Trade Contract Price or the Trade Contract Time arising out of a Trade Contract Interim Directed Change. As the Trade Contract Changed Work is performed, the Trade Contractor shall submit its costs for such work with its application for payment beginning with the next application for payment within thirty (30) Days of the issuance of the Trade Contract Interim Directed Change. If there is a dispute as to the cost to the Owner, the Trade Contractor shall continue to perform the, Trade Contract Changed Work set forth in the Trade Contract Interim Directed Change and the Owner shall pay the requirements Trade Contractor the Cost of the Work, defined in 8.3.1.3 below upon receipt of an application for payment and the Owner's (and the Architect's and construction manger's) determination that the work has been completed. The Parties reserve their rights as to the disputed amount, subject to the requirements ARTICLE 12.

8.2.3 When the Owner and the Trade Contractor agree upon the adjustment in the Trade Contract Price or the Trade Contract Time, for a change in the Trade Contract Work directed by a Trade Contract Interim Directed Change, such agreement shall be the subject of a Trade Contract Change Order. The

Trade Contract Change Order shall include all outstanding Trade Contract Interim Directed Changes on which the Owner and Trade Contractor have reached agreement on Contract Price or Contract Time issued since the last Trade Contract Change Order.

8.3 DETERMINATION OF COST

8.3.1 An increase or decrease in the Trade Contract Price or the Trade Contract Time resulting from a change in the Trade Contract Work shall be determined by one or more of the following methods:

8.3.1.1 unit prices set forth in this Agreement or as subsequently agreed;

8.3.1.2 a mutually accepted, itemized lump sum;

8.3.1.3 COST OF THE WORK Cost of the Work as defined by this subsection plus 10.0 % for Overhead and 5.0 % for profit. "Cost of the Work" shall include the following costs reasonably incurred to perform a change in the Work

8.3.1.3.1 wages paid for labor in the direct employ of the Constructor in the performance of the Work;

8.3.1.3.2 salaries of the Trade Contractor's employees when stationed at the field office to the extent necessary to complete the applicable Work, employees engaged on the road expediting the production or transportation of material and equipment, and supervisory employees from the principal or branch office performing the functions listed below;

8.3.1.3.3 cost of applicable employee benefits and taxes, including but not limited to, workers' compensation, unemployment compensation, social security, health, welfare, retirement and other fringe benefits as required by law, labor agreements, or paid under the Trade Contractor's standard personnel policy, insofar as such costs are paid to employees of the Trade Contractor who are included in the Cost of the Work in subsections .1 and .2 immediately above;

8.3.1.3.4 reasonable transportation, travel, and hotel expenses of the Trade Contractor's personnel incurred in connection with the Work;

8.3.1.3.5 cost of all materials, supplies, and equipment incorporated in the Work, including costs of inspection and testing if not provided by the Owner, transportation, storage, and handling;

8.3.1.3.6 payments made by the Trade Contractor to Subcontractors for Work performed under this Agreement;

8.3.1.3.7 cost, including transportation and maintenance of all materials, supplies, equipment, temporary facilities, and hand tools not owned by the workers that are used or consumed in the performance of the Work, less salvage value or residual value; and cost less salvage value of such items used, but not consumed that remain the property of the Trade Contractor;

8.3.1.3.8 rental charges of all necessary machinery and equipment, exclusive of hand tools owned by workers, used at the Worksite, whether rented from the Trade Contractor or Others, including installation, repair and replacement, dismantling, removal, maintenance, transportation, and delivery costs. Rental from unrelated third parties shall be reimbursed at actual cost. Rentals from the Trade Contractor or its affiliates, subsidiaries, or related parties shall be reimbursed at the prevailing rates in the locality of the Worksite up to eighty-five percent (85%) of the value of the piece of equipment;

8.3.1.3.9 cost of the premiums for all insurance and surety bonds which the Trade Contractor is

required to procure or deems necessary, and approved by the Owner including any additional premium incurred as a result of any increase in the cost of the Work;

8.3.1.3.10 sales, use, gross receipts or other taxes, tariffs, or duties related to the Work for which the Trade Contractor is liable;

8.3.1.3.11 permits, fees, licenses, tests, and royalties;

8.3.1.3.12 reproduction costs, photographs, facsimile transmissions, long-distance telephone calls, data processing costs and services, postage, express delivery charges, data transmission, telephone service, and computer-related costs at the Worksite to the extent such items are used and consumed in the performance of the Work or are not capable of use after completion of the Work;

8.3.1.3.13 all water, power, and fuel costs necessary for the Work;

8.3.1.3.14 cost of removal of all nonhazardous substances, debris, and waste materials;

8.3.1.3.15 all costs directly incurred to perform a change in the Work which are reasonably inferable from the Contract Documents for the Changed Work;

8.3.1.3.16 DISCOUNTS All discounts for prompt payment shall accrue to the Owner to the extent such payments are made directly by the Owner. To the extent payments are made with funds of the Constructor, all cash discounts shall accrue to the Constructor. All trade discounts, rebates and refunds, and all returns from sale of surplus materials and equipment, shall be credited to the Cost of the Work;

8.3.1.3.17 COST REPORTING The Trade Contractor shall maintain in conformance with generally accepted accounting principles a complete and current set of records that are prepared or used by the Trade Contractor to calculate the Cost of Work. The Owner and Construction Manager shall be afforded access to the Trade Contractor's records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda and similar data relating to requested payment for Cost of the Work. The Trade Contractor shall preserve all such records for a period of three years after the final payment or longer where required by law;

8.3.1.3.18 COST AND SCHEDULE ESTIMATES The Trade Contractor shall use reasonable skill and judgment in the preparation of a cost estimate or schedule for a change to the Work, but does not warrant or guarantee their accuracy

8.3.1.4 If an increase or decrease cannot be agreed to as set forth in Clauses .1 through .3 above, and the Owner or the Construction Manager issues a Trade Contract Interim Directed Change, the cost of the change in the Trade Contract Work shall be determined by the reasonable actual expense and savings of the performance of the Work resulting from the change. If there is a net increase in the Trade Contract Price, the Trade Contractor's Fee shall be adjusted accordingly. In case of a net decrease in the Trade Contract Price, the Trade Contractor's Fee shall not be adjusted unless ten percent (10%) or more of the Project is deleted. The Trade Contractor shall maintain a documented, itemized accounting evidencing the expenses and savings.

8.3.2 If unit prices are set forth in the Trade Contract Documents or are subsequently agreed to by the Parties, but the character or quantity of such unit items as originally contemplated is so different in a proposed Trade Change Order that the original unit prices will cause substantial inequity to the Owner or the Trade Contractor, such unit prices shall be equitably adjusted.

8.4 CLAIMS FOR ADDITIONAL COST OR TIME Except as provided in subsection 6.3.2 and section 6.4 for

any claim for an increase in the Trade Contract Price or the Trade Contract Time, the Trade Contractor shall give the Owner and the Construction Manager written notice of the claim within fourteen (14) Days after the occurrence giving rise to the claim or within fourteen (14) Days after the Trade Contractor first recognizes (or should have recognized) the condition giving rise to the claim, whichever is later. Except in an emergency, notice shall be given before proceeding with the Trade Contract Work. Thereafter, the Trade Contractor shall submit written documentation of its claim, including appropriate supporting documentation, within twenty-one (21) Days after giving notice, unless the Parties mutually agree upon a period of time. The Owner or Construction Manager shall respond in writing denying or approving the Trade Contractor's claim no later than fourteen (14) Days after receipt of the Trade Contractor's claim. Any change in the Trade Contract Price or the Trade Contract Time resulting from such claim shall be authorized by Trade Contract Change Order.

ARTICLE 9 PAYMENT

9.1 GENERAL PROVISIONS Within fourteen (14) calendar Days from the date of execution of this Agreement, the Trade Contractor shall prepare and submit to the Construction Manager for approval a Schedule of Values apportioned to the various divisions or phases of the Trade Contract Work. Each line item contained in the Schedule of Values shall be assigned a monetary price such that the total of all such items shall equal the Trade Contract Price. The Schedule of Values shall be prepared in such detail and be supported by such documents and proof as may be required by the Construction Manager.

9.2 PROGRESS PAYMENTS

9.2.1 APPLICATIONS The Trade Contractor shall submit to the Construction Manager monthly notarized applications for payment. Trade Contractor's applications for payment shall be itemized and supported by the Trade Contractor's Schedule of Values and any other substantiating data as required by this Trade Contractor Agreement or requested by the Construction Manager or Design Professional. Payment applications may include payment requests on account of properly authorized Trade Contract Change Orders and Interim Directed Changes. The progress payment application shall include Trade Contract Work performed through the preceding calendar month. The Construction Manager will review the application and recommend to the Design professional and the Owner amounts payable by the Owner to the Trade Contractor. The Owner, in accordance with the determination of the Design Professional, shall pay the amount otherwise due on any payment application, less any amounts as set forth below, no later than thirty (30) calendar Days after the payment application, or portion thereof, is approved the Design Professional. The Owner may deduct, from any progress payment, such amounts as may be retained pursuant to subsection 9.2.4 below.

9.2.2 STORED MATERIALS AND EQUIPMENT Unless otherwise provided in the contract documents, applications for payment may include materials and equipment not yet incorporated into the Work but delivered to and suitably stored onsite or offsite including applicable insurance, storage and costs incurred transporting the materials to an offsite storage facility. Approval of payment applications for stored materials and equipment stored offsite shall be conditioned on submission by the Trade Contractor of bills of sale and proof of required insurance, or such other procedures satisfactory to the Owner to establish the proper valuation of the stored materials and equipment, the Owner's title to such materials and equipment, and to otherwise protect the Owner's interests therein, including transportation to the site.

9.2.3 CLAIM WAIVERS

9.2.3.1 PARTIAL CLAIMWAIVERS AND AFFIDAVITS As a prerequisite for payment, the Trade Contractor shall provide, in a form satisfactory to the Owner and the Construction Manager, partial claim waivers in the amount of the application for payment and affidavits from the Trade Contractor, and its Subcontractors, Material Suppliers for the completed Trade Contract Work.

Such waivers shall be effective upon payment. In no event shall the Trade Contractor be required to sign an unconditional waiver of claim, either partial or final, prior to receiving payment or in an amount in excess of what it has been paid.

9.2.4 RETAINAGE From each progress payment made to the Trade Contractor has the Owner shall retain FIVE (5) percent of the amount otherwise due after deduction of any amounts as provided in section 9.3 and in no event shall such percentage exceed any applicable statutory requirements of this Agreement. Retainage shall be withheld and administered in accordance with Iowa Code Chapter 572:

9.3 ADJUSTMENT OF TRADE CONTRACTOR'S PAYMENT APPLICATION The Owner or the Construction Manager, upon notification of the Design Professional, may reject or adjust a Trade Contractor payment application or nullify a previously approved Trade Contractor payment application, in whole or in part, as may reasonably be necessary to protect the Owner from loss or damage based upon the following, to the extent that the Trade Contractor is responsible therefor under this Trade Contractor Agreement:

9.3.1 the Trade Contractor's repeated failure to perform the Trade Contract Work as required by the Trade Contractor Agreement;

9.3.2 loss or damage arising out of or relating to the Trade Contractor Agreement and caused by the Trade Contractor to the Owner, or to the Construction Manager or others to whom the Owner may be liable;

9.3.3 the Trade Contractor's failure to properly pay for labor, materials, equipment or supplies furnished in connection with the Trade Contract Work;

9.3.4 nonconforming or defective Trade Contract Work which has not been corrected in a timely fashion;

9.3.5 reasonable evidence of delay in performance of the Trade Contract Work such that the work will not be completed within the Trade Contract Time, and that the unpaid balance of the Trade Contract Price is not sufficient to offset any liquidated damages or actual damages that may be sustained by the Owner as a result of the anticipated delay caused by the Trade Contractor;

9.3.6 reasonable evidence demonstrating that the unpaid balance of the Trade Contract Price is insufficient to cover the cost to complete the Trade Contract Work; and

9.3.7 third-party claims involving the Trade Contractor or reasonable evidence demonstrating that third-party claims are likely to be filed unless and until the Trade Contractor furnishes the Owner with adequate security in the form of a surety bond, letter of credit or other collateral or commitment which are sufficient to discharge such claims if established. No later than thirty (30) Days after receipt of an application for payment, the Owner or Construction Manager shall give written notice to the Trade Contractor, disapproving or nullifying it or a portion thereof, specifying the reasons for the disapproval or nullification. When the above reasons for disapproving or nullifying an application for payment are removed, payment will be made for amounts previously withheld.

9.4 PAYMENT NOT ACCEPTANCE Payment to the Trade Contractor does not constitute or imply acceptance of any portion of the Trade Contract Work.

9.5 PAYMENT DELAY If for any reason not the fault of the Trade Contractor, the Trade Contractor does not receive a progress payment from the Owner sixty (60) calendar Days after the time such payment is due, as defined in Subparagraph 9.2.1, then the Trade Contractor, upon giving within seven (7) calendar Days after written notice to the Owner, and without prejudice to and in addition to any other legal remedies, may stop its Trade Contract Work until payment of the full amount owing to the Trade Contractor has been received. The

Trade Contract Price and Trade Contract Time shall be equitably adjusted by a Trade Contract Change Order to reflect reasonable cost and delay resulting from shutdown, delay and start-up.

9.6 SUBSTANTIAL COMPLETION

9.6.1 The Trade Contractor shall notify the Owner, the Construction Manager and the Design Professional when it considers Substantial Completion of the Trade Contract Work or a designated portion to have been achieved. The Construction Manager and the Design Professional shall promptly conduct an inspection to determine whether the Trade Contract Work or designated portion can be occupied or utilized for its intended use by the Owner without excessive interference in completing any remaining unfinished Trade Contract Work by the Trade Contractor. If the Construction Manager and the Design Professional determine that the Trade Contract Work or designated portion has not reached Substantial Completion, the Design Professional, and the Construction Manager, shall promptly compile a list of items to be completed or corrected so the Owner may occupy or utilize the Trade Contract Work or designated portion for its intended use. The Trade Contractor shall promptly complete all items on the list.

9.6.2 When Substantial Completion of the Trade Contract Work or a designated portion is achieved, the Construction Manager and the Design Professional shall prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, and the respective responsibilities of the Owner and Trade Contractor for interim items such as security, maintenance, utilities, insurance and damage to the Trade Contract Work. The Owner shall assume all responsibilities for items such as security, maintenance, utilities, and insurance, and damage to the Work. The certificate shall also list the items to be completed or corrected, and establish the time for their completion or correction. The Certificate of Substantial Completion shall be submitted to the Trade Contractor for written acceptance of responsibilities assigned in the Certificate.

9.6.3 Unless otherwise provided in the Certificate of Substantial Completion, warranties required by the Trade Contract Documents shall commence on the date of Substantial Completion of the Trade Contract Work or a designated portion.

9.6.4 Uncompleted items shall be completed by the Trade Contractor by the Final Completion date set forth in the Agreement and/or Construction Schedule. The Trade Contractor may request early release of retainage in accordance with Iowa Code Section 26.13. Payment for completed work and retainage shall be made in accordance with Iowa Code Chapters 26 and 573.

9.7 PARTIAL OCCUPANCY OR USE The Owner may occupy or use completed or partially completed portions of the Trade Contract Work when (a) the portion of the Trade Contract Work is designated in a Certificate of Substantial Completion, (b) appropriate insurer(s) consent to the occupancy or use, and (c) appropriate public authorities authorize the occupancy or use. Such partial occupancy or use shall constitute Substantial Completion of that portion of the Trade Contract Work.

9.8 FINAL PAYMENT

9.8.1 APPLICATION Upon acceptance of the Trade Contract Work by the Construction Manager, and approval by the Design Professional, and upon the Trade Contractor furnishing evidence of fulfillment of the Trade Contractor's obligations in accordance with the Trade Contract Documents, the Trade Contractor shall submit its application for final payment. The Construction Manager will review the Trade Contractor's final payment application and recommend to the Design Professional and the Owner an amount payable by the Owner to the Trade Contractor. The Design Professional shall then recommend an amount to be paid by the Owner. Final payment shall be made in accordance with Iowa Code Chapters 26 and 573.

9.8.2 REQUIREMENTS Along with its application for final payment, the Trade Contractor shall furnish to the Construction Manager:

9.8.2.1 an affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the Trade Contract Work for which the Owner or its property or the Construction Manager or the Owner's surety might in any way be liable, have been paid or otherwise satisfied;

9.8.2.2 consent of the Trade Contractor's surety to final payment;

9.8.2.3 satisfaction of closeout procedures as may be required by the Trade Contractor Agreement;

9.8.2.4 certification(or other writing indicating) that insurance required by the Trade Contractor Agreement is and will remain effect beyond final payment pursuant to this Trade Contractor Agreement and

9.8.2.5 other data if required by the Owner or Construction Manager, such as receipts, releases, and waivers of liens effective upon payment to the extent and in such form as may be designated by the Owner or Construction Manager. Acceptance of final payment by the Trade Contractor shall constitute a waiver of all claims by the Trade Contractor except those previously made in writing and identified by the Trade Contractor as unsettled at the time of final application for payment.

9.8.3 TIME OF PAYMENT Final payment of the balance of the Trade Contract Price, less any amount retained pursuant to subsection 9.2.4 of this Agreement, and as required by Iowa Code Chapters 26 and 573, which among other things requires that twice the amount of an Iowa Code Chapter 573 subcontractor claim be withheld from final payment, shall be made to the Trade contractor within sixty (60) Days after the Trade Contractor has submitted a complete and accurate application for final payment.

9.8.4 LATE PAYMENT INTEREST Progress payments or final payment due and unpaid under this Trade Contractor Agreement shall bear interest from the date payment is due at the statutory rate prevailing at the place of the Project.

9.9 PAYMENT USE AND VERIFICATION The Trade Contractor is required to pay for all labor, materials and equipment used in the performance of the Trade Contract Work through the most current period applicable to progress payments received. Reasonable evidence, satisfactory to the Construction Manager, may be required to show that all obligations relating to the Trade Contract Work are current before releasing any payment due on the Trade Contract Work. If required by the Construction Manager, before final payment is made for the Trade Contract Work, the Trade Contractor shall submit evidence satisfactory to the Construction Manager that all payrolls, bills for materials and equipment, and all known indebtedness connected with the Trade Contract Work, have been paid or otherwise satisfied as set forth in subsection 9.8.2.

ARTICLE 10 INDEMNITY, INSURANCE, WAIVERS AND BONDS

10.1 INDEMNITY

10.1A To the extent portions of this Article are in conflict with SF 396 (codified at Iowa Code Section 573A.5) said portions are void and unenforceable.

10.1.1 TRADE CONTRACTOR'S INDEMNITY To the fullest extent permitted by law, the Trade Contractor shall indemnify and hold harmless the Owner, the Owner's officers, directors, members,

consultants, agents and employees, from all claims for bodily injury and property damage, other than to the Work itself and other property insured under subsection 10.3.1, including reasonable attorneys' fees, costs and expenses, that may arise from the performance of the Work, but only to the extent caused by the negligent acts or omissions of the Trade Contractor, Subcontractors or anyone employed directly or indirectly by any of them or by anyone for whose acts any of them may be liable. The Trade Contractor shall be entitled to reimbursement of any defense costs paid above the Trade Contractor's percentage of liability for the underlying claim to the extent provided for under subsection 10.1.2.

10.1.2 OWNER'S INDEMNITY To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Trade Contractor, its officers, directors, members, consultants, agents, and employees, from all claims for bodily injury and property damage, other than property insured under subsection 10.3.1, including reasonable attorneys' fees, costs and expenses, that may arise from the performance of work by Owner, Design Professional or Others, but only to the extent caused by the negligent acts or omissions of the Owner, Design Professional or Others. The Owner shall be entitled to reimbursement of any defense costs paid above Owner's percentage of liability for the underlying claim to the extent provided for under subsection 10.1.1.

10.1.3 CONSTRUCTION MANAGER AND DESIGN PROFESSIONAL INDEMNITY The Owner shall cause the Construction Manager and the Design Professional to agree to indemnify and hold harmless the Owner from all claims for bodily injury and property damage, other than to the Work itself and other property insured under section 10.3, that may arise from the Construction Manager's or the Design Professional's services, but only to the extent that such claims result from the negligent acts or omissions of the Construction Manager or the Design Professional, respectively, or anyone for whose acts or omissions the Construction Manager or Design Professional, respectively, is liable. Such provisions shall be in a form no less protective of the Parties than the Construction Manager's Indemnity provided in ConsensusDocs 801 (2011) or the Design Professional's indemnity provided in ConsensusDocs 803 (2011) respectively, and shall be reasonably satisfactory to the Owner and the Trade Contractor.

10.1.4 ADJACENT PROPERTY INDEMNIFICATION To the extent of the limits of Trade Contractor's Commercial General Liability Insurance specified in subsection 10.2.1 or Zero Dollars and No Cents ($0.00) whichever is more, the Trade Contractor shall indemnify and hold harmless the Owner against any and all liability, claims, demands, damages, losses and expenses, including attorney's fees, in connection with or arising out of any damage or alleged damage to any of Owner's existing adjacent property that may arise from the performance of the Trade Contract Work, but only to the extent of the negligent acts or omissions of the Trade Contractor, Subcontractor or anyone employed directly or indirectly by any of them or by anyone for whose acts any of them may be liable.

10.1.5 NO LIMITATION ON LIABILITY In any and all claims against the Indemnitees by any employee of the Trade Contractor, anyone directly or indirectly employed by the Trade Contractor or anyone for whose acts the Trade Contractor may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Trade Contractor under Workers' Compensation acts, disability benefit acts or other employment benefit acts.

10.2 TRADE CONTRACTOR'S INSURANCE

10.2.1 Prior to the start of the Work, the Trade Contractor shall procure and maintain in force Workers Compensation/Employers' Liability Insurance, Business Automobile Liability Insurance, and Commercial General Liability Insurance (CGL). The CGL policy shall include coverage for liability arising from premises, operations, independent contractors, products-completed operations, personal injury and

advertising injury, contractual liability, and broad form property damage. The Trade Contractor's liability policies, as required in this Subparagraph 10.2.1, shall be written on an occurrence basis with at least the following limits of liability:

10.2.1.1 Workers' Compensation- amount required by the laws of Iowa

10.2.1.2 Employers' Liability Insurance - $500,000 or an amount required by Iowa law, whichever is greater.

10.2.1.3 Business Automobile Liability Insurance

a. $1,000,000 Each Accident

10.2.1.4 Commercial General Liability Insurance

a. $1,000,000 Each Occurrence b. $2,000,000 General Aggregate c. $1,000,000 Products/Completed Operations Aggregate d. $1,000,000 Personal and Advertising Injury Limit

10.2.2 The Trade Contractor Must also carry and maintain Excess or Umbrella Liability coverage for the policies in subsection 10.2.1 in the amounts as listed below:

Trade Contractor Contract Amount: <$1,000,000 - $2 Million Umbrella or more $1,000,000 - $5,000,000 - $5 Million Umbrella or more >$5,000,000 - $10 Million Umbrella or more

10.2.3 The Trade Contractor shall maintain in effect all insurance coverage required under subsection 10.2.1 with insurance companies lawfully authorized to do business in Iowa. Such insurance companies shall have a minimum A.M. Best Rating of A-VI (Consult instructions and insurance advisor).If the Trade Contractor fails to obtain or maintain any insurance coverage required under this Agreement, the Owner may purchase such coverage and charge the expense to the Trade Contractor, or terminate this Agreement.

10.2.4 To the extent commercially available, the policies of insurance required under Subparagraph 10.2.1 shall contain a provision that the insurance company or its designee must give the Owner written notice transmitted in paper or electronic format: (a) 30 days before coverage is nonrenewed by the insurance company and (b) with 10 business days after cancelation of coverage by the insurance company. The Trade Contractor shall maintain completed operations liability insurance for one year after acceptance of the Contract Documents, whichever is longer. Prior to commencement of services, the Trade Contract shall furnish the Owner with certificates evidencing the required coverages. In addition, if any insurance policy required under subsection 10.2.1 is not to be immediately replaced without a lapse in coverage when it expires, exhausts its limits, or is to be, cancelled, the Trade Contractor shall give Owner prompt written notice upon actual or constructive knowledge of such condition.

10.2.5 ADDITIONAL LIABILITY COVERAGE

10.2.5.1 The Owner [X] shall / [ ] shall not (indicate one) require the Trade Contractor to purchase and maintain liability coverage, primary to the Owner's coverage under subsection 10.3.1.

10.2.5.2 If required by subsection 10.2.5.1, the additional liability coverage required of the Trade Contractor shall be:

1. Additional Insured Owner shall be named as an additional insured on Trade Contractor's Commercial General Liability Insurance specified for operations and completed operations,

but only with respect to liability for bodily injury, property damage or personal and advertising injury to the extent caused by the negligent acts or omissions of Trade Contractor, or those acting on Trade Contractor's behalf, in the performance of Trade Contractor's Work for.

2. OCP Trade Contractor shall provide an Owners' and Contractors' Protective Liability Insurance ("OCP") policy with limits equal to the limits on Commercial General Liability Insurance specified or limits as otherwise required by Owner.

Any documented additional cost in the form of a surcharge associated with procuring the additional liability coverage in accordance with this subsection shall be paid by the Owner directly or the costs may be reimbursed by the Owner to the Trade Contractor by increasing the Trade Contract Price to correspond to the actual cost required to purchase and maintain the additional liability coverage. Prior to commencement of the Work, the Trade Contractor shall obtain and furnish to the Owner a certificate evidencing that the additional liability coverages have been procured.

10.2.6 PROFESSIONAL LIABILITY INSURANCE To the extent the Trade Contractor is required to procure design services under this Agreement, in accordance with section 3.14, the Trade Contractor shall require the designers to obtain professional liability insurance for claims arising from the negligent performance of professional services under this Agreement, with a company reasonably satisfactory to the Owner, including coverage for all professional liability caused by any of the Designer's(s') consultants, written for not less than $1,000,000 per claim and in the aggregate with the deductible not to exceed $2,000,000. The deductible shall be paid by the Designer.

10.3 OWNER'S INSURANCE

10.3.1 Deleted.

10.3.2 Deleted.

10.4 PROPERTY INSURANCE

10.4.1 Before the start of Trade Contract Work, the Owner shall obtain and maintain Builder's Risk Policy insurance with minimum coverage limits equal to the full cost of replacement of the Project at the time of loss. This insurance shall also name the Trade Contractor, Subcontractors, Material Suppliers, Construction Manager and Design Professional as insureds. This insurance shall be written as a Builder's Risk Policy or equivalent form to cover all risks of physical loss except those specifically excluded by the policy, and shall insure at least against the perils of fire, lightning, explosion, windstorm, hail, smoke, aircraft and vehicles, riot and civil commotion, theft, vandalism, malicious mischief, debris removal, flood (subject to sublimits), earthquake (subject to sublimits), earth movement, water damage, wind damage, testing if applicable, collapse however caused, and shall include coverage for, material, or equipment stored offsite, onsite or in transit. This policy shall provide for a waiver of subrogation in favor of the Trade Contractor, Subcontractors, Material Suppliers, Construction Manager and Design Professional. This insurance shall remain in effect until the Substantial Completion of the Work, final payment has been made or until no person or entity other than the Owner has an insurable interest in the property to be covered by this insurance, whichever is sooner. Partial occupancy or use of the Work shall not commence until the Owner has secured the consent of the insurance company or companies providing the coverage required in this Subparagraph 10.4.1.

10.4.2 If the Owner does not intend to purchase the property insurance required by this Agreement, including all of the coverages and deductibles described herein, the Owner shall give written notice to the Trade Contractor, the Design Professional and the Construction Manager before the Trade Contract

Work is commenced. The Trade Contractor may then provide insurance to protect its interests and the interests of the Subcontractors, including the coverage of deductibles. The cost of this insurance shall be charged to the Owner in a Change Order. The Owner shall be responsible for all of Trade Contractor's costs reasonably attributed to the Owner's failure or neglect in purchasing or maintaining the coverage described above.

10.4.2.1 The Owner will not obtain insurance to cover the risk of physical loss resulting from Terrorism. The Construction Manager is not required to purchase this type of insurance but may purchase this type of insurance if it chooses. f purchased, the cost of this insurance shall be borne by the Construction manager.

10.4.3 POLICIES The Owner shall provide the Trade Contractor with a copy of all policies including all endorsements upon request.

10.5 PROPERTY INSURANCE LOSS ADJUSTMENT

10.5.1 LOSS ADJUSTMENT Any insured loss shall be adjusted with the Owner and the Trade Contractor and made payable to the Owner as trustee for the insureds, as their interests may appear.

10.5.2 DISTRIBUTION OF PROCEEDS Following the occurrence of an insured loss, monies received will be deposited in a separate account and the trustee shall make distribution in accordance with the agreement of the Parties in interest.

10.6 WAIVERS

10.6.1 PROPERTY DAMAGE The Owner and Trade Contractor waive all claims and other rights they may have against each other for loss of or damage to (a) the Project, (b) all materials, machinery, equipment and other items used in accomplishing the Trade Contract Work or services or to be incorporated into the Project, while the same are in transit, at the Project Site, during erection and otherwise, and (c) all property owned by or in the custody of Owner and its affiliates, however such loss or damage shall occur, to be extent such damage is covered by property insurance. The proceeds of such insurance shall be held by the Owner as trustee.

10.6.2 WAIVER OF SUBROGATION The Owner shall have its insurers waive all rights of subrogation they may have against the Construction Manager, Design Professional, Trade Contractors, and their Subcontractors and Material Suppliers on all policies carried by the Owner on the Project and adjacent properties, including, after final payment, those policies to be provided on the completed Project not intended to insure the Project during construction.

10.6.3 ENDORSEMENT If the policies of insurance referred to in this section require an endorsement to provide for continued coverage where there is a waiver of subrogation, the Owner will cause them to be so endorsed.

10.7 RISK OF LOSS Except to the extent a loss is covered by propertyinsurance,carried by the owner, risk of loss or damage to the Work shall be upon the Trade Contractor until the Date of Final Completion, unless otherwise agreed to by the Parties.

10.8 BONDS Performance and Payment Bonds

☒ are

☐ are not

required of the Trade Contractor that meet the requirements of Iowa Code Chapter 573. A deposit in lieu of a

bond may be acceptable if it meets the requirements of Iowa Code Section 573.4. Such bonds shall be issued by a surety admitted in the State in which the Project is located and must be acceptable to the Owner. The Owner's acceptance shall not be withheld without reasonable cause. The penal sum of the Payment Bond and of the Performance Bond shall each be one hundred percent (100%) of the original Contract Price. Any increase in the Contract Price that exceeds ten percent (10%) in the aggregate shall require a rider to the Bonds increasing penal sums accordingly. Up to such ten percent (10%) amount, the penal sum of the Bond shall remain equal to one hundred percent (100%) of the Contract Price. The Trade Contractor shall endeavor to keep its surety advised of changes potentially impacting the Contract Time and Contract Price, though the Trade Contractor shall require that its surety waives any requirement to be notified of any alteration or extension of time. The Trade Contractor's Payment Bond for the Project, if any, shall be made available by the Owner for review and copying by the Subcontractor. Iowa Code Chapter 573 shall control and take precedence over any conflicting term or condition in this Agreement

ARTICLE 11 SUSPENSION, NOTICE TO CURE AND TERMINATION OF AGREEMENT

11.1 SUSPENSION BY OWNER FOR CONVENIENCE

11.1.1 OWNER SUSPENSION Should the Owner order the Trade Contractor in writing to suspend, delay, or interrupt the performance of the Trade Contract Work for such period of time as may be determined to be appropriate for the convenience of the Owner and not due to any act or omission of the Trade Contractor or any person or entity for whose acts or omissions the Trade Contractor may be liable, then the Trade Contractor shall immediately suspend, delay or interrupt that portion of the Trade Contract Work as ordered by the Owner. The Trade Contract Price and the Trade Contract Time shall be equitably adjusted by Trade Contract Change Order for the cost and delay resulting from any such suspension.

11.1.2 Any action taken by the Owner that is permitted by any other provision of the Trade Contract Documents and that results in a suspension of part or all of the Trade Contract Work does not constitute a suspension of Trade Contract Work under this section.

11.2 NOTICE TO CURE A DEFAULT If the Trade Contractor persistently refuses or fails to supply enough properly skilled workers, proper materials, or equipment to maintain the approved Construction Schedule in accordance with ARTICLE 6, or fails to make prompt payment to its workers, Subcontractors or Material Suppliers; disregards laws, ordinances, rules, regulations or orders of any public authority having jurisdiction; or is otherwise guilty of a material breach of a provision of this Agreement, the Trade Contractor may be deemed in default. If the Trade Contractor fails within seven (7) business Days after receipt of written notification to commence and continue satisfactory correction of such default with diligence and promptness, then the Owner shall give the Trade Contractor a second notice to correct the default within a three (3) Day period. If the Trade Contractor fails to promptly commence and continue satisfactory correction of the default following receipt of such second notice, the Owner without prejudice to any other rights or remedies may:

11.2.1 supply workers and materials, equipment and other facilities as the Owner or Construction Manager deems necessary for the satisfactory correction of the default, and charge the cost to the Trade Contractor, who shall be liable for the payment of same including reasonable Overhead, profit and attorneys' fees;

11.2.2 contract with Others to perform such part of the Trade Contract Work as the Owner or Construction Manager determines shall provide the most expeditious correction of the default, and charge the cost to the Trade Contractor;

11.2.3 withhold payment due the Trade Contractor in accordance with section 9.3; and

11.2.4 in the event of an emergency affecting the safety of persons or property, immediately commence

and continue satisfactory correction of such default as provided in subsections 11.2.1 and 11.2.2 without first giving written notice to the Trade Contractor, but shall give prompt written notice of such action to the Trade Contractor following commencement of the action.

11.3 OWNER'S RIGHT TO TERMINATE FOR DEFAULT

11.3.1 TERMINATION BY OWNER FOR DEFAULT If, within seven (7) Days of receipt of a notice to cure pursuant to section 11.2, the Trade Contractor fails to commence and satisfactorily continue correction of the default set forth in the notice to cure, the Owner may notify the Trade Contractor that it intends to terminate this Agreement for default absent appropriate corrective action within fourteen additional Days. After the expiration of the additional fourteen (14) Day period, the Owner may terminate this Agreement by written notice absent appropriate corrective action. Termination for default is in addition to any other remedies available to Owner under section 11.2. If the Owner's cost arising out of the Trade Contractor's failure to cure, including the cost of completing the Trade Contract Work and reasonable attorneys' fees, exceeds the unpaid Trade Contract Price, the Trade Contractor shall be liable to the Owner for such excess costs. If the Owner's costs are less than the unpaid Trade Contract Price, the Owner shall pay the difference to the Trade Contractor. In the event the Owner exercises its rights under this section, upon the request of the Trade Contractor the Owner shall furnish to the Trade Contractor a detailed accounting of the cost incurred by the Owner.

11.3.2 USE OF TRADE CONTRACTOR'S MATERIALS, SUPPLIES AND EQUIPMENT If the Owner or Others perform work under this section, the Owner shall have the right to take and use any materials, supplies and equipment belonging to the Trade Contractor and located at the Worksite for the purpose of completing any remaining Trade Contract Work. Immediately upon completion of the Work, any remaining materials, supplies or equipment not consumed or incorporated in the Trade Contract Work shall be returned to the Trade Contractor in substantially the same condition as when they were taken, reasonable wear and tear excepted.

11.3.3 If the Trade Contractor files a petition under the Bankruptcy Code, this Agreement may be terminated for cause at the may be terminated for cause at the Owner.

11.3.3 If the Trade Contractor files a petition under the Bankruptcy Code, this Agreement may be terminated for cause at the may be terminated for cause at the Owner.

11.3.4 The Owner shall make reasonable efforts to mitigate damages arising from Trade Contractor default, and shall promptly invoice the Trade Contractor for all amounts due pursuant to sections 11.2 and 11.3.

11.4 TERMINATION BY OWNER FOR CONVENIENCE

11.4.1 Upon written notice to the Trade Contractor, the Owner may, without cause, terminate this Agreement. The Trade Contractor shall immediately stop the Work, follow the Owner's or Construction Manager's instructions regarding shutdown and termination procedures, and strive to minimize any further costs.

11.4.2 If the Owner terminates this Agreement pursuant to this section, the Trade Contractor shall be paid:

11.4.2.1 for the Work performed to date including Overhead and profit; and

11.4.2.2 for all demobilization costs and costs incurred as a result of the termination but not including Overhead or profit on work not performed;

11.4.2A Upon written notice to the Trade Contractor the Owner has the right to terminate this

Agreement without penalty as a result of the following: 1) the legislature or governor fail to appropriate funds sufficient to allow the Owner to operate as required and fulfill its obligations under this Agreement, 2) funds are de-appropriated or not allocated, 3) the Owner's authorization to operate is withdrawn or there is a material alteration in the programs administered by the owner, or 4) the Owner's duties are substantially modified. If such a termination results then the Trade Contractor shall be paid in the manner set forth in subparagraph 11.4.2. If, however, an appropriation to cover the cost of this Agreement becomes available within sixty (60) days subsequent to termination under this paragraph then the Owner agrees to re-enter into a modified version of this Agreement that accounts for the termination and reinstatement.

11.4.3 If the Owner terminates this Agreement pursuant to sections 11.3 or 11.4, the Trade Contractor shall:

11.4.3 If the Owner terminates this Agreement pursuant to sections 11.3 or 11.4, the Trade Contractor shall:

11.4.3.1 execute and deliver to the Owner all papers and take all action required to assign, transfer and vest in the Owner the rights of the Trade Contractor to all materials, supplies and equipment for which payment has or will be made in accordance with the Trade Contract Documents and all subcontracts, orders and commitments which have been made in accordance with the Trade Contract Documents;

11.4.3.2 exert reasonable effort to reduce to a minimum the Owner's liability for subcontracts, orders and commitments that have not been fulfilled at the time of the termination;

11.4.3.3 cancel any subcontracts, orders and commitments as the Owner or Construction Manager directs; and

11.4.3.4 sell at prices approved by the Owner or Construction Manager any materials, supplies and equipment as the Owner or Construction Manager directs, with all proceeds paid or credited to the Owner.

11.5 TRADE CONTRACTOR'S RIGHT TO TERMINATE

11.5.1 Upon seven (7) Days' written notice to the Owner and Construction Manager, the Trade Contractor may terminate this Agreement if the Trade Contract Work has been stopped for a thirty (30) Day period through no fault of the Trade Contractor for any of the following reasons:

11.5.1.1 under court order or order of other governmental authorities having jurisdiction;

11.5.1.2 as a result of the declaration of a national emergency or other governmental act during which, through no act or fault of the Trade Contractor, materials are not available; or

11.5.1.3 suspension by the Owner for convenience pursuant to section 11.1

11.5.2 In addition, upon seven (7) Days' written notice to the Owner and Construction Manager, the Trade Contractor may terminate the Agreement if the Owner:

11.5.2.1 fails to furnish reasonable evidence pursuant to section 4.1.2 that sufficient funds are available and committed for Project financing, or

11.5.2.2 assigns this Agreement over the Trade Contractor's reasonable objection, or

11.5.2.3 fails to pay the Trade Contractor in accordance with this Agreement and the Trade Contractor has complied with the notice provisions of section 9.5, or

11.5.2.4 otherwise materially breaches this Agreement.

11.5.3 Upon termination by the Trade Contractor in accordance with this section, the Trade Contractor shall be entitled to recover from the Owner payment for all Trade Contract Work executed and for any proven loss, cost or expense in connection with the Trade Contract Work, including all demobilization costs plus reasonable Overhead and profit on work not performed.

11.6 OBLIGATIONS ARISING BEFORE TERMINATION Even after termination pursuant to ARTICLE 11, the provisions of this Agreement still apply to any Trade Contract Work performed, payments made, events occurring, costs charged or incurred or obligations arising before the termination date.

ARTICLE 12 DISPUTE MITIGATION AND RESOLUTION

12.1 WORK CONTINUANCE AND PAYMENT Unless otherwise agreed in writing, the Trade Contractor shall continue the Trade Contract Work and maintain the Construction Schedule during any dispute mitigation or resolution proceedings. If the Trade Contractor continues to perform, the Owner shall continue to make payments in accordance with this Agreement.

12.2 DIRECT DISCUSSIONS If the Parties cannot reach resolution on a matter relating to or arising out of the Agreement, the Parties shall endeavor to reach resolution through good faith direct discussions between the Parties' representatives, who shall possess the necessary authority to resolve such matter and who shall record the date of first discussions. The authorized representative for the Trade Contractor is identified in Paragraph 3.4 of the Agreement. The authorized representative for the Owner is identified in Paragraph 4.2 of the Agreement. The parties' authorized representative are, among other things, authorized to resolve matters of disagreement and disputes between the Parties. If the dispute remains unresolved after fifteen (15) Days from the date of first discussion, the Parties shall submit such matter to the dispute mitigation and dispute resolution procedures selected herein.

12.3 MITIGATION The Parties agree that dispute mitigation procedures provided in this Project. Disputes remaining unresolved after direct discussions shall be directed to the selected mitigation procedure immediately below. The dispute mitigation procedure shall result in nonbinding finding on the matter. This may be introduced as evidence at a subsequent binding adjudication of the matter, as designee on Paragraph 12.5. The Parties agree that the dispute mitigation procedure shall be

(Designate only one.)

[X] Project Neutral

[ ] Dispute Review Board

12.3.1 MITIGATION PROCEDURES The Project Neutral/Dispute Review Board shall be mutually selected and appointed by the Parties and shall execute a retainer agreement with the Parties establishing the scope of the Project Neutral/Dispute Review Board's responsibilities. The costs and expenses of the Project Neutral/Dispute Review Board shall be shared equally by the Parties. The Project Neutral/Dispute Review Board shall be available to either Party, upon request, throughout the course of the Project, and shall make regular visits to the Project so as to maintain an up-to-date understanding of the Project progress and issues and to enable the Project Neutral/Dispute Review Board to address matters in dispute between the Parties promptly and knowledgeably. The Project Neutral/Dispute Review Board shall issue nonbinding findings within five (5) business Days of referral of the matter to the Project Neutral, unless good cause is shown.

12.3.2 If the matter remains unresolved following the issuance of the nonbinding finding by the mitigation procedure or if the Project Neutral/Dispute Review Board fails to issue nonbinding findings

within five (5) Days of the referral, the Parties shall submit the matter to the binding dispute resolution procedure designated in section 12.5.

12.4 MEDIATION If direct discussions pursuant to section 12.2 do not result in resolution of the matter and no dispute mitigation procedure is selected under section 12.3, the Parties shall endeavor to resolve the matter by mediation through the current Construction Industry Mediation Rules of the American Arbitration Association, or the Parties may mutually agree to select another set of mediation rules. The administration of the mediation shall be as mutually agreed by the Parties. The mediation shall be convened within thirty (30) business Days of the matter first being discussed and shall conclude within forty-five (45) business Days of the matter first being discussed. Either Party may terminate the mediation at any time after the first session, but the decision to terminate shall be delivered in person by the terminating Party to the non-terminating Party and to the mediator. The costs of the mediation shall be shared equally by the Parties.

12.5 BINDING DISPUTE RESOLUTION If the matter is unresolved after submission of the matter to a mitigation procedure or to mediation, the Parties shall submit the matter to the binding dispute resolution procedure designated herein.

(Designate only one.)

☐ Arbitration using the current Construction Industry Arbitration Rules of the American Arbitration Association

☒ Litigation in either the state or federal court having jurisdiction of the matter in the location of the Project.

12.5.1 The costs of any binding dispute resolution procedures shall be borne by the non-prevailing Party, as determined by the adjudicator of the dispute. However, the costs of binding dispute resolution does not include attorney fees. The Parties are each responsible for paying for their own attorney fees.

12.5.2 VENUE The venue of any binding dispute resolution procedure shall be Des Moines, Iowa.

12.6 MULTIPARTY PROCEEDING All parties necessary to resolve a claim shall be parties to the same dispute resolution proceeding. Appropriate provisions shall be included in all other contracts relating to the Work to provide for the joinder or consolidation of such dispute resolution procedures.

12.7 LIEN RIGHTS The Trade Contractor acknowledges that it has no mechanic's lien rights on this Project because it is a public improvement project.

ARTICLE 13 MISCELLANEOUS PROVISIONS

13.1 ASSIGNMENT Neither the Owner nor the Trade Contractor shall assign their interest in this Agreement without the written consent of the other except as to the assignment of proceeds. The terms and conditions of this Agreement shall be binding upon both Parties, their partners, successors, assigns and legal representatives. Neither Party to this Agreement shall assign the Agreement as a whole without written consent of the other. If either Party attempts to make such an assignment, that Party shall nevertheless remain legally responsible for all obligations under this Agreement, unless otherwise agreed by the other Party.

13.2 GOVERNING LAW This Agreement and all disputes arising there from shall be governed by the Iowa law.

13.3 SEVERABILITY The partial or complete invalidity of any one or more provisions of this Agreement shall not affect the validity or continuing force and effect of any other provision.

13.4 NO WAIVER OF PERFORMANCE The failure of either Party to insist, in any one or more instances, on the performance of any of the terms, covenants or conditions of this Agreement, or to exercise any of its rights, shall not be construed as a waiver or relinquishment of such term, covenant, condition or right with respect to further performance or any other term, covenant, condition or right.

13.5 TITLES AND GROUPINGS The titles given to the articles of this Agreement are for ease of reference only and shall not be relied upon or cited for any other purpose. The grouping of the articles in this Agreement and of the Owner's specifications under the various headings is solely for the purpose of convenient organization and in no event shall the grouping of provisions, the use of sections or the use of headings be construed to limit or alter the meaning of any provisions.

13.6 ASSISTANCE OF COUNSEL AND INTERPRETATION The Parties agree that they had the opportunity to obtain the assistance of counsel in reviewing the Agreement terms prior to execution. This Agreement shall be construed neither against nor in favor of either Party, but shall be construed in a neutral manner.

13.7 RIGHTS AND REMEDIES The Parties' rights, liabilities, responsibilities and remedies with respect to this Agreement, whether in contract, tort, negligence or otherwise, shall be exclusively those expressly set forth in this Agreement.

13.8 ADDITIONAL PROVISIONS (Insert here other provisions, if any, that pertain to this Agreement See Below.)

13.9 COMPLIANCE WITH LAW AND REGULATIONS The Trade Contractor shall comply with all applicable federal, state, and local laws, rules, ordinances, regulations and orders when performing services and/or performing work under this Agreement, including without limitation, all laws applicable to the prevention of discrimination in employment and the use of targeted small businesses as subcontractors or suppliers. The Trade Contractor declares that it has complied with all federal, state and local laws regarding business permits and licenses that may be required to provide the services and work required by this Agreement. The Trade Contractor further acknowledges that if this Project is a recipient of Federal financial assistance that it may be subject to requirements of Federal Acts and Executive Orders as mandated by Federal agencies having authority and jurisdiction to enforce and ensure compliance with such laws and regulations including, but not necessarily limited to, the Davis Bacon Act and other Federal Acts and Executive Orders.

13.10 EMPLOYMENT PRACTICES: It is the intent of the Iowa Department of Administrative Services to assure equal employment opportunity in all contract work as required by law. Vendors, are required to take affirmative action to ensure that applicants employed or seeking employment with them are treated equally as required by law. Vendors shall not illegally discriminate against any employee. During the course of the Project, the Vendor may be required to show compliance with the EEO and Affirmative Action requirements. Noncompliance with the provisions set forth at the time of contract award may result in termination or suspension of the Agreement in whole or in part. All vendors and service providers working under the terms of this Agreement are prohibited from engaging in discriminatory employment practices forbidden by Iowa law. Vendors shall complete and submit the Nondiscrimination Clause form for the Owner's approval.

13.11 RECIPROCAL BIDDER PREFERENCE In accordance with Iowa Code Section 73A.21, as amended in 2011 by HF 648, if the Trade Contractor is not a resident bidder of Iowa, as defined by law, then the Trade Contractor must specifically identify in writing with its bid any and all preferences or preferential treatment (including preferences related to labor) enforced by the state or foreign country in which the Trade Contractor is a resident. If the low bid Trade Contractor is not a resident bidder of Iowa and the Trade Contractor's foreign State of residence enforces such a preference then the Owner shall reciprocally enforce the preference in favor of a resident bidder of Iowa. Failure on the part of the Trade Contractor to completely and accurately abide by this legal requirement may, among other things, result in civil penalties and void this Agreement. The Trade Contractor should contact its attorney regarding this legal requirement if the Trade

Contractor has questions regarding its meaning or application.

13.12 LABOR RELATIONS The Trade Contractor shall comply with all Iowa and Federal labor laws. In accordance with Executive Order Number 69, issued by the Governor of Iowa on or about January 14, 2011, no project labor agreement (also known as a PLA), or similar, will be used on this Project. Iowa is a right to work state. No consultant, contractor, or employee shall be obligated to contract with or join any labor organization as a condition of performing work on this Project.

ARTICLE 14 TRADE CONTRACT DOCUMENTS

14.1 The Trade Contract Documents in existence at the time of execution of this Agreement are as follows:

RFBXXXXXXXXX Bid Package X

14.2 INTERPRETATION OF TRADE CONTRACT DOCUMENTS

14.2.1 The drawings and specifications are complementary. If Trade Contract Work is shown only on one but not on the other, the Trade Contractor shall perform the Trade Contract Work as though fully described on both consistent with the Trade Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

14.2.2 In case of conflicts between the drawings and specifications, the specifications shall govern. In any case of omissions or errors in figures, drawings or specifications, the Trade Contractor shall immediately submit the matter to the Owner for clarification. The Owner's clarifications are final and binding on all Parties, subject to an equitable adjustment in Trade Contract Time or Price pursuant to ARTICLE 6 and ARTICLE 7 or dispute resolution in accordance with ARTICLE 12.

14.2.3 Where figures are given, they shall be preferred to scaled dimensions.

14.2.4 Any terms that have well-known technical or trade meanings, unless otherwise specifically defined in this Agreement, shall be interpreted in accordance with their well-known meanings. This Agreement entered into as of the date entered in ARTICLE 1.

14.2.5 PRECEDENCE In case of any inconsistency, conflict or ambiguity among the Trade Contract Documents, the documents shall govern in the following order: (a) Trade Contract Change Orders and written amendments to this Agreement; (b) this Agreement; (c) subject to subsection 14.2.2 the drawings, specifications and addenda issued prior to the execution of this Agreement; (d) approved submittals; (e) information furnished by the Owner pursuant to subsection 4.1.3; (f) other documents listed in this Agreement. Among all the Trade Contract Documents, the term or provision that is most specific or includes the latest date shall control. Information identified in one Trade Contract Document and not identified in another shall not be considered to be a conflict or inconsistency.

This Agreement entered into as of the date entered in ARTICLE 1.

OWNER State of Iowa, Department of Administrative Services

Trade Contractor: *Contractor Name*

By: _____

(Authorized Representative)

Name:

Title:

Date:

Owner: State of Iowa - DAS

By: _____

(Authorized Representative)

Name:

Title:

Date:

END OF DOCUMENT.

SECTION 00 6000
PERFORMANCE AND PAYMENT BOND

PART 1 - GENERAL

1.01 PERFORMANCE AND PAYMENT BOND

A. Performance and payment bonds to be used on this project, ConsensusDocs 260 and 261 are attached for reference following this page. ConsensusDocs performance and payment bonds are not required (other standard forms are acceptable to the State of Iowa).

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

CONSENSUSDOCS 260

PERFORMANCE BOND

This document was developed through a collaborative effort of organizations representing a wide cross-section of the design and construction industry. The organizations endorsing this document believe it represents a fair allocation of risk and responsibilities for all project participants.

Endorsing organizations recognize that this document must be reviewed and adapted to meet specific needs and applicable laws. This document has important legal and insurance consequences. You are encouraged to consult legal, insurance and surety advisors before completing or modifying this document. The software includes a notes section indicating where information is to be inserted to complete this document. Further information and endorsing organizations' perspectives are available at www.consensusdocs.org/guidebook.

For Use with ConsensusDOCS 200, Standard Form of Agreement and General Conditions Between Owner and Constructor (Where the Contract Price is a Lump Sum) and ConsensusDOCS 500, Standard Agreement and General Conditions Between Owner and Construction Manager.

The Owner, _____,(the "Owner") and the Constructor, _____,(the "Constructor") have entered into a Contract (the "Contract") dated _____ for _____(the "Project"). The Contract is incorporated by reference into this Performance Bond (the "Bond").

By virtue of this Bond, the Constructor as Principal and _____as Surety ("Surety"), are bound to the Owner as Obligee in the maximum amount of _____Dollars ($_____)(the "Bond Sum"). The Constructor and Surety hereby bind themselves, their heirs, executors,

administrators, successors and assigns, jointly and severally, as provided herein.

1. GENERAL CONDITIONS It is the condition of this Bond that if the Constructor performs its Contract obligations (the "Work"), the Surety's obligations under this Bond are null and void. Otherwise the Surety's obligations shall remain in full force and effect. The Surety waives any requirement to be notified of alterations or extensions of time made by the Owner in the Contract. The Owner may not invoke the provisions of this Bond unless the Owner has performed its obligations pursuant to the Contract. Upon making demand on this Bond, the Owner shall make the Contract Balance (the total amount payable by the Owner to the Constructor pursuant to the Contract less amounts properly paid by the Owner to the Constructor) available to the Surety for completion of the Work.

2. SURETY OBLIGATIONS If the Constructor is in default pursuant to the Contract and the Owner has declared the Constructor in default, the Surety promptly may remedy the default or shall

a. Complete the Work, with the consent of the Owner, through the Constructor or otherwise,

b. Arrange for the completion of the Work by a Constructor acceptable to the Owner and secured by performance and payment bonds equivalent to those for the Contract issued by a qualified surety. The Surety shall make available as the Work progresses sufficient funds to pay the cost of completion of the Work less the Contract Balance up to the Bond Sum, or

c. Waive its right to complete the Work and reimburse the Owner the amount of its reasonable costs, not to exceed the Bond Sum, to complete the Work less the Contract Balance.

3. DISPUTE RESOLUTION All disputes pursuant to this Bond shall be instituted in any court of competent jurisdiction in the location in which the Project is located and shall be commenced within two years after default of the Constructor or Substantial Completion of the Work, whichever occurs first. If this provision is prohibited by law, the minimum period of limitation available to sureties in the jurisdiction shall be applicable.

This Bond is entered into as of _____.

SURETY _____(seal)

By: .....

Print Name: _____

Print Title: _____

(Attach Power of Attorney)

Witness: .....

CONSTRUCTOR _____(seal)

By: .....

Print Name: _____

Print Title: _____

Witness: .....

(Additional signatures, if any, appear on attached page)

CONSENSUSDOCS 261

PAYMENT BOND

This document was developed through a collaborative effort of organizations representing a wide cross-section of the design and construction industry. The organizations endorsing this document believe it represents a fair allocation of risk and responsibilities for all project participants.

Endorsing organizations recognize that this document must be reviewed and adapted to meet specific needs and applicable laws. This document has important legal and insurance consequences. You are encouraged to consult legal, insurance and surety advisors before completing or modifying this document. The software includes a notes section indicating where information is to be inserted to complete this document. Further information and endorsing organizations' perspectives are available at www.consensusdocs.org/guidebook.

For Use with ConsensusDOCS 200, Standard Form of Agreement and General Conditions Between Owner and Constructor (Where the Contract Price is a Lump Sum) and ConsensusDOCS 500, Standard Agreement and General Conditions Between Owner and Construction Manager.

The Owner, _____,(the "Owner ") and the Constructor, _____, (the "Constructor") have entered into a Contract (the "Contract") dated _____ for _____(the "Project"). The Contract is incorporated by reference into this Payment Bond (the "Bond").

By virtue of this Bond, the Constructor as Principal and _____as Surety ("Surety"), are bound to the Owner as Obligee in the maximum amount of _____Dollars ($_____)(the "Bond Sum"). The Constructor and Surety hereby bind themselves, their heirs, executors,

administrators, successors and assigns, jointly and severally, as provided herein.

1. GENERAL CONDITIONS It is the condition of this Bond that if the Constructor promptly makes payment of all sums for all labor, materials, and equipment furnished for use in the performance of the work required by the Contract, the Surety's obligations pursuant to this Bond are null and void. Otherwise the Surety's obligations shall remain in full force and effect. The Surety waives any requirement to be notified of alterations or extensions of time made by the Owner in the Contract.

2. SURETY OBLIGATION Every Claimant who has not been paid in full before the expiration of a period of ninety (90) Days after such Claimant provided or performed the last of the work or labor, or furnished the last of the materials for which said claim is made, may have a right of action on this Bond. The Surety's obligation to the Claimant(s) shall not exceed the Bond Sum.

3. LIMITATION OF ACTION No suit or action shall be commenced on this Bond by any Claimant

a. Unless Claimant, other than one having a direct Contract with the Constructor, shall have given written notice to the Constructor, the Owner and the Surety within ninety (90) Days after the Claimant provided or performed the last of the work or labor, or furnished the last of the materials for which the claim is made, stating with substantial accuracy the amount claimed and the name of the Party to whom the materials were furnished, or for whom the work or labor was provided or performed. Such notice shall be served by any means which provides written third party verification of delivery to the Constructor at any place it maintains an office or conducts business, or served in any manner in which legal process may be served in the state in which the Project is located.

b. After the expiration of one (1) year from the date on which the Claimant last performed labor or furnished materials or equipment on the Project. If this provision is prohibited by law, the minimum period of limitation available to sureties in the jurisdiction shall be applicable.

c. Other than in any court of competent jurisdiction in the location in which the Project is located.

4. CLAIMANT A Claimant is defined as an individual or entity having a direct contract with the Constructor or having a contract with a subcontractor having a direct contract with the Constructor to furnish labor, materials or equipment for use in the performance of the Contract.

This Bond is entered into as of _____.

SURETY _____(seal)

By: .....

Print Name: _____

Print Title: _____

(Attach Power of Attorney)

Witness: .....

CONSTRUCTOR _____(seal)

By: .....

Print Name: _____

Print Title: _____

Witness: .....

(Additional signatures, if any, appear on attached page)

SECTION 01 1200

CONTRACT SUMMARY

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Project Information
B. Project Summary
C. Bid Scope Summary
D. Work Hour Restrictions
E. Contractor Use of Site and Premisis
F. Owner Occupancy
G. Rules for Construction Workers
H. Bid Package Instructions

1.02 PROJECT INFORMATION

A. Facility Name/Location: Newton Correctional Facility, 307 S. 60th Ave W, Newton, Iowa 50208 (CRC).
B. DAS Project #: 9404.00
C. Owner: State of Iowa, Department of Administrative Services, Hoover State Office Building, Level 3 1305 East Walnut Street, Des Moines, IA 50319.

1.03 PROJECT SUMMARY

A. The project includes:
    1. Boiler Replacement (x2) in 2 phases including all associated equipment, fittings, piping.
    2. Removal and backfill of existing buried Underground Storage Tank (UST).
    3. Provide and install back up fuel source propane tank and all associated equipment, fittings, and piping.
    4. Target date for substantial completion is June 06, 2025.

1.04 BID SCOPE SUMMARY

A. Scope Applicable to All Bid Packages:
    1. The Contractor's Work includes all labor, supervision, materials, equipment, services, supplies, tools, facilities, transportation, hoisting, storage, disposal, receiving, licenses, inspections, certifications, overhead, profit, or other items required or reasonably inferable to properly and timely perform and complete all work and services to be performed by the Contractor pursuant to this Agreement. Unless specifically stated otherwise, incidental work required to accomplish the work of this Bid Package shall be included in the bid. This shall include but not be limited to, temporary facilities, protection of the work, security of equipment and work in progress, etc. Contractor's Work shall be performed in accordance with the Drawings, Specification Divisions 00 and 01, and Specification sections applicable to each Contractor's scope.
    2. Contractor is responsible for all labor and equipment to unload, account, and storage for all material delivered, stock, and delivery for this scope of work. Storage and delivery of materials and equipment at the Site shall be permitted only to the extent approved minimum 48 hours in advance by the Construction Manager, and if anything so stored obstructs the progress of any portion of the work or impacts the operations of the Owner, it shall be promptly removed or relocated by the Contractor without reimbursement.

3. On site supervision by Prime Contractor at all times when work by the contractor or their subcontractors/suppliers is taking place.
4. Provide all temporary facilities required for this scope of work including trailer, trailer power, telephone, secured storage, temporary power for work, temporary and task lighting for work, etc. as determined necessary by Contractor. Coordinate location of trailers, materials storage and utility lines with Construction Manager prior to mobilization to the project site. Limited space is available, and permission to bring any such facility or excess materials to the project site shall be prior approved by the Construction Manager.
5. Contractor shall provide all equipment and tools for Contractor's own cleanup. Clean up shall be done at end of every shift or more frequently if required for the Contractor to perform their work, for other Contractors to perform their work, for safety, as required by the Owner's operations, and at the discretion of the Construction Manager.
6. All turf, landscaping, and subgrade disturbances caused by equipment traffic or other activities by the Contractor's scope during construction shall be repaired or restored to proper conditions by the Contractor prior to Substantial Completion.
7. Protect adjacent existing buildings, structures, and/or improvements from damage from Scope of work. Repair existing building, structures, and/or improvements of damage caused during Contractor's Scope of work.

1.05 WORK HOUR RESTRICTIONS

A. Work hours are from 07:00 AM to 03.00 PM (Central Time Zone) Monday through Friday unless arrangements are made minimum 48 hours in advance, and approved by Facilities Manger and Construction Manager.

1.06 CONTRACTOR USE OF SITE AND PREMISIS

A. Construction Operations: Limited to areas noted on Drawings.
B. Provide access to and from site as required by law and Owner:
    1. Emergency Building Exists During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routs are temporarily altered.
    2. Do not obstruct roadways, sidewalks, or other public ways without permission of Owner and permit if required.
C. Facility will be occupied at all times during scope of work. Contractor personnel shall conduct themselves in an agreeable manner at all times. Failure to do so may result in removal from the work site.

1.07 OWNER OCCUPANCY

A. Owner intends to occupy the Project during both phases of the boiler replacement.
B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
C. Schedule the Work to accommodate Owner occupancy.

1.08 RULES FOR CONSTRUCITON WORKERS

A. The staff of the State of Iowa has a responsibility to protect the public by providing a secure environment. All work site rules must be followed to the letter, at all times.
B. All construction workers must have a background check and PREA training completed prior to entering the campus to perform work.
C. Hot Work Permit Processes and Fire Watch, when necessary, will be adhered to for this project. Hot Work Permit Program of the Contractor and Subcontractor's shall be submitted with Site

Specific Safety Plan prior to work. Permits documents shall be submitted to the Construction Manager (including permit closing documents) each occurrence at the end of each day when used. Site Specific Safety Plan shall be included in project submittals.

D. Excavation / Trenching Permit Process / Program when necessary, will be adhered to for this project. Excavation / Trenching Permit program shall be submitted with the Site-Specific Safety Plan prior to work. Documentation will be submitted to Construction Manager at the end of each day when used. Site Specific Safety Plan shall be included in project submittals.
E. All State properties are tobacco free. No smoking or non-smoke tobacco use will be permitted or tolerated on campus unless in designated areas.
F. You are permitted access only to the work site and no other area of the institution.
G. No drugs, alcohol, firearms, or weapons are allowed on the work site.
H. Do not leave money, drugs, alcohol, firearms, or weapons in your personal / company vehicles.
I. Company and personal vehicles are to be parked and locked in designated or authorized area of the work.
J. Record of tool inventory is required each day (check-in and check-out with facility/security employees).
K. Secure all tools at the end of the day.
L. Maintain control of all tools, supplies, and debris at all times during the work.
M. Never leave keys in any vehicle or accessible. If a security officer finds keys in a vehicle, they are under orders to turn them in to a security supervisor.
N. Do not give anything to residents or take anything from residents; if they offer, inform your supervisor.
O. Secure all tools at the end of each shift and/or end of each day. Never leave tools unattended. All tools shall be checked in at the beginning of the day and checked out at the end of the day. If security officers find loose tools, they are under order orders to turn them in to their supervisor.
P. All delivery vehicles must go directly to the job site work area. Extra time should be anticipated for all deliveries to achieve security check-in, inspections, and approvals. Provide minimum 24-hour notice to the facility of deliveries.
Q. During an emergency, follow the instruction(s) of the security staff.
R. Contractor shall wear clothing of different color, pattern, fashion, etc. as to distinguish themselves from residents.
S. Contractor shall include all temp toilet / dumpster(s) and associated fees for use and haul off/removal. Including associated dump fees.

1.09 BID PACKAGE INSTRUCTION – Construction Manager shall use the following outline at minimum to identify specific bid package instructions or attach within this section the internal instructions they utilize to manage and instruct the work performance. Non pre-approved alternates will not be accepted. Alternates shall be pre-approved through process described within these bid documents prior to bid date and by addendum process <u>ONLY</u> through the Issuing Officer.

A. **BID PACKAGE #01:**

1. **Boiler Replacement Summary**: Trade Contractor shall include all of the following, but not limited to, as part of the contract:
    a. Demo Existing Boilers in two (2) phases including associated equipment and concrete bases (mechanical / housekeeping pads).

b. Install two (2) New Boilers in two (2) phases including associated materials, equipment, and concrete bases.
    1) Boiler 1 = Phase One (1)
    2) Boiler 2 = Phase Two (2)
    3) Boiler 2 to remain in operation during phase one (1).
    4) New Boiler 1 to be commissioned and operating prior to phase tow (2) start.
c. Include all labor, materials, and equipment to complete the project. Also include test / balancing and Owner training.

2. **Specification Sections Included**: Division 00, 01, 03, 23.05.00, 23.05.05, 23.05.13, 23.05.15, 23.05.17, 23.05.19, 23.05.20, 23.05.23.02, 23.05.23.05, 23.05.29, 23.05.53, 23.05.93, 23.07.19, 23.08.02, 23.09.23, 23.11.23, 23.21.23, 23.21.23, 23.52.00, 26.05.00, 31.20.00

3. **Demo To Include** all of the following, but not limited to as part of the contract:
    a. Furnish and install all labor, equipment, and materials to complete selective demolition as identified on the contract documents.
    b. Include all debris removal from site and provide documentation of proper and legal disposal.
    c. Include all progress cleaning daily for all debris generated by scope of work.
    d. Include all permits required by local, state, and federal authorities having jurisdiction for this scope of work.
    e. Furnish and install all temporary protections, barricades, shoring, scaffolding, supports, and enclosures required to complete this scope of work until complete.
    f. Maintain temporary facilities and controls until permanent products being installed.
    g. Furnish and install all safety equipment and controls to perform the scope of this work that meets or exceeds OSHA, IOSHA, NFPA, NEC, and all other regulatory standards having jurisdiction.
    h. Coordinate with Construction Manager for all items affecting this package.
    i. Provide a clean and tidy edge at all cuts and / or core-drilling associated with this scope of work.

4. **Boiler Equipment, Components, and Systems** to include all the following, but not limited to as part of the contact:
    a. Furnish and install all labor, equipment, and materials for work described within contract documents.
    b. Include all progress cleaning daily for all debris generated by this scope of work.
    c. Included all permits required by local, state, and federal authorities having jurisdiction for this scope of work.
    d. Furnish and install all temporary protections, barricades, shoring, scaffolding, supports and enclosure required to complete this scope of work until complete.
    e. Maintain temporary facilities and controls until permanent products being installed.

f. Furnish and install all safety equipment and controls to perform the scope of this work that meets or exceeds OSHA, IOSHA, NFPA, NEC, and all other regulatory standards having jurisdiction.
g. Coordinate with Construction Manager for all items affecting this package.
h. Provide horizontal and vertical chamfered edge to all concrete bases (mechanical housekeeping pads).
    1) Provide submittal date identifying mix design, reinforcing, and shop drawings for each concrete base (mechanical housekeeping pad). See specification section 033000.

5. **Propane Tank:** 12,000 gallon used, reconditioned, and certified Propane Tank, Color "White", all Concrete, Supports, Bollards, Equipment, Components, and Complete Systems for boilers back up fuel system to include all of the following, but not limited to as part of the contract:
    a. Trade Contractor shall include all of the following, but not limited to, as parr of the contract: Engineered Stamped Concrete design for tank supports.
    b. Concrete for bollard fill. Minimum 28 day 3,500 psi concrete mix unless otherwise noted. See concrete specifications 033000.
    c. Furnish and install all labor, equipment, and materials for work described within contract documents.
    d. Include all progress cleaning daily for all debris generated by this scope of work.
    e. Include all permits required by local, state, and federal authorities having jurisdiction for this scope of work.
    f. Furnish and install all temporary protections, barricades, shoring, scaffolding, supports, and enclosures required to complete this scope of work until complete. Maintain temporary facilities and controls until permanent products being installed.
    g. Include a broom clean condition at completion of this scope of work. Called "Final Cleaning".
    h. Furnish and install all safety equipment and controls to perform the scope of this work that meets or exceeds OSHA, IOSHA, NFPA, NEC, and all other regulatory standards having jurisdiction.
        1) Bollard quantity for base bid is complete per detail F on M03 and counted on M02 of bid drawings dated 11/16/2024. Quantity for base bid is twenty-six.
            i. M03 quantity is twenty-four (24). See Unit Price #02.
            ii. Two (2) additional bollards per base bid to be placed at tank fill station.
            iii. See Unit Price #02 for add-on or deduct bollard price.
    i. Coordinate with Construction Manager for all items affecting this package.
    j. Coordinate / Schedule work with Construction Manager.
    k. Furnish and install all labor, materials, and equipment for tank filling piping and connections from fill location to propane tank.
    l. Provide horizontal and vertical chamfered edge to all concrete above grade.
    m. Provide air entrained concrete to all exterior concrete subject to freeze/thaw cycles. Include in concrete mix design submittal. See specifications 033000
    n. Furnish and install all labor, equipment, and materials to complete scope of work as identified on the contract documents for electrical and low voltage work.

6. **Electrical General Inclusions** to include all of the following, but not limited to as part of the contact:

a. Furnish all labor, equipment, and materials to ensure operation of phased equipment; existing or new described in the contract documents.
b. Furnish and install all labor, equipment, and materials to complete scope of work as identified on the contract documents for electrical and low voltage work.
c. Include all permits required by local, state, and federal authorities having jurisdiction for this scope of work.
d. This bidder acknowledges that routing as shown on the contract documents is schematic in nature. Offsets and modifications to routings shown to accommodate existing conditions and coordination with other trades is included.
e. Furnish and install all firestopping of all wall and floor penetrations is included in this bid regardless of wall rating for full height walls (floor shall be waterproof type). Include labeling of all wall and floor penetrations.
f. This bidder has reviewed all the contract documents in order to fully determine their respective scope of work, including drawings of other trades. Mechanical and Electrical drawings shall be referenced to properly locate mechanical and electrical equipment and devices.
g. Include connection/termination of all life safety and mechanical devices requiring electrical connections.
h. Furnish and install all hangers and supports for piping and equipment including roof supports.
i. Furnish and install labor and trash receptacles for daily clean-up of trash and debris related to this subcontractor's work and this subcontractor's personnel.
j. This bidder includes keeping a red-line record copy of the prints on the job site for marking up work that deviates from the shop drawings to be updated as the job progresses and to be incorporated into the As-Built Drawings in electronic format at the end of the job.
k. Provide all shop drawings and submittals in electronic PDF format.
l. Provide as built drawings in CAD and pdf format.
m. Provide all required code updates as part of this scope of work.

7. **Electrical Demolition** to include all of the following, but not limited to as part of the contact:
    a. All Materials/Equipment being provided is per plans and specifications. ABSOLUTELY NO SUBTSITUTIONS WILL BE PERMITTED IN THE BASE BID PRICING. Voluntary alternates must be presented separately and pre-approved prior to bid.
    b. Furnish and install all labor, equipment, and materials to complete selective demolition as identified on the contract documents.
    c. Furnish all labor, equipment, and materials to ensure operation of phased equipment; existing or new described in the contract documents.
    d. Cut, cap, drop, and make safe all electrical equipment, lighting, conduit and wiring into gondolas and remove to dumpster provided onsite. Dumpster to be provided by Bid Package #1.
    e. Disconnect and remove all power connections, conduit, and wiring/cabling to mechanical, plumbing, fire alarm, fire suppression, and other electrical equipment.
    f. Remove and dispose of light bulbs from all removed lighting as applicable.

g. Remove all existing above ceiling supports for removed electricals as applicable.
h. Provide all cutting, demolition, and patching of horizontal and vertical surfaces required to complete demolition and rough-in for new work.
i. Owner has first option to retain removed equipment, components, wiring, and associated accessory parts (piping, conduit, hangars, etc.)
j. Include removal of existing underground fuel storage tank controls wiring and conduits.

8. **HVAC General Inclusions** to include all of the following, but not limited to as part of the contact:
    a. All Materials/Equipment being provided is per plans and specifications. ABSOLUTELY NO SUBTSITUTIONS WILL BE PERMITTED IN THE BASE BID PRICING. Voluntary alternates **must be presented separately prior to bid**.
    b. Furnish and install all labor, equipment, and materials to complete scope of work as identified on the contract documents for HVAC relative scope of work.
    c. Include labor, materials, and equipment for boiler flue roof penetration(s).
    d. Coordinate roof penetration plan with Construction Manager.
        1) Boiler Flue to be doubled walled.
    e. Include all permits required by local, state, and federal authorities having jurisdiction for this scope of work.
    f. This bidder has reviewed all the contract documents in order to fully determine their respective scope of work, including drawings of other trades. Mechanical and Electrical drawings shall be referenced to properly locate mechanical and electrical equipment and devices.
    g. Furnish all labor, equipment, and materials to ensure operation of phased equipment; existing or new described in the contract documents.
    h. Furnish and install all firestopping of all wall and floor penetrations is included in this bid regardless of wall rating for full height walls (floor shall be waterproof type). Include labeling of all wall and floor penetrations.
    i. Provide all required labor, materials, equipment to reinstall (make connections) from new system to existing system as defined in the contract documents related to this scope of work.
    j. Furnish and install all duct and equipment identification as required by contract documents.
    k. Include new equipment support(s) required for new and relocated mechanical equipment as required by contract documents.
    l. Furnish and install labor and trash receptacles for daily clean-up of trash and debris related to this subcontractor's work and this subcontractor's personnel.
    m. This bidder includes keeping a red-line record copy of the prints on the job site for marking up work that deviates from the shop drawings to be updated as the job progresses and to be incorporated into the As-Built Drawings in electronic format at the end of the job.
    n. Provide all shop drawings and submittals in electronic PDF format.
    o. Provide as built drawings in CAD and pdf format.
    p. Provide all required code updates as part of this scope of work.

9. **Plumbing General Inclusions** to include all of the following, but not limited to as part of the contact:
    a. All Materials/Equipment being provided is per plans and specifications. ABSOLUTELY NO SUBTSITUTIONS WILL BE PERMITTED IN THE BASE BID PRICING. **Voluntary alternates must be presented separately prior to bid.**
    b. Include all permits required by local, state, and federal authorities having jurisdiction for this scope of work.
    c. Furnish and install plumbing fixtures per plumbing fixture schedule.
    d. Furnish and install water heater boiler system per plumbing fixture schedule, mechanical drawings and contract documents.
    e. Furnish and install all firestopping of all wall and floor penetrations is included in this bid regardless of wall rating for full height walls (floor shall be waterproof type). Include labeling of all wall and floor penetrations.
    f. Furnish and install all labor, equipment, and materials to complete scope of work as identified on the contract documents for Plumbing relative scope of work.
    g. This bidder has reviewed all the contract documents in order to fully determine their respective scope of work, including drawings of other trades. Mechanical and
    h. Electrical drawings shall be referenced to properly locate mechanical and electrical equipment and devices.
    i. Furnish and install all plumbing piping insulation (horizontal and vertical) as required to complete work.
    j. Furnish and install all piping and equipment identification as required by contract documents.
    k. Furnish and install all hangers and supports for piping and equipment including roof supports.
    l. Furnish and install all sleeves and escutcheons required for new plumbing work.
    m. Furnish and install all equipment listed on the plumbing drawings and schedules.
    n. Provide standard warranties and extended warranties for all system components as required by contract documents.
    o. Furnish all labor, equipment, and materials to ensure operation of phased equipment; existing or new described in the contract documents.
    p. Furnish and install labor and trash receptacles for daily clean-up of trash and debris related to this subcontractor's work and this subcontractor's personnel.
    q. This bidder includes keeping a red-line record copy of the prints on the job site for marking up work that deviates from the shop drawings to be updated as the job progresses and to be incorporated into the As-Built Drawings in electronic format at the end of the job.
    r. Provide all shop drawings and submittals in electronic PDF format.
    s. Provide as built drawings in CAD and pdf format.
    t. Provide all required code updates as part of this scope of work.
    u. Provide all required labor, materials, equipment to reinstall (make connections) from new system to existing system as defined in the contract documents related to this scope of work.

10. **Testing General Inclusions** to include all of the following, but not limited to as part of the contact:
    a. Provide testing for all electrical equipment as required by the specifications. Submit written reports upon testing completion for review.
    b. Provide attic stock as indicated in the contract documents.
    c. Standard warranties and extended warranties for all system components as required by specifications.
    d. Testing and certification of all equipment and systems as required by the Commissioning Agent including but not limited to Pre-Functional and Functional Performance Tests.
    e. Include testing of all systems while working in conjunction with the Commissioning Agent.
    f. Included all work required to complete commissioning process until final acceptance is granted by the Commissioning Agent.
    g. Submit all testing, certification, and commissioning documentation to the General Contractor/Construction Manager and Commissioning Agent.
    h. Supply, assemble, and maintain commissioning documentation binders as defined in the commissioning specifications in three ring binders and in electronic format in the General Contractor's Construction Office.
    i. Provide all testing equipment and electrical software and hardware required for commissioning activities to Commissioning Agent.
    j. Provide testing plan prior to commencement of startup including planning meeting attendance and coordination with Commissioning Agent.
    k. Attend all commissioning and coordination meetings scheduled by Commissioning Agent.
    l. Provide Owner training as defined by the commissioning specifications.
    m. Provide all closeout documentation as defined by the commissioning and the contract document specifications.

11. **Roofing General Inclusions** to include all of the following but not limited to as part of the contract:
    a. Due to the current warranty of the roof, all roofing work will need to be completed by Academy Roofing and below is contact information:
        1) Andrew Pritchard, Project Manager – Academy Roofing
            a) Cell Phone: 515-689-1225
            b) Office Phone: 515-964-2345
            c) Fax: 515-964-5514
            d) E-mail: apritchard@academyroofing.com
            e) 6361 NE 14th Street, Des Moines, IA 50313
    b. Qualified roofing contractor shall perform weather-tight patching of all roof penetrations.
    c. Existing roof warranties shall be maintained.
    d. Furnish and install all labor, equipment, and materials to complete scope of work as identified on the contract documents for roof patching relative scope of work.
    e. Submit weather-tight roof patching plan for approvals.
        1) Include methods and materials.
        2) Include existing roof manufacturers patching methods

and materials recommendations to maintain warranties.
3) Include extended warranty of roof patch labor and materials.

f. Include all permits required by local, state, and federal authorities having jurisdiction for this scope of work.
g. Coordinate roof patching with Construction Manager prior to work start.
h. This bidder has reviewed all the contract documents in order to fully determine their respective scope of work, including drawings of other trades. Mechanical and Electrical drawings shall be referenced to properly locate mechanical and electrical equipment and devices.
i. Furnish all labor, equipment, and materials to ensure operation of phased equipment; existing or new described in the contract documents.
j. Furnish and install labor and trash receptacles for daily clean-up of trash and debris related to this subcontractor's work and this subcontractor's personnel.

12. **Underground Storage Tank (UST) Removal Summary**: Trade Contractor shall include all of the following, but not limited to, as part of the contract:
    a. Complete removal of Underground Storage Tank (UST) per specification of the Department of Natural Resources (DNR) for removing Underground Storage Tank (UST).
    b. Include compacted backfill of suitable material per SUDAS requirements. Testing costs provided by others. Provide proctor sample and submittal information for fill material to be used. Coordinate testing with Construction Manager. Backfill to match existing grade elevations to ensure no settling or ponding from surface water.
    c. Includes specification: Defined within Department of Natural Resources (DNR) for removing Underground Storage Tank (UST).
    d. Removal Contractor shall hold active certifications with the Department of Natural Resources (DNR) to perform work included in the removal.
        1) Certification(s) will be included in Contractor Submittals.
    e. Work to include but not limited:
    f. Owner and/or Filing required documents to Department of Natural Resources (DNR):
        1) DNR Form 542-0274 UST Closure Claim Form
        2) DNR Form 542-1308 Notification of Tank Closure or Change-in-Service.
        3) All other required forms and documentation required for this scope of work.
    g. Visual Inspection of existing tank.
    h. Existing fluid removal. Calculate for 8,600 gallons of diesel fuel (plus or minus 100 gallons).
    i. All soil/water testing required and costs.
    j. Removal of unsuitable excavated material as discovered. Follow all regulatory requirements.
    k. Furnish and install all temporary protections, barricades, shoring, scaffolding, supports, and enclosures required to complete this scope of work until complete. Maintain temporary facilities and controls until permanent scope of work is complete.
    l. Maintain a clean work area.
    m. Furnish and install all safety equipment and controls to perform the scope of this work that meets or exceeds OSHA, IOSHA, NFPA,

NEC, and all other regulatory standards having jurisdiction.

n. Submittals shall include all of the following, but not limited to, as part of the contract:
    4) Safety Plan
        a) Include hazardous materials handling plan.
    5) Excavation Plan.
    6) Sample Dig Permit.
    7) Backfill Material
        a) Provide Unit Price Cost alternate for Structural Backfill – See Unit Price #03.
o. Provide daily and/or shift Dig Permits to include
    1) Excavation inspection.
    2) Soil Classifications.
    3) Access and Egress types and locations.
p. Provide Unit Price cost of per cubic yard contaminated soil removal. – See Unit Price #04.
    4) Load tickets and quantities will be submitted for pay request review.
q. Tank Removal
r. Tank disposal/recycle per Department of Natural Resources (DNR) Closure Claim requirements.
s. Pre-Transport tank cleaning and/or conditioning.\

13. **Propane Tank Summary**. Trade Contractor shall include all of the following, but not limited to, as part of the contract:

    a. Provide and install complete 12,000 gallon, used, reconditioned, and certified propane tank back-up fuel source system for new boilers. All alternates must be pre-approved and approval noted in Addendum posted through Issuing Officer.
    b. Reconditioned tank with a minimum 20-year warranty.
    c. Provide all labor, materials, and equipment for a complete and operational system meeting all applicable codes, State Fire Marshal recommendations, and approved structural review.
        1) Include all code / State Fire Marshal required safety devices including but not limited traffic protections, fencing, etc.
    d. Include minimum 5,000 gallons of liquid propane fill for startup and testing requirements.
    e. Include Unit Price for price per gallon over initial 5,000 gallons of propane per bid package #01. See Unit Price #05
    f. Submittals shall include all of the following, but not limited to, as part of the contract:
        1) Structural review of tank supports.
        2) Tank Supplier / Installer Qualifications.
        3) Code Compliance documentation.
        4) Tank recondition process, and applicable tank certification(s) after reconditioning.
        5) Tank plumbing, equipment, and safety devices.
        6) Tank Warranty – Minimum 20 year.
        7) Certificate of State of Iowa ownership of propane tank.

B. **Alternate #01** – **Removal of Control Systems from base bid**.

C. **Alternate #02** – **Liquid Propane Tank Size**.
   1. Alternates need to be pre-approved per pre-approval and addendum process described within these documents prior to bid date through Issuing Officer.
   2. List tank size and if tank is new or used on bid form.

D. **Unit Price #01** – **Replacement Valves**: See Bid Drawing M02 General Mechanical Note #3. Trade Contractor shall include all of the following, but not limited to, as part of the contract:
   1. Base bid to include Six (6) – 4" Replacement Valves.
   2. Unit price includes all necessary material, plus cost for delivery, installation, insurance, overhead, and profit for one (1) additional replacement valve.
   3. Adjustments of less than Six (6) replacement valves are to be adjusted by unit price credit amount back to Owner.
   4. Coordination: Define by operation of existing valves the quantity of additional valves beyond new construction valve requirements needed. Coordinate with Construction Manager quantity through Change Event in Procore prior and have Owner approval prior to installation.
   5. Reference Unit Price #01

E. **Unit Price #02** – **Bollard**. Trade Contractor shall include all of the following, but not limited to, as part of the contract:
   1. Cost to provide and install complete bollard as shown in drawing details in addition to bollard quantity.
   2. Base Bid Bollard Quantity is twenty-four (26) bollards as counted on M02 of bid drawings dated 11/16/2024 and adding two (2) for tank fill station. Unit Price #02 is for additional or deduct Change Order from field requirements.
   3. Reference Unit Price #02

F. **Unit Price #03** – **Structural Backfill of Tank Removal**. Trade Contractor shall include all of the following, but not limited to, as part of the contract:
   1. Provide Unit Pricing for structural backfill of removed tank for new propane tank saddles and related concrete per contact documents
   2. Coordinate with Construction Manager quantity through Change Event in Procore prior to have Owner approval prior to installation.
   3. Reference Unit Price #03

G. **Unit Price** #04 – **Removal of Contaminated Excavated Materials**. Trade Contractor shall include all of the following, but not limited to, as part of the contract:
   1. Provide Unit Pricing for removal per cubic yard of contaminated Excavated Materials.

i. Included in Unit Price if applicable:
   1. Special protection(s)
   2. Special dumping fee(s)
   3. Special permit(s)
   4. Additional mileage to contaminated soil dump site
   5. Other pricing additional to standard soil export
   2. Coordinate with Construction Manager quantity through Change Event in Procore prior and have Owner approval prior to installation.
   3. Reference Unit Price #04.

H. **Unit Price #05 – Liquid Propane**. Traded Contractor shall include all of the following, but not limited to, as part of the contract:
   1. Cost per gallon of liquid of propane beyond initial 5,000, which is included

in base bid.

2. Coordinate with Construction Manager quantity through Change Event in Procore and having Owner approval prior to installation.
3. Reference Unit Price #05

I. **Work Performed by Owner: Not Used**

J. **Owner Furnished Products: Not Used**

END OF SECTION

D. Design Professional's action on RFIs that may result in a change to the Contract Time or the Contract Sum/Price.
    1. If Trade Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Construction Manager in writing within ten (10) days of receipt of the RFI response.
E. On receipt of Design Professional's response in Procore, review the response and notify Design Professional within seven (7) days if Trade Contractor disagrees with response.

3.05 BACKGROUND CHECKS

A. Background checks must be performed on all on site employees, including sub-contractors.
B. The Contractor hereby explicitly authorized the Iowa DAS to conduct criminal history and/or other background investigation(s) of the Contractor, its officers, supervisory personnel, employees, and other staff retained by the Contractor or their sub-contractors for the performance of the contract.
C. E-mail containing process information for the necessary background checks will be sent to the awarded contractor.
D. A state of Iowa record check request form will be provided at the pre-construction meeting. Information required may include:
    1. Last Name
    2. First Name
    3. Middle Name
    4. Date of Birth
    5. State Driver' s License or State ID #
    6. Social Security #

3.06 UTILITY LOCATES/GROUND PENETRATIONS

A. Call Iowa One Call at 800-292-8989 to request a locate
    1. Requests must be least five (5) working days prior to ground penetration.

3.07 FIRE WATCH

A. Fire watch is to be performed any time the fire alarm is disabled for more than four hours. This includes both when the system is in bypass and when any detectors are disabled by removal or covering.
B. When fire alarm is disabled for four hours or less it will be at the discretion of Owner to determine if fire watch must be provided.
C. Written notice must be received two (2) working days prior to scheduling of fire watch.

END OF SECTION

CONSTRUCTION PROJECT REQUEST FOR NOTIFICATION AND/OR SERVICES FROM CAPITOL COMPLEX MAINTENANCE (CCM)

Notifications must be provided to Owner' s Representative to forward to CCM Plant Operations Manager. Information must be received by Owner' s Representative in email format. Notice for tunnel repairs must be received 11 days before the work is to occur (for tunnel shut downs). All other notices must be received by the Owners Representative 4 working days prior to the work occurring.

DAS Project Number: _____
Brief Description of Work: _____
_____
Building: _____
Affected Locations within Building: _____

Dates of Work: _____
Hours of Work: _____

Impact: [ ] Parking [ ] Noise [ ] Odors [ ] Equipment [ ] Other disruption
[ ] Dust [ ] Fire Alarm [ ] HVAC [ ] Plumbing/Restroom [ ] Lighting
[ ] Power/Electrical [ ] Private/Public Utility Locate [ ] _____

Escort: [ ] Required [ ] Not Required [ ] Need assistance to determine

Additional Information: (or attached map/drawing of affected area/impact)
_____

SECTION 01 3100.01

WEB BASED CONSTRUCTION MANAGEMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Owner and Contractor shall utilize **Procore Technologies, Inc. Procore** system for electronic submittal of all data and documents (unless specified otherwise by the owner's representative) throughout the duration of the Contract. **Procore** is a web-based electronic media site that is hosted by **Procore Technologies, Inc.**, utilizing their **Procore** web solution. **Procore** will be made available to all contractors' project personnel, subcontractor personnel, suppliers, consultants and the Designer of Record. The joint use of this system is to facilitate; electronic exchange of information, automation of key processes, and overall management of the contract. **Procore** shall be the primary means of project information submission and management. When required by the Owners representative, paper documents will also be provided. In the event of discrepancy between the electronic version and paper documents, the paper documents will govern. **Procore** is a registered trademark of **Procore Technologies,Inc.**

1.02 USER ACCESS LIMITATIONS

A. The Owner' s Representative/Construction Manager will control the Contractor's access to **Procore** by allowing access and assigning user profiles to accepted Contractor personnel. User profiles will define levels of access into the system, determine assigned function-based authorizations (determines what can be seen) and user privileges (determines what they can do). Sub-contractors and suppliers will be given access to **Procore** through the Contractor. Entry of information exchanged and transferred between the Contractor and its sub-contractors and suppliers on **Procore** shall be the responsibility of the Contractor.

1. Joint Ownership of Data: Data entered in a collaborative mode (entered with the intent to share as determined by permissions and workflows within the **Procore** system) by the Owner' s Representative and the Contractor will be jointly owned.

1.03 AUTOMATED SYSTEM NOTIFICATION AND AUDIT LOG TRACKING

A. Review comments made (or lack thereof) by the Owner on Contractor submitted documentation shall not relieve the Contractor from compliance with requirements of the Contract Documents. The Contractor is responsible for managing, tracking, and documenting the Work to comply with the requirements of the Contract Documents. Owner' s acceptance via automated system notifications or audit logs extends only to the face value of the submitted documentation and does not constitute validation of the Contractor's submitted information.

1.04 SUBMITTALS

A. See Section 01 3300 SUBMITTAL PROCEDURES:

B. Preconstruction Submittals

1. List of Contractor's key **Procore** personnel. Include descriptions of key personnel's roles and responsibilities for this project. Contractor should also identify their organization' s administrator on the list.

1.05 COMPUTER REQUIREMENTS

A. The Contractor shall use computer hardware and software that meets the requirements of the **Procore** system as recommended by **Procore Technologies, Inc.** to access and utilize

Procore. As recommendations are modified by **Procore**, the Contractor will upgrade their system(s) to meet the recommendations or better. Upgrading of the Contractor's computer systems will not be justification for a cost or time modification to the Contract. The contractor will ensure that connectivity to the **Procore** system (whether at the home office or job site) is accomplished through DSL, cable, T-1 or wireless communications systems. The minimum bandwidth requirement for using the system is 128kb/s. It is recommended a faster connection be used when uploading pictures and files into the system. **Procore** supports the current and prior two major versions of Chrome, Firefox, Internet Explorer, and Safari.

B. The Contractor shall be responsible for the validity of their information placed in **Procore** and for the abilities of their personnel. Accepted users shall be knowledgeable in the use of computers, including Internet Browsers, email programs, cad drawing applications, and Adobe Portable Document Format (PDF) document distribution program. The Contractor shall utilize the existing forms in **Procore** to the maximum extent possible. If a form does not exist in **Procore** the Contractor must include a form of their own or provided by the Owner representative as an attachment to a submittal. Adobe PDF documents will be created through electronic conversion rather than optically scanned whenever possible. The Contractor is responsible for the training of their personnel in the use of **Procore** (outside what is provided by the owner) and the other programs indicated above as needed.

C. User Access Administration: Provide a list of Contractor's key **Procore** personnel for the Owner's Representative acceptance. Contractor is responsible for adding and removing users from the system. The Owners Representative reserves the right to perform a security check on all potential users. The Contractor will be allowed to add additional personnel and sub-contractors to **Procore.**

1.06 CONNECTIVITY PROBLEMS

A. **Procore** is a web-based environment and therefore subject to the inherent speed and connectivity problems of the Internet. The Contractor is responsible for its own connectivity to the Internet. **Procore** response time is dependent on the Contractor's equipment, including processor speed, Internet access speed, etc. and current traffic on the Internet. The Owner will not be liable for any delays associated from the usage of **Procore** including, but not limited to: slow response time, down time periods, connectivity problems, or loss of information. The contractor will ensure that connectivity to the **Procore** system (whether at the home office or job site) is accomplished through DSL, cable, T-1 or wireless communications systems. The minimum bandwidth requirement for using the system is 128kb/s. It is recommended a faster connection be used when uploading pictures and files into the system. Under no circumstances shall the usage of the **Procore** be grounds for a time extension or cost adjustment to the contract.

1.07 TRAINING

A. The Construction Manager shall provide the necessary training to the Prime Contractor.

B. Contractor and Subcontractor training is found within Procore, provided by Procore Technologies, Inc..

PART 2 - PRODUCTS

2.01 DESCRIPTION

A. **Procore** project management application (no equal) Provided by Procore Technologies, Inc. www.**Procore**.com

PART 3 - EXECUTION

3.01 PROCORE UTILIZATION

A. **Procore** shall be utilized in connection with submittal preparation and information management required by Sections:
   1. PROJECT MANAGEMENT AND COORDINATION
   2. CONSTRUCTION PROGRESS DOCUMENTATION
   3. SUBMITTAL PROCEDURES
   4. QUALITY REQUIREMENTS
   5. Other Division One sections.
   6. Requirements of this section are in addition to requirements of all other sections of the specifications.

B. Design Document Submittals
   1. All design drawings and specifications shall be submitted as cad .dwg files or PDF attachments to the **Procore** submittal work flow process and form.

C. Shop Drawings
   1. Shop drawing and design data documents shall be submitted as cad .dwg files or PDF attachments to the **Procore** submittal work flow process and form. Examples of shop drawings include, but are not limited to:
   2. Standard manufacturer installation drawings.
   3. Drawings prepared to illustrate portions of the work designed or developed by the Contractor.
   4. Steel fabrication, piece, and erection drawings.

D. Product Data
   1. Product catalog data and manufacturer' s instructions shall be submitted as
   2. PDF attachments to the **Procore** submittal work flow process and form. Examples of product data include, but are not limited to:
   3. Manufacturer's printed literature.
   4. Preprinted product specification data and installation instructions.

E. Samples
   1. Sample submittals shall be physically submitted as specified in Section 01 3300 SUBMITTAL PROCEDURES. Contractor shall enter submittal data information into **Procore** with a copy of the submittal form(s) attached to the sample. Examples of samples include, but are not limited to:
   2. Product finishes and color selection samples.
   3. Product finishes and color verification samples.
   4. Finish/color boards.
   5. Physical samples of materials.

F. Administrative Submittals
   1. All correspondence and pre-construction submittals shall be submitted using **Procore**. Examples of administrative submittals include, but are not limited to:
   2. Digging permits and notices for excavation.
   3. List of product substitutions
   4. List of contact personnel.
   5. Notices for roadway interruption, work outside regular hours, and utility cut overs.
   6. Requests for Information (RFI).
   7. Construction progress Schedules and associated reports and updates.
      a. Each schedule submittal specified in CONSTRUCTION PROGRESS DOCUMENTATION shall be submitted as a native backed-up file (.PRX or .STX) of the scheduling program being used. The schedule will also be posted as a PDF

file in the format.

8. Plans for safety, demolition, environmental protection, and similar activities.
9. Quality Control Plan(s), Testing Plan and Log, Quality Control Reports, Production Reports, Quality Control Specialist Reports,Preparatory Phase Checklist, Initial Phase Checklist, Field Test reports, Summary reports, Rework Items List, etc.
10. Meeting minutes for quality control meetings, progress meetings, pre-installation meetings, etc.
11. Any general correspondence submitted.

G. Compliance Submittals
   1. Test reports, certificates, and manufacture field report submittals shall be submitted on **Procore** as PDF attachments. Examples of compliance submittals include, but are not limited to:
      a. Field test reports.
      b. Quality Control certifications.
      c. Manufacturer's documentation and certifications for quality of products and materials provided.

H. Record and Closeout Submittals
   1. Operation and maintenance data and closeout submittals shall be submitted on **Procore** as PDF documents during the approval and review stage as specified, with actual set of documents submitted for final. Examples of record submittals include, but are not limited to:
      a. Operation and Maintenance Manuals: Final documents shall be submitted as specified.
      b. As-built Drawings: Final documents shall be submitted as specified.
      c. Extra Materials, Spare Stock, etc.: Submittal forms shall indicate when actual materials are submitted.

I. Financial Submittals
   1. Schedule of Value, Pay Applications and Change Request Proposals shall be submitted on **Procore.** Supporting material for Pay Applications and Change Requests shall be submitted on **Procore** as PDF attachments. Examples of compliance submittals include, but are not limited to:
      a. Contractors Schedule of Values
      b. Contractors Monthly Progress Payment Requests
      c. Contract Change proposals requested by the project owner

J. Contractor Daily Reports – See Specification Section 01 3200.3.04
K. Project Progress Photos – See Specification Section 01 3200.3.05

END OF SECTION

SECTION 01 3200

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Construction Progress Schedule
B. Construction Manager' s Construction Schedule
C. Submittal Schedule
D. Daily Construction Reports
E. Progress Photographs

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 CONSTRUCTION MANAGER'S MASTER CONSTRUCTION SCHEDULE

A. Upon award of package, Contractor agrees to accept and meet or improve upon the schedule proposed in section **00 3113 PRELIMINARY SCHEDULE** with intermediate handoffs. Each package contractor will be required to participate in schedule coordination meetings with the Construction Manager.
B. If the bid package contractor does not meet the handoff milestones in the master construction schedule, the bid package contractor shall take measures to increase work forces, increase work hours, initiate revisions to means and methods of construction, and/or other similar measures as required to make up lost time and complete the work in accordance with the construction schedule and remain consistent with project progress and overall construction schedule. Such measures shall be at no additional cost to the Owner. The Construction Manager shall have sole discretion on decisions to accelerate work.
C. Updating the master construction schedule – Contractors are required to attend and participate in schedule coordination update meetings with the Construction Manager. This will be an opportunity for contractors to further define their scheduled scope of work in conjunction with other trades on site.
D. Acceptance of revised master construction schedule – After an updated master construction schedule has been issued via Procore, Contractors will have 48 hours to dispute the new schedule. All contractors will be held to the last fully accepted master construction schedule.

3.02 CONSTRUCTION PROGRESS SCHEDULE

A. Submit preliminary outline to the Construction Manager no later than 48 hours prior to the pre-construction meeting for coordination with Owner' s requirements.
B. Submit revised progress schedule with each application for payment.
C. Schedules will be electronically submitted through Procore.
D. Distribute copies of reviewed schedules to project site file, subcontractors, suppliers, and other concerned parties.
E. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.
F. Submit computer generated horizontal bar chart with separate line for each major portion of work or operation, identifying the first day of each week.
G. Show complete sequence of construction activity, identifying work of separate stages and other

logically grouped activities. Indicate early and late start, early and late finish, float dates, and duration.

H. Indicate estimated percentage of completion for each item of work at each submission.

I. Participate in joint review and evaluation of schedule with Construction Manager.

J. Revisions to schedules:

1. Indicate progress of each activity to date of submittal and projected completion date of each activity.
2. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.
3. Prepare narrative report to define problem areas, anticipate delays, and impact on schedule. Report corrective action taken, or proposed, and its effect including effect of changes on schedules of separate contractors.

3.03 **SUBMITTAL SCHEDULE**

A. Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, re-submittal, ordering, manufacturing, fabrications, and delivery when establishing dates.

1. Coordinate submittal schedule with list of subcontractors, the schedule of values, and construction schedule.
2. Submit concurrently with first complete submittal of contractor's construction schedule.

3.04 **DAILY CONSTRUCTION REPORTS**

A. Daily Construction Reports: Submitted at weekly intervals.

1. Daily Construction Reports will be submitted to Construction Manager.

B. Prepare a daily construction report recording the following information concerning events at project site:

1. Count of personnel at Project site
2. Equipment at Project site
3. Material Deliveries
4. High and low temperatures and general weather conditions, including presence of rain or snow
5. Accidents
6. Meetings and significant decisions
7. Unusual events
8. Stoppages, delays, shortages, and losses
9. Meter readings and similar recordings
10. Emergency procedures
11. Orders and requests of authorities having jurisdiction
12. Change orders received and implemented
13. Services connected and disconnected
14. Equipment or system tests and startups
15. Partial completions and occupancies
16. Substantial completions authorized

3.05 **PROGRESS PHOTOGRAPHS**

A. Progress photographs will be electronically submitted through Procore.

B. Photos to include but not limited to:

1. Daily photos of work in progress shall be entered by Contractor(s) into photo section of

Procore. Periodic Construction Photographs: Take photographs at regular intervals (daily). Select vantage points to show status of construction and progress since last photographs were taken.

2. Photo Albums will be pre-generated by Construction Manager. Photo Albums will be broke out into scope of work.
3. Photos to include but not limited to:
4. Pre-Construction. Prior to construction start, take photographs of project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Construction Manager.
5. Existing Conditions. Take additional photographs as required to record existing damage to site, structure, equipment, or finishes
6. All encapsulated work. Prior to encapsulating systems, components, equipment, and assemblies.
7. As-Builts
8. Inspections
9. Delivery Tickets
    a. Concrete Batch Tickets
    b. Equipment Delivery
        1) Delivery Tickets, Invoices, Bill of Ladings, etc.
        2) Before, During, and after unloading
        3) Damages – All damages
10. Thermal and Moisture Protections
    a. Installation
    b. Products used
11. Issues
12. Delays
13. All complete work prior
    a. Prior to turning over area to other contractors
    b. At Substantial Completion
    c. At completion of
        1) Observations
        2) Inspections
        3) Punch Lists
        4) Warranty work

C. Field Completion Construction Photographs: Take photographs after date of Substantial Completion for submission as project record documents. Construction Manager will inform of desired vantage points.

END OF SECTION

SECTION 01 3300

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Submittals for Review
B. Submittals for Information
C. Submittal Procedures
D. Samples

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
   1. Product Data
   2. Shop Drawings
   3. Samples for Selection
   4. Samples for Verification
B. Submit to Construction Manager to forward to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
C. Samples will be reviewed only for aesthetic, color, or finish selection.
D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record document purposes.

3.02 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
   1. Design data.
   2. Certificates.
   3. Test reports.
   4. Inspection reports.
   5. Manufacturer' s instructions.
   6. Manufacturer' s field reports.
   7. Other types indicated.
B. Submit for Construction Manager, Architect, and Owner' s knowledge. No action will be taken.

3.03 SUBMITTAL PROCEDURES

A. Submittals will be electronically submitted through Procore. Contractor will be invited to join web based program after issue of Notice of Intent to award.
B. Shop Drawing Procedures:
   1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Contract Documents and coordinating related Work.
   2. Do not reproduce the Contract Documents to create shop drawings.

3. Generic, non-project specific information submitted as shop drawings do not meet the requirements for shop drawings.

C. Transmit each submittal with a copy of approved submittal form.

D. Sequentially number the submittal form. Revise submittals with original number and a sequential numeric suffix.

E. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.

F. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.

G. Schedule submittals to expedite the project and coordinate submission of related items.

H. For each submittal review, allow 15 days excluding delivery time to and from the contractor.

I. Identify variations from the Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.

J. When revised for resubmission, identify all changes made since previous submission.

K. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

L. Submittals not requested will not be recognized or processed.

3.04 SAMPLES

A. Submit to Construction Manager to forward to Architect/Engineer for review for limited purpose for checking conformance with information given and design concept expressed in the Contract Documents.

B. Samples for selection as specified in product sections:

1. Submit to Construction Manager to forward to Architect/Engineer for aesthetic, color, or finish selections.
2. Submit samples of finishes from full range of manufacturer's standard colors, textures, and patterns to Construction Manager to forward to Architect/Engineer for selection.

C. Submit samples to illustrate functional and aesthetic characteristics of products, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

D. Include identification on each sample, with full project information.

E. Submit number of samples specified in individual specification sections.

F. Photograph of submitted samples, along with transmittal sheet, shall be uploaded as a submittal in Procore.

END OF SECTION

SECTION 01 4000

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. References
B. Quality assurance and control of installation
C. Tolerances
D. Defect Assessment
E. Inspection and testing laboratory services
F. Manufacturer's field services and reports

1.02 REFERENCES

A. Conform to reference standard in effect at date of contract.
B. When required by contract documents, obtain copies of standards.
C. Should specified reference standards conflict with contract documents request clarification from engineer before proceeding.
D. The contractual relationship of the parties to the contract shall not be altered from the contract documents by mention or inference otherwise in any reference document.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 QUALITY ASSURANCE/CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship to produce work of specified quality.
B. Comply fully with manufacturer's instructions, including each step in sequence.
C. Should manufacturer's instructions conflict with contract documents, request clarification from the engineer prior to proceeding.
D. Comply with specified standards as a minimum quality for the work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
E. Perform work by persons qualified to produce workmanship of specified quality
F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
G. Secure products in place with positive anchorage devices designed and sized to withstand stress, vibration, physical distortion, or disfiguration.

3.02 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable work. Do not permit tolerances to accumulate.
B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with contract documents, request clarification from Architect before proceeding.
C. Adjust products to appropriate dimensions; position before securing products in place.

3.03 DEFECT ASSESSMENT

A. Replace work or portions of work not conforming to specified requirements.

B. If, in the option of the Owner, it is not practical to remove and replace the work, Architect will direct an appropriate remedy or recommend adjusted payment.

3.04 INSPECTION AND TESTING

A. Owner shall include and pay for all required special inspections and testing required by IBC Section 1705, if applicable. This does not include inspections and testing required by other specification sections in this Project Manual. Copies of all testing and inspection reports shall be submitted to the Construction Manager and Design Professional by the testing and inspection agency.

B. Testing Agency Duties:
   1. Provide qualified personnel at site. Cooperate with Architect, Construction Manager, and contractor in performance of services.
   2. Perform specified sampling and testing of products in accordance with specified standards.
   3. Ascertain compliance of materials and mixes with requirements of contract documents.
   4. Immediately notify the Construction Manager and contractor of observed irregularities or non-conformance of work or products.
   5. Perform additional testing and inspections required by the Owner

C. Limits on Testing Agency/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirement of contract documents.
   2. Agency may not approve or accept any portion of the work.
   3. Agency may not assume any duties of the contractor.
   4. Agency has no authority to stop the work.

D. Contractor responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the work and to manufacturer' s facilities.
   3. Provide incidental labor and facilities:
      a. To provide access to work to be tested/inspected.
      b. To obtain and handle samples at the site or at source of products to be tested/inspected.
      c. To facilitate test/inspections.
      d. To provide storage and curing of test samples.
   4. Notify Construction Manager and laboratory 24 hours prior to expected time for operations requiring testing/inspection.

E. Re-testing required because of non-conformance to specified requirements shall be performed by the same testing agency on instruction by Architect/Construction Manager.

F. Re-testing required because of non-conformance to specified requirements shall be paid for by the Contractor.

3.05 MANUFACTURER'S FIELD SERVICES AND REPORTS

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start up of equipment, test, adjust and balance of equipment as applicable and to initiate instructions when necessary.

B. Individuals are to report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to the manufacturers' written instructions.

C. Submit report in duplicate within 30 days of observation to Construction Manager for review.

END OF SECTION

SECTION 01 5000

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Temporary Utilities
B. Temporary Sanitary Facilities
C. Telephone Service
D. Removal of Utilities, Facilities, and Controls
E. Temporary Facilities
F. Equipment
G. Vehicular Access and Parking
H. Traffic Regulation
I. Barriers
J. Enclosures and Fencing
K. Waste Removal

1.02 TEMPORARY UTILITIES

A. Owner will provide the following:
   1. Electrical Power, consisting of connection to existing facilities.
   2. Water Supply, consisting of connection to existing facilities.
B. The Contractor shall pay for installation, maintenance, and removal of temporary utilities. Temporary utilities shall not disrupt the Facility' s need for continuous service.

1.03 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
B. Maintain daily in clean and sanitary condition.

1.04 TELEPHONE SERVICE

A. Provide, maintain, and pay for telephone service to field or use a cellular telephone.

1.05 REMOVAL OF UTILITIES, FACILITIES AND CONTROLS

A. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

PART 2 - PRODUCTS

2.01 TEMPORARY FACILITIES

A. Field Offices: Coordinate with Construction Manager and Owner if applicable.

2.02 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated, with class and extinguishing agent as required by locations and classes of fire exposures.

PART 3 - EXECUTION

3.01 VEHICULAR ACCESS AND PARKING

A. Use designated existing on-site roads for construction traffic.
B. Parking is as directed by Owner.
C. When site space is not adequate, provide additional off-site parking.
D. Use of designated existing on-site streets and driveways used for construction traffic is permitted. Track vehicles not allowed on paved areas.
E. Use of designated areas of existing parking facilities used by construction personnel as permitted.
F. Do not allow heavy vehicles or construction equipment in parking areas.
G. Provide and maintain access to fire hydrants, free of obstructions.
H. Provide means of removing mud from vehicle wheels before entering streets.

3.02 TRAFFIC REGULATION

A. Flag Persons: Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.
B. Flares and lights: Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.
C. Haul Routes:
   1. Consult with authority having jurisdiction, establish public thoroughfares to be used for haul routes and site access.
D. Removal:
   1. Remove equipment and devices when no longer required.
   2. Repair damage caused by demolition.

3.03 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for Owner' s use of site and to protect existing facilities and adjacent properties from damage during construction operations.
B. Provide barricades and covered walkways required by governing authorities for public rights-of-way.
C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

3.04 ENCLOSURES AND FENCING

A. Provide temporary enclosure and fences as necessary to protect the public and secure the site.
B. Provide security and facilities to protect work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

3.05 WASTE REMOVAL

A. Except for items or materials to be salvaged, recycled or otherwise reused, remove waste materials from project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
   1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
   2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
B. Burning: Do not burn waste materials.
C. Waste Disposal Facilities: Provide waste collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction.

END OF SECTION

SECTION 01 6000

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. General product requirements
B. Product options
C. Maintenance materials
D. Transportation and handling
E. Storage and protections

PART 2 - PRODUCTS

2.01 GENERAL PRODUCT REQUIREMENTS

A. Provide new products unless specifically required or permitted by the contract documents.
B. Do not use products having any of the following characteristics:
   1. Made using or containing CFC' s or HCFC' s
   2. Made of wood from newly cut old growth timber.
C. Where all other criteria are met, contractor shall give preference to products that:
   1. If used on interior, have lower emissions
   2. If wet-applied, have lower VOC content
   3. Are extracted, harvested, and/or manufactured closer to the location of the project
   4. Have longer documented life span under normal used
   5. Result in less construction waste
   6. Are made of vegetable materials that are rapidly renewable

2.02 PRODUCT OPTIONS

1. Products specified by reference standards or by description only: Use of any product meeting those standards or description.
2. Products specified by naming one or more manufacturers, with or without a provision for substitutions: Use a product of one of the manufacturers named and meeting specifications or submit a request for substitution for any manufacturer not named by the date specified in this project manual. Substitution requests shall be emailed to the Issuing Officer at the email address provided in Instructions to Bidders Section 1.04.

2.03 MAINTENANCE MATERIALS

1. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
2. Deliver to project site; obtain receipt prior to final payment.

PART 3 - EXECUTION

3.01 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer ' s instructions.
E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.02 STORAGE AND PROTECTIONS

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
B. Store and protect products in accordance with manufacturers ' instructions.
C. Store with seals and labels intact and legible.
D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to the product.
E. For exterior storage of fabricated products, place on slopped supports above ground.
F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
G. Comply with manufacturers' warranty conditions, if any.
H. Cover product subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
I. Prevent contact with material that may cause corrosion, discoloration, or staining.
J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 7300

EXECUTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures
B. Alteration project procedures
C. Cutting and patching
D. Cleaning and protection
E. Adjusting

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 EXAMINATION, PREPARATION, AND GENERAL INSTALLATION PROCEDURES

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
C. Examine and verify specific conditions described in individual specification sections.
D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misproduction.
E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
F. Prior to cutting: Examine existing conditions prior to commencing work; include elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.
G. Clean substrate surfaces prior to applying next material or substance.
H. Seal cracks or openings of substrate prior to applying next material or substance.
I. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.
J. Install products as specified in individual sections, in accordance with manufacturer ' s instructions and recommendations, and so as to avoid waste due to necessity for replacement.
K. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
L. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
M. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
N. Make neat transitions between different surfaces, maintaining texture and appearance.

3.02 ALTERATION PROJECT PROCEDURES

A. Materials: As specified in product sections match existing products and work for patching and extending work.
B. Employ skilled and experienced installer to perform alteration work.
C. Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.
D. Remove unsuitable material not marked for salvage, including rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished work.
E. Remove, cut and patch work in a manner to minimize damage and to provide a means of restoring products and finished to original condition.

F. Remove debris and abandoned items from area and from concealed spaces.
G. Refinish visible existing surfaces to remain in renovated rooms and spaces to specified condition for each material with a neat transition to adjacent finishes.
H. Where new work abuts or aligns with existing, perform a smooth and even transition. Patched work to match existing adjacent work in texture and appearance.
I. When finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line of division and make recommendation to the Construction Manager. Prior to cutting get the Owner's approval.
J. Where change of plane of ¼ inch or more occurs, submit recommendation for providing smooth transition to the Construction Manager for review.

3.03 CUTTING AND PATCHING

A. Employ skilled and experienced installer to perform cutting and patching.
B. Submit written request in advance of cutting or altering elements which affect:
   1. Structural integrity of element.
   2. Integrity of weather-exposed or moisture-resistant elements.
   3. Efficiency, maintenance, or safety of element.
   4. Visual qualities of sight exposed elements.
   5. Work of owner or separate contractor.
C. Execute cutting, fitting, and patching to complete work, and to:
   1. Fit the several parts together, to integrate with other work.
   2. Uncover work to install or correct ill-timed work.
   3. Remove and replace defective and non-conforming work.
   4. Remove samples of installed work for testing.
   5. Provide openings in elements of work for penetrations of mechanical and electrical work.
D. Execute work by methods to avoid damage to other work and which will provide proper surfaces to receive patching and finishing.
E. Cut rigid materials using masonry saw or core drill.
F. Cut masonry and concrete materials using masonry saw or core drill.
G. Restore work with new products in accordance with requirements of Contract Documents.
H. Fit work tight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.
I. Maintain integrity of wall, ceiling or floor construction; completely seal voids.
J. Refinish surfaces to match adjacent finishes. Refinish to nearest intersection for continuous surfaces. Refinish entire unit for continuous surfaces for an assembly.
K. Identify hazardous substances or conditions exposed during the work to the engineer for decision or remedy.

3.04 CLEANING AND PROTECTION

A. Progress cleaning
   1. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
   2. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.
B. Protection of installed work
   1. Protect installed work from damage by construction operations.
   2. Provide special protection where specified in individual specification sections.
   3. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
   4. Remove protective coverings when no longer needed; reuse or recycle plastic coverings if possible.
   5. Prohibit traffic from landscaped areas.

3.05 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

END OF SECTION

SECTION 01 7700

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Inspections
B. Substantial Completion
C. Project Record Documents
D. Warranties
E. Operations and Maintenance Manuals
F. Operations and Maintenance Data for Materials and Finishes
G. Operations and Maintenance Data for Equipment and Systems
H. Training
I. Final Completion
J. Maintenance

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 INSPECTIONS

A. Ensure all state inspections have been completed by the authority having jurisdiction.
B. Upload documentation of all test/inspections to Procore.
C. Submit a written request for inspection of Substantial Completion. On receipt of request, The Design Professional will either proceed with inspection or notify contractor of unfulfilled requirements. The Design Professional will prepare the Certificate of Substantial Completion after inspection or will notify contractor of items, either on contractor's list or additional items identified by architect that must be completed or corrected before certificate will be issued.
    1. Re-inspection: Request re inspection when the work identified in previous inspections as incomplete is completed or corrected.
    2. Results of completed inspection will form the basis of requirements for Final Completion.

3.02 SUBSTANTIAL COMPLETION

A. A substantial completion checklist is attached for reference following this specification section.
B. Make submittals that are required by governing or other authorities.
    1. Provide copies to the Construction Manager through upload to Procore.
C. Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
    1. Submit written certification that contract documents have been reviewed, work has be inspected, and that work is completed in accordance with contract documents and ready for review
    2. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the work has not been completed.
    3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
    4. Make final changeover of permanent locks and deliver key to the owner. Advise owner's personnel of changeover in security provisions.
    5. Complete startup testing of systems.
    6. Submit test/adjust, balance records.
    7. Terminate and remove temporary facilities from project site, along with mockups, construction tools, and similar elements.

8. Advise owner of changeover in heat and other utilities.
9. Submit changeover information related to owner's occupancy, use, operation, and maintenance.
10. Complete final cleaning requirements, including touch up painting.
11. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

3.03 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the work:
   1. Drawings
   2. Specifications
   3. Addenda
   4. Change orders and other modifications to the contract
   5. Reviewed shop drawings, product data, and samples
B. Ensure entries are complete and accurate, enabling future reference by Owner.
C. Store record documents separate from documents used for construction.
D. Record information concurrent with construction progress, not less than weekly.
E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Manufacturer' s name and product model and number.
   2. Product substitutions or alterations utilized.
   3. Changes made by Addenda and modifications.
F. Record Drawings:
   1. Measured depths of foundations in relation to finish first floor datum.
   2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the work.
   4. Field changes of dimension and detail.
   5. Details not on original contract drawings.
G. Record Drawings shall be uploaded to Procore in pdf format.

3.04 WARRANTIES

A. Submit written warranties for designated portions of the work where commencement of warranties other than date of Substantial Completion is indicated.
B. Submit properly executed warranties in Procore prior to Final Completion.
C. Verify that documents are in proper form, contain full information, and are notarized.
D. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
E. Include warranties in operation and maintenance manuals.
F. Items of work delayed beyond date of Substantial Completion, provide updated submittal after acceptance by Owner, listing date of acceptance as start of warranty period

3.05 OPERATIONS AND MAINTENANCE MANUALS

A. Format: Submit operations and maintenance manuals in the following format:
   1. Portable Document Format (PDF) electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Owner and upload to Procore.
      a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.

2. Assemble with data arranged in the same sequence as, and identified by the specification sections. Where systems involve more than one specification section, provide separate index for each system.
3. Include project directory listing title and address of project, names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.
4. Include Table of Contents listing every item separated by index and specification section.

B. Source Data: For each product or system, list names, addresses, and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

C. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

D. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use project record documents as maintenance drawings.

E. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.06 OPERATIONS AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For each product, applied material, and finish:
1. Product data, with catalog number, size, composition, and color and texture designations.
2. Information for re-ordering custom manufactured products.

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.

D. Additional information as specified in individual product specification sections.

E. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specified products.

3.07 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For each item of equipment and each system:
1. Description of unit or system, and component parts
2. Identify function, normal operating characteristics, and limiting conditions
3. Include performance curves, with engineering data and tests
4. Complete nomenclature and model number of replacement parts.

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specified products.

C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.

D. Include color coded wiring diagrams as installed.

E. Operating procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

F. Maintenance requirements: Include routine procedure and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

G. Provide servicing and lubrication schedule and list of lubricants required.

H. Include manufacturer's printed operation and maintenance instructions.

I. Include sequence of operation by controls manufacturer.

J. Provide original manufacturer' s parts list, illustrations, assembly drawings, and diagrams required for maintenance.
K. Provide control diagrams by controls manufacturer as installed.
L. Provide contractor' s coordination drawings, with color coded piping diagrams as installed.
M. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
N. Provide list of original manufacturer' s spare parts, current prices, and recommended quantities to be maintained in storage.
O. Include test and balancing reports.
P. Additional requirements: As specified in individual specification sections.

3.08 TRAINING

A. Demonstrate operations of systems, subsystems, and equipment.
B. Train in operation and maintenance of systems, subsystems, and equipment
C. 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.
D. Submit written agenda to Construction Manager for approval prior to scheduling training.
E. Engage qualified instructors to instruct Owner' s personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

3.09 FINAL COMPLETION

A. A final completion checklist is attached for reference following this specification section.
B. Before requesting final inspection for determining date of Final Completion, complete the following:
    1. Complete punch list items.
    2. Prepare and submit project record documents, operation and maintenance manuals, damage or settlement surveys, and similar final record information.
    3. Deliver tools, spare parts, extra materials, and similar items to location designated by owner. Label with manufacturer's name and model number where applicable.
    4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
    5. All trailers, construction signs, unused, broken or demolition materials have been removed from the site and the premises returned to the original condition in the opinion of the Owner and Design Professional.
    6. Submit a final Application for Payment (retainage).
C. Upon receipt of final payment complete final completion certificate in Procore.

END OF SECTION

Substantial Completion Project Checklist **Date:** _____

DAS Project Number: _____
Project Title: _____
Location: _____
Contractor: _____

In order to process the 99% payment (100% pay app less closeout and retainage) on a Capital Project, the Department of Administrative Services needs the following information. Please complete this form and obtain the necessary documents.

Have all state inspections been completed and documentation uploaded to Procore?
(Including but not limited to the following inspections)

Boiler Inspection ❑ **Yes** ❑ **No** ❑ **N/A**

Water Heater Inspection ❑ **Yes** ❑ **No** ❑ **N/A**

Energy Code Inspection ❑ **Yes** ❑ **No** ❑ **N/A**

Building Code Inspection ❑ **Yes** ❑ **No** ❑ **N/A**

Electrical Inspection ❑ **Yes** ❑ **No** ❑ **N/A**

Elevator Inspection ❑ **Yes** ❑ **No** ❑ **N/A**

Other: _____ ❑ **Yes** ❑ **No** ❑ **N/A**

❑ **Occupancy Permit if applicable**

❑ **Test and Balance has been performed**

❑ **Certificate of Substantial Completion in Procore (Consensus Docs 814)**

Are there any disputes with the above mentioned vendor which need resolution?

❑ **Yes (provide description below)** ❑ **No**

Can payment (less closeout and retainage) be released? ❑ Yes ❑ No

Final Completion Project Checklist

Date: _____

DAS Project Number: _____
Project Title: _____
Location: _____
Contractor: _____

In order to process the 100% payment and Retainage payment on a Capital Project, the Department of Administrative Services needs the following information. Please complete this form and obtain the necessary documents.

Have all Warranties been received? ❑ Yes ❑ No

Have the Operations and Maintenance Manuals been received? ❑ Yes ❑ No

Who is in possession of the O & M Manuals? _____

Has all training been completed? ❑ Yes ❑ No

Have all as-built drawings been scanned and uploaded into Procore? ❑ Yes ❑ No

Have electronic drawing/specification files been transferred to DAS? ❑ Yes ❑ No

Have all Test & Balance reports been received? ❑ Yes ❑ No

Have all punchlist items been corrected? ❑ Yes ❑ No

❑ **573 Notification** *(To be obtained from the general contractor):* Copy of general contractor' s notification of application for retainage to all subcontractors and suppliers. General contractor must follow IAC 26 section 23.13.2.

❑ **AIA Form G706 – Contractor' s Affidavit of Payment of Debts and Claims**

❑ **AIA Form G706A – Contractor' s Affidavit of Release of Liens**

❑ **AIA Form G707 – Consent of Surety Company to Final Payment**

❑ **Certificate of Final Completion in Procore (Consensus Docs 815)**

Are there any disputes with the above mentioned vendor which need resolution?

❑ **Yes (provide description below)** ❑ **No**

_____

_____

Can 100% payment and retainage payment be released? ❑ **Yes** ❑ **No**

NEWTON CORRECTIONAL FACILTIY
9404.4 DOC NCF CRC BOILER REPLACMENTS

SECTION 03 30 00 CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies cast-in-place structural concrete and materials and mixes for other concrete.

1.2 TESTING AGENCY FOR CONCRETE MIX DESIGN

A. Testing agency for the trial concrete mix design retained and reimbursed by the Contractor and approved by Owner PM.

B. Testing agency maintaining active participation in Program of Cement and Concrete Reference Laboratory (CCRL) of National Institute of Standards and Technology.

C. Testing agency shall furnish equipment and qualified technicians to establish proportions of ingredients for concrete mixes.

1.3 TOLERANCES

A. Formwork: ACI 117, except the elevation tolerance of formed surfaces before removal of shores is +0 inch and -3/4 inch.

Cross-Sectional Dimension: ACI 117, except tolerance for thickness of slabs 12 inches or less is +3/4 inch and -1/4 inch.

B. Slab Finishes: ACI 117, Section 4.5.6, F-number method in accordance with ASTM E1155, except as follows:

1. Test entire slab surface, including those areas within 6 feet of construction joints and vertical elements that project through slab surface.
2. Allow sample measurement lines that are perpendicular to construction joints to extend past joint into previous placement no further than 5 feet.

1.4 REGULATORY REQUIREMENTS

A. ACI SP-66 – ACI Detailing Manual.

B. ACI 318 - Building Code Requirements for Reinforced Concrete.

C. ACI 301 – Standard Specifications for Structural Concrete.

1.5 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES. All items indicated below are required submittals requiring Contracting Officer’s Representative (COR) review and approval.

B. Shop Drawings: Reinforcing steel: Complete shop drawings

C. Mill Test Reports:

1. Reinforcing Steel.
2. Cement.

D. Manufacturer's Certificates:

1. Abrasive aggregate.

2. Lightweight aggregate for structural concrete.
3. Air-entraining admixture.
4. Chemical admixtures, including chloride ion content.
5. Waterproof paper for curing concrete.
6. Liquid membrane-forming compounds for curing concrete.
7. Non-shrinking grout.
8. Liquid hardener.
9. Waterstops.
10. Expansion joint filler.
11. Adhesive binder.

E. Testing Agency for Concrete Mix Design: Approval request including qualifications of principals and technicians and evidence of active participation in program of Cement and Concrete Reference Laboratory (CCRL) of National Institute of Standards and Technology.

F. Test Report for Concrete Mix Designs: Trial mixes including water-cement ratio curves, concrete mix ingredients, and admixtures.

G. Shoring and Reshoring Sequence: Submit for approval a shoring and reshoring sequence for flat slab/flat plate portions, prepared by a registered Professional Engineer. As a minimum, include timing of form stripping, reshoring, number of floors to be re-shored and timing of re-shore removal to serve as an initial outline of procedures subject to modification as construction progresses. Submit revisions to sequence, whether initiated by COR (see FORMWORK) or Contractor.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Conform to ACI 304. Store aggregate separately for each kind or grade, to prevent segregation of sizes and avoid inclusion of dirt and other materials.

B. Deliver cement in original sealed containers bearing name of brand and manufacturer, and marked with net weight of contents. Store in suitable watertight building in which floor is raised at least 1 foot above ground. Store bulk cement in separate suitable bins.

C. Deliver other packaged materials for use in concrete in original sealed containers, plainly marked with manufacturer's name and brand, and protect from damage until used.

1.7 PRE-CONCRETE CONFERENCE

A. General: At least 15 days prior to submittal of design mixes, conduct a meeting to review proposed methods of concrete construction to achieve the required results.

B. Agenda: Includes but is not limited to:

1. Submittals.
2. Coordination of work.
3. Availability of material.
4. Concrete mix design including admixtures.

5. Methods of placing, finishing, and curing.
6. Finish criteria required to obtain required flatness and levelness.
7. Timing of finish measurements.
8. Material inspection and testing.

C. Attendees: Include but not limited to representatives of Contractor; subcontractors involved in supplying, conveying, placing, finishing, and curing concrete; lightweight aggregate manufacturer; admixture manufacturers; COR; Consulting Engineer; Department of Corrections; retained testing laboratories for concrete testing and finish (F-number) verification.

D. Minutes of the meeting: Contractor shall take minutes and type and distribute the minutes to attendees within five days of the meeting.

1.8 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

B. American Concrete Institute (ACI):

117-10	Specifications for Tolerances for Concrete Construction and Materials and Commentary
211.1-91(R2009)	Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
211.2-98(R2004)	Standard Practice for Selecting Proportions for Structural Lightweight Concrete
214R-11(R2019)	Guide to Evaluation of Strength Test Results of Concrete
301-16	Specifications for Structural Concrete
304R-00(R2009)	Guide for Measuring, Mixing, Transporting, and Placing Concrete
305.1-14	Specification for Hot Weather Concreting
306.1-90(R2002)	Standard Specification for Cold Weather Concreting
308.1-11	Specification for Curing Concrete
309R-05	Guide for Consolidation of Concrete
318/318-19	Building Code Requirements for Structural Concrete and Commentary
347R-14	Guide to Formwork for Concrete
SP-66-04	ACI Detailing Manual

C. American National Standards Institute and American Hardboard Association (ANSI/AHA):

A135.4-2012	Basic Hardboard

D. ASTM International (ASTM):

A615/A615M-20	Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement

A653/A653M-20 ..... Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by the Hot Dip Process

A706/A706M-16 ..... Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement

A767/A767M-19 ..... Standard Specification for Zinc Coated (Galvanized) Steel Bars for Concrete Reinforcement

A775/A775M-19 ..... Standard Specification for Epoxy Coated Steel Reinforcing Bars

A820/820M-16..... Standard Specification for Steel Fibers for Fiber Reinforced Concrete

A1064/A1064M-18a ..... Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

C31/C31M-19a..... Standard Practice for Making and Curing Concrete Test Specimens in the field

C33/C33M-18..... Standard Specification for Concrete Aggregates

C39/C39M-20..... Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

C94/C94M-19a..... Standard Specification for Ready Mixed Concrete

C143/C143M-20..... Standard Test Method for Slump of Hydraulic Cement Concrete

C150C150M-20..... Standard Specification for Portland Cement

C171-16 ..... Standard Specification for Sheet Materials for Curing Concrete

C172C172M-17..... Standard Practice for Sampling Freshly Mixed Concrete

C173/C173M-16..... Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

C192/C192M-19..... Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory

C231/C231M-17a..... Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

C260/C260M-10a(2016) ..... Standard Specification for Air Entraining Admixtures for Concrete

C309-19 ..... Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete

C330/C330M-17a..... Standard Specification for Lightweight Aggregates for Structural Concrete

C494/C494M-19..... Standard Specification for Chemical Admixtures for Concrete

C666/C666M-15..... Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing

C881/C881M-20..... Standard Specification for Epoxy Resin Base Bonding Systems for Concrete

C1107/1107M-20 ..... Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink)

C1315-19 ..... Standard Specification for Liquid Membrane Forming Compounds Having Special Properties for Curing and Sealing Concrete

D297-15(2019) ..... Standard Test Methods for Rubber Products Chemical Analysis

D412—16 ..... Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension

D1751-18 ..... Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)

D4263-83(2018) ..... Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.

F1249-20 ..... Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor

F1869-16a ..... Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

E. American Welding Society (AWS):
D1.4/D1.4M-18 ..... Structural Welding Code – Steel Reinforcing Bars

F. Concrete Reinforcing Steel Institute (CRSI):
Handbook 2008

G. U. S. Department of Commerce Product Standard (PS):
PS 1-07 ..... Structural Plywood
PS 20-20 ..... American Softwood Lumber Standard

H. U. S. Army Corps of Engineers Handbook for Concrete and Cement:
CRD C513 ..... Rubber Waterstops
CRD C572 ..... Polyvinyl Chloride Waterstops

PART 2 – PRODUCTS

2.1 FORMS

A. Wood: PS 20 free from loose knots and suitable to facilitate finishing concrete surface specified; tongue and grooved.

B. Plywood: PS-1 Exterior Grade B-B (concrete-form) 16 mm (5/8 inch), or 20 mm (3/4 inch) thick for unlined contact form. B-B High Density Concrete Form Overlay optional.

C. Metal for Concrete Rib-Type Construction: Steel (removal type) of suitable weight and form to provide required rigidity.

D. Permanent Steel Form for Concrete Slabs: Corrugated, ASTM A653, Grade E, and Galvanized, ASTM A653, G90. Provide venting where insulating concrete fill is used.

E. Corrugated Fiberboard Void Boxes: Double faced, completely impregnated with paraffin and laminated with moisture resistant adhesive, size as shown. Design forms to support not less than 48 KPa (1000 psf) and not lose more than 15 percent of their original strength after being completely submerged in water for 24 hours and then air dried.

F. Form Lining:

1. 1. Hardboard: ANSI/AHA A135.4, Class 2 with one (S1S) smooth side)
2. 2. Plywood: Grade B-B Exterior (concrete-form) not less than 6 mm (1/4 inch) thick.
3. 3. Plastic, fiberglass, or elastomeric capable of reproducing the desired pattern or texture.

G. Concrete products shall comply with following standards for biobased materials:

Material Type	Percent by Weight
Concrete Penetrating Liquid	79 percent biobased material
Concrete form Release Agent	87 percent biobased material
Concrete Sealer	11 percent biobased material

The minimum-content standards are based on the weight (not the volume)
of the material.

H. Form Ties: Develop a minimum working strength of 13.35 kN (3000 pounds) when fully assembled. Ties shall be adjustable in length to permit tightening of forms and not have any lugs, cones, washers to act as spreader within form, nor leave a hole larger than 20 mm (3/4 inch) diameter, or a depression in exposed concrete surface, or leave metal closer than 40 mm (1 1/2 inches) to concrete surface. Wire ties not permitted. Cutting ties back from concrete face not permitted.

2.2 MATERIALS

A. Portland Cement: ASTM C150 Type I or II.

B. Coarse Aggregate: ASTM C33.

1. Size 67 or Size 467 may be used for footings and walls over 012 inches thick.
2. Coarse aggregate for interior slabs on grade shall conform to the following:
   a. Dense or well graded aggregate.
      1) Percent retained on each sieve below the top size and above the No. 100 sieve:
         a) 8 to 18 percent for 1-1/2 inches top size.
         b) 8 to 22 percent for 3/4 or 1 inch top size.
      2) The above requirements may be deviated from based on locally available material.

a) One or two non-adjacent sieves sizes may fall outside of the limits set above.
b) Percent retained on two adjacent sieves sizes shall not be less than 5 percent of the above required.
c) Percent retained on three adjacent sieve sizes shall not be less than 8 percent of the above required.
d) When the percent retained on each of two adjacent sieve sizes is less than 8 percent the total percent retained on either of these sieves and the adjacent outside sieve should be at least 13 percent (for example, if both the No. 4 and No. 8 sieves have 6 percent retained on each item then: 1. the total retained on the 3/8 inch and No. 4 sieves should be at least 13 percent, and 2. the total retained on the No. 8 and No. 16 sieves should be at least 13 percent.

3. Coarse aggregate for applied topping, encasement of steel columns, and metal pan stair fill shall be Size 7.
4. Maximum size of coarse aggregates not more than one-fifth of narrowest dimension between sides of forms, one-third of depth of slabs, nor three-fourth of minimum clear spacing between reinforcing bars.

C. Lightweight Aggregates for Structural Concrete: ASTM C330, Table 1. Maximum size of aggregate not larger than one-fifth of narrowest dimension between forms, nor three-fourth of minimum clear distance between reinforcing bars. Contractor to furnish certified report to verify that aggregate is sound and durable, and has a durability factor of not less than 80 based on 300 cycles of freezing and thawing when tested in accordance with ASTM C666.
D. Fine Aggregate: ASTM C33. Fine aggregate for applied concrete floor topping shall pass a No. 4 sieve, 10 percent maximum shall pass a (No. 100) sieve.
E. Mixing Water: Fresh, clean, and potable.
F. Admixtures:
1. Water Reducing Admixture: ASTM C494, Type A and not contain more chloride ions than are present in municipal drinking water.
2. Water Reducing, Retarding Admixture: ASTM C494, Type D and not contain more chloride ions than are present in municipal drinking water.
3. High-Range Water-Reducing Admixture (Superplasticizer): ASTM C494, Type F or G, and not contain more chloride ions than are present in municipal drinking water. Use of superplasticizer requires COR approval.
4. Non-Corrosive, Non-Chloride Accelerator: ASTM C494, Type C or E, and not contain more chloride ions than are present in municipal drinking water. Admixture manufacturer must have long-term non-corrosive test data from an independent testing laboratory of at least one year duration using an acceptable accelerated corrosion test method such as that using electrical potential measures.

5. Air Entraining Admixture: ASTM C260.
6. Calcium Nitrite corrosion inhibitor: ASTM C494 Type C.
7. Prohibited Admixtures: Calcium chloride, thiocyanate or admixtures containing more than 0.05 percent chloride ions are not permitted.
8. Certification: Written conformance to the requirements above and the chloride ion content of the admixture prior to mix design review.

G. Reinforcing Steel: ASTM A615, or ASTM A996, deformed, grade as shown.

H. Welded Wire Fabric: ASTM A185.

I. Reinforcing Bars to be Welded: ASTM A706.

J. Galvanized Reinforcing Bars: ASTM A767.

K. Epoxy Coated Reinforcing Bars: ASTM A775.

L. Expansion Joint Filler: ASTM D1751.

M. Sheet Materials for Curing Concrete: ASTM C171.

N. Liquid Membrane-forming Compounds for Curing Concrete: ASTM C309, Type I, with fugitive dye, and shall meet the requirements of ASTM C1315.Compound shall be compatible with scheduled surface treatment, such as paint and resilient tile, and shall not discolor concrete surface.

O. Non-Shrink Grout:
   1. ASTM C1107, pre-mixed, produce a compressive strength of at least 18 MPa at three days and 35 MPa (5000 psi) at 28 days. Furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95 percent bearing under a 1200 mm x 1200 mm (4 foot by 4 foot) base plate.
   2. Where high fluidity or increased placing time is required, furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95 percent under an 450 mm x 900 mm (18 inch by 36 inch) base plate.

P. Adhesive Binder: ASTM C881.

Q. Waterstops:
   1. Polyvinyl Chloride Waterstop: CRD C572.

R. Porous Backfill: Crushed stone or gravel graded from 25 mm to 20 mm (1 inch to 3/4 inch).

S. Fibers:
   1. Synthetic Fibers: Monofilament or fibrillated polypropylene fibers for secondary reinforcing of concrete members. Use appropriate length and 0.9 kg/m^3 (1.5 lb. per cubic yard). Product shall have a UL rating.
   2. Steel Fibers: ASTM A820, Type I cold drawn, high tensile steel wire for use as primary reinforcing in slab-on-grade. Minimum dosage rate 18 kg/m^3 (30 lb. per cubic yard).

T. Epoxy Joint Filler: Two component, 100 percent solids compound, with a minimum shore D hardness of 50.

U. Bonding Admixture: Non-rewettable, polymer modified, bonding compound.

2.3 CONCRETE MIXES

A. Mix Designs: Proportioned in accordance with Section 5.3, "Proportioning on the Basis of Field Experience and/or Trial Mixtures" of ACI 318.
   1. If trial mixes are used, make a set of at least 6 cylinders in accordance with ASTM C192 for test purposes from each trial mix; test three for compressive strength at 7 days and three at 28 days.
   2. Submit a report of results of each test series, include a detailed listing of the proportions of trial mix or mixes, including cement, admixtures, weight of fine and coarse aggregate per cubic yard measured dry rodded and damp loose, specific gravity, fineness modulus, percentage of moisture, air content, water-cement ratio, and consistency of each cylinder in terms of slump.
   3. Prepare a curve showing relationship between water-cement ratio at 7-day and 28-day compressive strengths. Plot each curve using at least three specimens.
   4. If the field experience method is used, submit complete standard deviation analysis.

B. After approval of mixes no substitution in material or change in proportions of approval mixes may be made without additional tests and approval of the COR or as specified. Making and testing of preliminary test cylinders may be carried on pending approval of cement // and fly ash //, providing Contractor and manufacturer certify that ingredients used in making test cylinders are the same. The COR may allow Contractor to proceed with depositing concrete for certain portions of work, pending final approval of cement and approval of design mix.

C. Cement Factor: Maintain minimum cement factors in Table I regardless of compressive strength developed above minimums.

TABLE I - CEMENT AND WATER FACTORS FOR CONCRETE

Concrete Strength		Non-Air-Entrained	Air-Entrained	
Min. 28 Day Comp. Str. MPa (psi)	Min. Cement lbs./c. yd	Max. Water Cement Ratio	Min. Cement lbs/c. yd	Max. Water Cement Ratio
35 (5000)1,3	375 (630)	0.45	385 (650)	0.40
30 (4000)1,3	325 (550)	0.55	340 (570)	0.50
25 (3000)1,3	280 (470)	0.65	290 (490)	0.55

   1. If trial mixes are used, the proposed mix design shall achieve a compressive strength 1200 psi in excess of f'c. For concrete strengths above 5000 psi, the proposed mix design shall achieve a compressive strength 1400 psi in excess of f'c.
   2. For concrete exposed to high sulfate content soils maximum water cement ratio is 0.44.
   3. Determined by Laboratory in accordance with ACI 211.1 for normal concrete.

D. Maximum Slump: Maximum slump, as determined by ASTM C143 with tolerances as established by ASTM C94, for concrete to be vibrated shall be as shown in Table II.

SPEC WRITER NOTE: Refer to Section 32 05 23, CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS, for slump used for concrete walks, curbs, gutters, and pavements.

TABLE II - MAXIMUM SLUMP, MM (INCHES)

Type of Construction	Normal Weight Concrete	Lightweight Structural Concrete
Reinforced Footings and Substructure Walls	3 inches	3 inches
Slabs, Beams, Reinforced Walls, and Building Columns	4 inches	4 inches

E. Slump may be increased by the use of the approved high-range water-reducing admixture (superplasticizer). Tolerances as established by ASTM C94. Concrete containing the high-range-water-reducing admixture may have a maximum slump of 9 inches. The concrete shall arrive at the job site at a slump of 2 inches to 3 inches, and 3 inches to 4 inches for lightweight concrete. This should be verified, and then the high-range-water-reducing admixture added to increase the slump to the approved level.

F. Air-Entrainment: Air-entrainment of normal weight concrete shall conform with Table III. Determine air content by either ASTM C173 or ASTM C231.

TABLE III - TOTAL AIR CONTENT
FOR VARIOUS SIZES OF COARSE AGGREGATES (NORMAL CONCRETE)

Nominal Maximum Size of Total Air Content	Coarse Aggregate, mm (Inches) Percentage by Volume
3/8 in.:6 to 10	1/2 in:.5 to 9
3/4 in:.4 to 8	1 in: .3-1/2 to 6-1/2
1 1/2 in:.3 to 6	

G. High early strength concrete, made with Type III cement or Type I cement plus non-corrosive accelerator, shall have a 7-day compressive strength equal to specified minimum 28-day compressive strength for concrete type specified made with standard Portland cement.

H. Concrete slabs placed at air temperatures below 50 degrees Fahrenheit use non-corrosive, non-chloride accelerator. Concrete required to be air entrained use approved air entraining admixture. Pumped concrete, synthetic fiber concrete, architectural concrete, concrete required to be watertight, and concrete with a water/cement ratio below 0.50 use high-range water-reducing admixture (superplasticizer).

I. Durability: Use air entrainment for exterior exposed concrete subjected to freezing and thawing and other concrete shown or specified. For air content requirements see Table III.

J. Enforcing Strength Requirements: Test as specified in Section 01 45 29, TESTING LABORATORY SERVICES, during the progress of the work. Seven-day tests may be used as indicators of 28-day strength. Average of any three 28-day consecutive strength tests of laboratory-cured specimens representing each type of concrete shall be equal to or greater than specified strength. No single test shall be more than 500 psi below specified strength. Interpret field test results in accordance with ACI 214. Should strengths shown by test specimens fall below required values, the COR may require any one or any combination of the following corrective actions, at no additional cost to the State:

1. Require changes in mix proportions by selecting one of the other appropriate trial mixes or changing proportions, including cement content, of approved trial mix.
2. Require additional curing and protection.
3. If five consecutive tests fall below 95 percent of minimum values given in Table I or if test results are so low as to raise a question as to the safety of the structure, the COR may direct Contractor to take cores from portions of the structure. Use results from cores tested by the Contractor retained testing agency to analyze structure.
4. If strength of core drilled specimens falls below 85 percent of minimum value given in Table I, the COR may order load tests, made by Contractor retained testing agency, on portions of building so affected. Load tests in accordance with ACI 318 and criteria of acceptability of concrete under test as given therein.
5. Concrete work, judged inadequate by structural analysis, by results of load test, or for any reason, shall be reinforced with additional construction or replaced, if directed by the COR.

2.4 BATCHING AND MIXING

A. General: Concrete shall be "Ready-Mixed" and comply with ACI 318 and ASTM C94, except as specified. Batch mixing at the site is permitted. Mixing process and equipment must be approved by the COR. With each batch of concrete, furnish certified delivery tickets listing information in Paragraph 16.1 and 16.2 of ASTM C94. Maximum delivery temperature of concrete is 100 degrees Fahrenheit. Minimum delivery temperature as follows:

Atmospheric Temperature	Minimum Concrete Temperature
30 degrees to 40 degrees F	60 degrees F
0 degrees to 30 degrees F	70 degrees F

1. Services of aggregate manufacturer's representative shall be furnished during the design of trial mixes and as requested by the COR for consultation during batching, mixing, and placing operations of lightweight structural concrete. Services will be required until field controls indicate that concrete of required quality is being furnished. Representative shall be thoroughly familiar with the structural lightweight aggregate, adjustment and control of mixes to produce concrete of required quality. Representative shall assist and advise the COR.

PART 3 – EXECUTION

3.1 FORMWORK

A. General: Design in accordance with ACI 347 is the responsibility of the Contractor. The Contractor shall retain a registered Professional Engineer to design the formwork.
   1. Form boards and plywood forms may be reused for contact surfaces of exposed concrete only if thoroughly cleaned, patched, and repaired and the COR approves their reuse.
   2. Provide forms for concrete footings and supports unless the COR determines forms are not necessary.
   3. Corrugated fiberboard forms: Place forms on a smooth firm bed, set tight, with no buckled cartons to prevent horizontal displacement, and in a dry condition when concrete is placed.

B. Treating and Wetting: Treat or wet contact forms as follows:
   1. Coat plywood and board forms with non-staining form sealer. In hot weather, cool forms by wetting with cool water just before concrete is placed.
   2. Clean and coat removable metal forms with light form oil before reinforcement is placed. In hot weather, cool metal forms by thoroughly wetting with water just before placing concrete.
   3. Use sealer on reused plywood forms as specified for new material.

C. Size and Spacing of Studs: Size and space studs, wales and other framing members for wall forms so as not to exceed safe working stress of kind of lumber used nor to develop deflection greater than 1/270 of free span of member.

D. Unlined Forms: Use plywood forms to obtain a smooth finish for concrete surfaces. Tightly butt edges of sheets to prevent leakage. Back up all vertical joints solidly and nail edges of adjacent sheets to same stud with 6d box nails spaced not over 150 mm (6 inches) apart.

E. Lined Forms: May be used in lieu of unlined plywood forms. Back up form lining solidly with square edge board lumber securely nailed to studs with all edges in close contact to prevent bulging of lining. No joints in lining and backing may coincide. Nail abutted edges of sheets to same backing board. Nail lining at not over 8 inches on center along edges and with at least one nail to each square foot of surface area; nails to be 3d blued shingle or similar nails with thin flatheads.

F. Construction Tolerances:
   1. Set and maintain concrete formwork to assure erection of completed work within tolerances specified and to accommodate installation of other rough and finish materials. Accomplish remedial work necessary for correcting excessive tolerances. Erected work that exceeds specified tolerance limits shall be remedied or removed and replaced, at no additional cost to the State.
   2. Permissible surface irregularities for various classes of materials are defined as "finishes" in specification sections covering individual materials. They are to be distinguished from tolerances specified which are applicable to surface irregularities of structural elements.

3.2 PLACING REINFORCEMENT

A. General: Details of concrete reinforcement in accordance with ACI 318 unless otherwise shown.

B. Placing: Place reinforcement conforming to CRSI DA4, unless otherwise shown.

1. Place reinforcing bars accurately and tie securely at intersections and splices with 16 gauge black annealed wire. Secure reinforcing bars against displacement during the placing of concrete by spacers, chairs, or other similar supports. Portions of supports, spacers, and chairs in contact with formwork shall be made of plastic in areas that will be exposed when building is occupied. Type, number, and spacing of supports conform to ACI 318. Where concrete slabs are placed on ground, use concrete blocks or other non-corrodible material of proper height, for support of reinforcement. Use of brick or stone supports will not be permitted.
2. Lap welded wire fabric at least 1 1/2 mesh panels plus end extension of wires not less than 12 inches in structural slabs. Lap welded wire fabric at least 1/2 mesh panels plus end extension of wires not less than 6 inches in slabs on grade.
3. Splice column steel at no points other than at footings and floor levels unless otherwise shown.

C. Spacing: Minimum clear distances between parallel bars, except in columns and multiple layers of bars in beams shall be equal to nominal diameter of bars. Minimum clear spacing is 1 inch or 1-1/3 times maximum size of coarse aggregate.

D. Splicing: Splices of reinforcement made only as required or shown or specified. Accomplish splicing as follows:

1. Lap splices: Do not use lap splices for bars larger than Number 36 (Number 11). Minimum lengths of lap as shown.
2. Welded splices: Splicing by butt-welding of reinforcement permitted providing the weld develops in tension at least 125 percent of the yield strength (fy) for the bars. Welding conform to the requirements of AWS D1.4. Welded reinforcing steel conform to the chemical analysis requirements of AWS D1.4.
   a. Submit test reports indicating the chemical analysis to establish weldability of reinforcing steel.
   b. Submit a field quality control procedure to insure proper inspection, materials and welding procedure for welded splices.
   .
3. Mechanical Splices: Develop in tension and compression at least 125 percent of the yield strength (fy) of the bars. Stresses of transition splices between two reinforcing bar sizes based on area of smaller bar. Provide mechanical splices at locations indicated. Use approved exothermic, tapered threaded coupling, or swaged and threaded sleeve. Exposed threads and swaging in the field not permitted.

a. Initial qualification: In the presence of the COR, make three test mechanical splices of each bar size proposed to be spliced.

b. During installation: Furnish, at no additional cost to the State, one companion (sister) splice for every 50 splices for load testing.

E. Bending: Bend bars cold, unless otherwise approved. Do not field bend bars partially embedded in concrete, except when approved by the COR.

F. Cleaning: Metal reinforcement, at time concrete is placed, shall be free from loose flaky rust, mud, oil, or similar coatings that will reduce bond.

G. Future Bonding: Protect exposed reinforcement bars intended for bonding with future work by wrapping with felt and coating felt with a bituminous compound unless otherwise shown.

3.3 VAPOR BARRIER

A. Except where membrane waterproofing is required, interior concrete slab on grade shall be placed on a continuous vapor barrier.

1. Place 4 inches of fine granular fill over the vapor barrier to act as a blotter for concrete slab.
2. Vapor barrier joints lapped 6 inches and sealed with compatible waterproof pressure-sensitive tape.
3. Patch punctures and tears.

3.6 EXPANSION JOINTS AND CONTRACTION JOINTS

A. Clean expansion joint surfaces before installing premolded filler and placing adjacent concrete.

B. Install polyvinyl chloride or rubber water seals, in accordance with manufacturer's instructions, to form continuous watertight seal.

3.7 PLACING CONCRETE

C. Preparation:

1. Remove hardened concrete, wood chips, shavings and other debris from forms.
2. Remove hardened concrete and foreign materials from interior surfaces of mixing and conveying equipment.
3. Have forms and reinforcement inspected and approved by the COR before depositing concrete.
4. Provide runways for wheeling equipment to convey concrete to point of deposit. Keep equipment on runways which are not supported by or bear on reinforcement. Provide similar runways for protection of vapor barrier on coarse fill.

D. Bonding: Before depositing new concrete on or against concrete which has been set, thoroughly roughen and clean existing surfaces of laitance, foreign matter, and loose particles.

1. Preparing surface for applied topping:

a. Remove laitance, mortar, oil, grease, paint, or other foreign material by sand blasting. Clean with vacuum type equipment to remove sand and other loose material.

b. Broom clean and keep base slab wet for at least four hours before topping is applied.

c. Use a thin coat of one part Portland cement, 1.5 parts fine sand, bonding admixture; and water at a 50: 50 ratio and mix to achieve the consistency of thick paint. Apply to a damp base slab by scrubbing with a stiff fiber brush. New concrete shall be placed while the bonding grout is still tacky.

E. Conveying Concrete: Convey concrete from mixer to final place of deposit by a method which will prevent segregation. Method of conveying concrete is subject to approval of the COR.

F. Placing: For special requirements see Paragraphs, HOT WEATHER and COLD WEATHER.

1. Do not place concrete when weather conditions prevent proper placement and consolidation, or when concrete has attained its initial set, or has contained its water or cement content more than 1 1/2 hours.
2. Deposit concrete in forms as near as practicable in its final position. Prevent splashing of forms or reinforcement with concrete in advance of placing concrete.
3. Do not drop concrete freely more than 10 feet for concrete containing the high-range water-reducing admixture (superplasticizer) or 5 feet for conventional concrete. Where greater drops are required, use a tremie or flexible spout (canvas elephant trunk), attached to a suitable hopper.
4. Discharge contents of tremies or flexible spouts in horizontal layers not exceeding 20 inches in thickness, and space tremies such as to provide a minimum of lateral movement of concrete.
5. Continuously place concrete until an entire unit between construction joints is placed. Rate and method of placing concrete shall be such that no concrete between construction joints will be deposited upon or against partly set concrete, after its initial set has taken place, or after 45 minutes of elapsed time during concrete placement.
6. On bottom of members with severe congestion of reinforcement, deposit 1 inch layer of flowing concrete containing the specified high-range water-reducing admixture (superplasticizer). Successive concrete lifts may be a continuation of this concrete or concrete with a conventional slump.

G. Consolidation: Conform to ACI 309. Immediately after depositing, spade concrete next to forms, work around reinforcement and into angles of forms, tamp lightly by hand, and compact with mechanical vibrator applied directly into concrete at approximately 450 mm (18 inch) intervals. Mechanical vibrator shall be power driven, hand operated type with minimum frequency of 5000 cycles per minute having an intensity sufficient to cause flow or settlement of concrete into place. Vibrate concrete to produce thorough compaction, complete embedment of reinforcement and concrete of uniform and maximum density without segregation of mix. Do not transport concrete in forms by vibration.

1. Use of form vibration shall be approved only when concrete sections are too thin or too inaccessible for use of internal vibration.

2. Carry on vibration continuously with placing of concrete. Do not insert vibrator into concrete that has begun to set.

3.8 HOT WEATHER

A. Follow the recommendations of ACI 305 or as specified to prevent problems in the manufacturing, placing, and curing of concrete that can adversely affect the properties and serviceability of the hardened concrete. Methods proposed for cooling materials and arrangements for protecting concrete shall be made in advance of concrete placement and approved by the COR.

3.9 COLD WEATHER

A. Follow the recommendations of ACI 306 or as specified to prevent freezing of concrete and to permit concrete to gain strength properly. Use only the specified non-corrosive, non-chloride accelerator. Do not use calcium chloride, thiocyantes or admixtures containing more than 0.05 percent chloride ions. Methods proposed for heating materials and arrangements for protecting concrete shall be made in advance of concrete placement and approved by the COR.

3.10 PROTECTION AND CURING

A. Conform to ACI 308: Initial curing shall immediately follow the finishing operation. Protect exposed surfaces of concrete from premature drying, wash by rain and running water, wind, mechanical injury, and excessively hot or cold temperatures. Keep concrete not covered with membrane or other curing material continuously wet for at least 7 days after placing, except wet curing period for high-early-strength concrete shall be not less than 3 days. Keep wood forms continuously wet to prevent moisture loss until forms are removed. Cure exposed concrete surfaces as described below. Other curing methods may be used if approved by the COR.
   1. Liquid curing and sealing compounds: Apply by power-driven spray or roller in accordance with the manufacturer’s instructions. Apply immediately after finishing. Maximum coverage 400 square feet per gallon on steel troweled surfaces and 300 square feet per gallon on floated or broomed surfaces for the curing/sealing compound.
   2. Plastic sheets: Apply as soon as concrete has hardened sufficiently to prevent surface damage. Utilize widest practical width sheet and overlap adjacent sheets 2 inches. Tightly seal joints with tape.
   3. Paper: Utilize widest practical width paper and overlap adjacent sheets 2 inches. Tightly seal joints with sand, wood planks, pressure-sensitive tape, mastic or glue.

3.11 REMOVAL OF FORMS

A. Remove in a manner to assure complete safety of structure after the following conditions have been met.
   1. Where structure as a whole is supported on shores, forms for beams and girder sides, columns, and similar vertical structural members may be removed after 24 hours, provided

concrete has hardened sufficiently to prevent surface damage and curing is continued without any lapse in time as specified for exposed surfaces.

2. Take particular care in removing forms of architectural exposed concrete to insure surfaces are not marred or gouged, and that corners and arises are true, sharp and unbroken.

B. Control Test: Use to determine if the concrete has attained sufficient strength and curing to permit removal of supporting forms. Cylinders required for control tests taken in accordance with ASTM C172, molded in accordance with ASTM C31, and tested in accordance with ASTM C39. Control cylinders cured and protected in the same manner as the structure they represent. Supporting forms or shoring not removed until strength of control test cylinders have attained at least 70 percent of minimum 28-day compressive strength specified. Exercise care to assure that newly unsupported portions of structure are not subjected to heavy construction or material loading.

3.12 CONCRETE SURFACE PREPARATION

A. Metal Removal: Unnecessary metal items cut back flush with face of concrete members.

B. Patching: Maintain curing and start patching as soon as forms are removed. Do not apply curing compounds to concrete surfaces requiring patching until patching is completed. Use cement mortar for patching of same composition as that used in concrete. Use white or gray Portland cement as necessary to obtain finish color matching surrounding concrete. Thoroughly clean areas to be patched. Cut out honeycombed or otherwise defective areas to solid concrete to a depth of not less than 1 inch. Cut edge perpendicular to surface of concrete. Saturate with water area to be patched, and at least 6 inches surrounding before placing patching mortar. Give area to be patched a brush coat of cement grout followed immediately by patching mortar. Cement grout composed of one part Portland cement, 1.5 parts fine sand, bonding admixture, and water at a 50:50 ratio, mix to achieve consistency of thick paint. Mix patching mortar approximately 1 hour before placing and remix occasionally during this period without addition of water. Compact mortar into place and screed slightly higher than surrounding surface. After initial shrinkage has occurred, finish to match color and texture of adjoining surfaces. Cure patches as specified for other concrete. Fill form tie holes which extend entirely through walls from unexposed face by means of a pressure gun or other suitable device to force mortar through wall. Wipe excess mortar off exposed face with a cloth.

C. Upon removal of forms, clean vertical concrete surface that is to receive bonded applied cementitious application with wire brushes or by sand blasting to remove unset material, laitance, and loose particles to expose aggregates to provide a clean, firm, granular surface for bond of applied finish.

3.13 CONCRETE FINISHES

A. Vertical and Overhead Surface Finishes:
   1. Unfinished areas: Vertical and overhead concrete surfaces exposed in pipe basements, elevator and dumbwaiter shafts, pipe spaces, pipe trenches, above suspended ceilings, manholes, and other unfinished areas will not require additional finishing.
   2. Interior and exterior exposed areas to be painted: Remove fins, burrs and similar projections on surfaces flush, and smooth by mechanical means approved by the COR, and by rubbing lightly with a fine abrasive stone or hone. Use ample water during rubbing without working up a lather of mortar or changing texture of concrete.
   3. Interior and exterior exposed areas finished: Give a grout finish of uniform color and smooth finish treated as follows:
      a. After concrete has hardened and laitance, fins and burrs removed, scrub concrete with wire brushes. Clean stained concrete surfaces by use of a hone stone.
      b. Apply grout composed of one part of Portland cement, one part fine sand, smaller than a No. 30 sieve. Work grout into surface of concrete with cork floats or fiber brushes until all pits, and honeycombs are filled.
      c. After grout has hardened slightly, but while still plastic, scrape grout off with a sponge rubber float and, about 1 hour later, rub concrete vigorously with burlap to remove any excess grout remaining on surfaces.
      d. In hot, dry weather use a fog spray to keep grout wet during setting period. Complete finish of area in same day. Make limits of finished areas at natural breaks in wall surface. Leave no grout on concrete surface overnight.

B. Slab Finishes:
   1. Monitoring and Adjustment: Provide continuous cycle of placement, measurement, evaluation and adjustment of procedures to produce slabs within specified tolerances. Monitor elevations of structural steel in key locations before and after concrete placement to establish typical deflection patterns for the structural steel. Determine elevations of cast-in-place slab soffits prior to removal of shores. Provide information to the COR and floor consultant for evaluation and recommendations for subsequent placements.
   2. Set perimeter forms to serve as screed using either optical or laser instruments. For slabs on grade, wet screeds may be used to establish initial grade during strike-off, unless the COR determines that the method is proving insufficient to meet required finish tolerances and directs use of rigid screed guides. Where wet screeds are allowed, they shall be placed using grade stakes set by optical or laser instruments. Use rigid screed guides, as opposed to wet screeds, to control strike-off elevation for all types of elevated (non slab-on-grade) slabs. Divide bays into halves or thirds by hard screeds. Adjust as necessary where monitoring of

previous placements indicates unshored structural steel deflections to other than a level profile.

3. Place slabs monolithically. Once slab placement commences, complete finishing operations within same day. Slope finished slab to floor drains where they occur, whether shown or not.
4. Use straightedges specifically made for screeding, such as hollow magnesium straightedges or power strike-offs. Do not use pieces of dimensioned lumber. Strike off and screed slab to a true surface at required elevations. Use optical or laser instruments to check concrete finished surface grade after strike-off. Repeat strike-off as necessary. Complete screeding before any excess moisture or bleeding water is present on surface. Do not sprinkle dry cement on the surface.
5. Immediately following screeding, and before any bleed water appears, use a 10 foot wide highway straightedge in a cutting and filling operation to achieve surface flatness. Do not use bull floats or darbys, except that darbying may be allowed for narrow slabs and restricted spaces.
6. Wait until water sheen disappears and surface stiffens before proceeding further. Do not perform subsequent operations until concrete will sustain foot pressure with maximum of 1/4 inch indentation.
7. Scratch Finish: Finish base slab to receive a bonded applied cementitious application as indicated above, except that bull floats and darbys may be used. Thoroughly coarse wire broom within two hours after placing to roughen slab surface to insure a permanent bond between base slab and applied materials.
8. Float Finish: Slabs to receive unbonded toppings, steel trowel finish, fill, mortar setting beds, or a built-up roof, and ramps, stair treads, platforms (interior and exterior), and equipment pads shall be floated to a smooth, dense uniform, sandy textured finish. During floating, while surface is still soft, check surface for flatness using a 10 foot highway straightedge. Correct high spots by cutting down and correct low spots by filling in with material of same composition as floor finish. Remove any surface projections and re-float to a uniform texture.
9. Steel Trowel Finish: Concrete surfaces to receive resilient floor covering or carpet, monolithic floor slabs to be exposed to view in finished work, future floor roof slabs, applied toppings, and other interior surfaces for which no other finish is indicated. Steel trowel immediately following floating. During final troweling, tilt steel trowel at a slight angle and exert heavy pressure to compact cement paste and form a dense, smooth surface. Finished surface shall be smooth, free of trowel marks, and uniform in texture and appearance.
10. Broom Finish: Finish exterior slabs, ramps, and stair treads with a bristle brush moistened with clear water after surfaces have been floated. Brush in a direction transverse to main traffic. Match texture approved by the COR from sample panel.

11. Finished slab flatness (FF) and levelness (FL) values comply with the following minimum requirements:
    a. Areas covered with carpeting, or not specified otherwise in b. below:
        1) Slab on Grade:
            a) Specified overall value — F_F 25/F_L 20
            b) Minimum local value — F_F 17/F_L 15
        2) Level tolerance such that 80 percent of all points fall within a 20 mm (3/4 inch) envelope +10 mm, -10 mm (+3/8 inch, -3/8 inch) from the design elevation.
    b. Areas that will be exposed, receive thin-set tile or resilient flooring, or roof areas designed as future floors:
        1) Slab on grade:
            a) Specified overall value — FF 36/FL 20
            b) Minimum local value — FF 24/FL 15
        2) Level suspended slabs (shored until after testing) and topping slabs
            a) Specified overall value — FF 30/FL 20
            b) Minimum local value — FF 24/FL 15
        3) Unshored suspended slabs:
            a) Specified overall value — FF 30
            b) Minimum local value — FF 24
        4) Level tolerance such that 80 percent of all points fall within a 20 mm (3/4 inch) envelope +10 mm, -10 mm (+3/8 inch, -3/8 inch) from the design elevation.
    c. "Specified overall value" is based on the composite of all measured values in a placement derived in accordance with ASTM E1155.
    d. "Minimum local value" (MLV) describes the flatness or levelness below which repair or replacement is required. MLV is based on the results of an individual placement and applies to a minimum local area. Minimum local area boundaries may not cross a construction joint or expansion joint. A minimum local area will be bounded by construction and/or control joints, or by column lines and/or half-column lines, whichever is smaller.
12. Measurements
    a. Retained testing laboratory will take measurements as directed by the COR, to verify compliance with FF, FL, and other finish requirements. Measurements will occur within 72 hours after completion of concrete placement (weekends and holidays excluded). Make measurements before shores or forms are removed to insure the "as-built" levelness is accurately assessed. Profile data for above characteristics may be collected using a laser level or any Type II apparatus (ASTM E1155, "profileograph" or "dipstick").

Contractor's surveyor shall establish reference elevations to be used by retained testing laboratory.

b. Contractor not experienced in using FF and FL criteria is encouraged to retain the services of a floor consultant to assist with recommendations concerning adjustments to slab thicknesses, finishing techniques, and procedures on measurements of the finish as it progresses in order to achieve the specific flatness and levelness numbers.

13. Acceptance/ Rejection:
    a. If individual slab section measures less than either of specified minimum local F_F/F_L numbers, that section shall be rejected and remedial measures shall be required. Sectional boundaries may be set at construction and contraction (control) joints, and not smaller than one-half bay.
    b. If composite value of entire slab installation, combination of all local results, measures less than either of specified overall F_F/F_L numbers, then whole slab shall be rejected and remedial measures shall be required.
14. Remedial Measures for Rejected Slabs: Correct rejected slab areas by grinding, planing, surface repair with underlayment compound or repair topping, retopping, or removal and replacement of entire rejected slab areas, as directed by the COR, until a slab finish constructed within specified tolerances is accepted.

3.15 APPLIED TOPPING

A. Separate concrete topping on floor base slab of thickness and strength shown. Topping mix shall have a maximum slump of 200 mm (8 inches) for concrete containing a high-range water-reducing admixture (superplasticizer) and 100 mm (4 inches) for conventional mix. Neatly bevel or slope at door openings and at slabs adjoining spaces not receiving an applied finish.

B. Placing: Place continuously until entire section is complete, struck off with straightedge, leveled with a highway straightedge or highway bull float, floated and troweled by machine to a hard dense finish. Slope to floor drains as required. Do not start floating until free water has disappeared and no water sheen is visible. Allow drying of surface moisture naturally. Do not hasten by "dusting" with cement or sand.

3.18 PRECAST CONCRETE ITEMS

A. Precast concrete items, not specified elsewhere. Cast using 25 MPa (3000 psi) air-entrained concrete to shapes and dimensions shown. Finish to match corresponding adjacent concrete surfaces. Reinforce with steel for safe handling and erection.

END OF SECTION 03 30 00

SECTION 23 05 00 – COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. Section 01 33 00 - Submittal Procedures.

B. Section 01 74 21 - Construction / Demolition Waste Management and Disposal.

C. Section 01 78 00 - Closeout Submittals.

1.2 SUBMITTALS

A. Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

B. Shop drawings; submit drawings stamped and signed for approval by Owner.

C. Shop drawings to show:
1. Mounting arrangements.
2. Operating and maintenance clearances.

D. Shop drawings and product data accompanied by:
1. Detailed drawings of bases, supports, and anchor bolts.
2. Acoustical sound power data, where applicable.
3. Points of operation on performance curves.
4. Manufacturer to certify current model production.
5. Certification of compliance to applicable codes.

E. Closeout Submittals:
1. Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
2. Operation and maintenance manual approved by, and final copies deposited with, Owner before final inspection.
3. Operation data to include:
4. Control schematics for systems including environmental controls.
5. Description of systems and their controls.
6. Description of operation of systems at various loads together with reset schedules and seasonal variances.
7. Operation instruction for systems and component.
8. Description of actions to be taken in event of equipment failure.
9. Valves schedule and flow diagram.
10. Color coding chart.

F. Maintenance data to include:
1. Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
2. Data to include schedules of tasks, frequency, tools required and task time.

G. Performance data to include:
1. Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.

2. Equipment performance verification test results.
3. Special performance data as specified.
4. Testing, adjusting and balancing reports as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.

H. Approvals:
1. Submit 2 copies of draft Operation and Maintenance Manual to Owner for approval. Submission of individual data will not be accepted unless directed by Owner.
2. Make changes as required and re-submit as directed by Owner.

I. Additional data:
1. Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.

J. Site records:
1. Owner will provide one (1) set of reproducible mechanical drawings or AutoCAD files. Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.
2. Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.
3. Use different colour for each service.
4. Make available for reference purposes and inspection.

K. As-built drawings:
1. Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.
2. Identify each drawing in lower right hand corner in letters at least 1/2 inch high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).
3. Submit to Owner for approval and make corrections as directed.
4. Perform testing, adjusting and balancing for HVAC using as-built drawings.
5. Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.

L. Submit copies of as-built drawings for inclusion in final TAB report.

1.3 QUALITY ASSURANCE

A. Quality Assurance: in accordance with Section 01 45 00 - Quality Control.

B. Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.4 MAINTENANCE

A. Furnish spare parts in accordance with Section 01 78 00 - Closeout Submittals as follows:
1. One casing joint gasket for each size pump.
2. One head gasket set for each heat exchanger.
3. One filter cartridge or set of filter media for each filter or filter bank in addition to final operating set.

B. Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Section 01 78 00 - Closeout Submittals.

C. Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Waste Management and Disposal:

1. Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PRODUCTS

1.6 MATERIALS

A. All materials used on this project shall be new and Owner approved unless noted otherwise.

EXECUTION

1.7 PAINTING, REPAIRS AND RESTORATION

A. Do painting in accordance with Section 09 91 23 - Interior Painting.

B. Prime and touch up marred finished paintwork to match original.

C. Restore to new condition, finishes which have been damaged.

1.8 CLEANING

A. Clean interior and exterior of all systems including strainers. Protect open ends of ducts, diffusers, grilles and registers during construction to prevent ingress of dust and dirt into interior of ducts. If dust or dirt is detected prior to startup, vacuum interior of all ducts and air handling units. Prior to vacuuming use video camera to record condition of ductwork. Also use video camera to record condition of ducts after cleaning.

1.9 FIELD QUALITY CONTROL

A. Site Tests: conduct following tests in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - SUBMITTALS.

1. Submit tests as specified in other sections of this specification.

B. Manufacturer's Field Services:

1. Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.

2. Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3. Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

1.10 DEMONSTRATION

A. Owner will use equipment and systems for test purposes prior to acceptance. Contractor to supply labour, material, and instruments required for testing.

B. Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours prior to acceptance.

C. Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.

D. Instruction duration time requirements as specified in appropriate sections.

E. Owner may record these demonstrations on video tape for future reference.

1.11 PROTECTION

A. Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

END OF SECTION

SECTION 23 05 05 – SELECTIVE DEMOLITION FOR HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes requirements for selective demolition and removal of heating, ventilation and air conditioning systems, controls and automated automation components, and related mechanical components and incidentals required to complete work described in this Section.

1.2 RELATED SECTIONS

A. Section 01 74 00 – Cleaning.

B. Section 01 74 21 – Construction / Demolition Waste Management and Disposal

C. Section 23 08 02 – Cleaning and Start-up of Mechanical Piping Systems.

1.3 REFERENCE STANDARDS

A. CSA Group (CSA)
   1. CSA S350, Code of Practice for Safety in Demolition of Structures.

1.4 DEFINITIONS

A. Demolish: Detach items from existing construction and legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.

B. Remove: Planned deconstruction and disassembly of electrical items from existing construction including removal of conduit, junction boxes, cabling and wiring from electrical component to panel taking care not to damage adjacent assemblies designated to remain; legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.

C. Remove and Salvage: Detach items from existing construction and deliver them to Owner ready for reuse.

D. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

E. Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed and salvaged, or removed and reinstalled.

F. Hazardous Substances: Dangerous substances, dangerous goods, hazardous commodities and hazardous products may include asbestos, mercury and lead, PCB's, poisons, corrosive agents, flammable substances, radioactive substances, or other material that can endanger human health

or wellbeing or environment if handled improperly as defined by the Federal Hazardous Products Act (RSC 1985) including latest amendments.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate work of this Section to avoid interference with work by other Sections.

B. Account for Owner's continued occupancy requirements during selective demolition and schedule staged occupancy and worksite activities.

1.6 SITE CONDITIONS

A. Condition of materials identified as being salvaged or demolished are based on their observed condition on date that tender is accepted.

1.7 SALAVAGE AND DEBRIS MATERIALS

A. Demolished items become Contractor's property and will be removed from Project site; except for items indicated as being reused, salvaged, or otherwise indicated to remain Owner’s property or credited to Owner’s account.

B. Carefully remove materials and items designated for salvage and store in a manner to prevent damage or devaluation of materials

PART 2 - PRODUCTS

2.1 MATERIALS

A. Use only new materials required for completion or repair matching materials damaged during performance of work of this Section; new materials are required to meet assembly or system characteristics as existing systems indicated to remain and as required by the Authority Having Jurisdiction.

B. Use listed fire stopping materials compatible with existing fire stopping systems where removal or demolition work affects rated assemblies, restore to match existing fire rated performance.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Visit site, thoroughly examine and become familiar with conditions that may affect the work of this Section before tendering the Bid; Owner will not consider claims for extras for work or materials necessary for proper execution and completion of the contract that could have been determined by a site visit.

B. Identify on-site removal of walls and ceiling to facilitate the work.

C. Identify on-site testing of ductwork and equipment to facilitate the work.

3.2 PREPARATION

A. Protect systems and components indicated to remain in place during selective demolition operations and as follows:
   1. Prevent movement and install bracing to prevent settlement or damage of adjacent services and parts of existing buildings scheduled to remain.
   2. Notify Owner and cease operations where safety of buildings being demolished, adjacent structures or services appears to be endangered and await additional instructions before resuming demolition work specified in this Section.
   3. Prevent debris from blocking drainage inlets.
   4. Protect mechanical systems that must remain in operation.
   5. Ensure hazardous materials are removed or abated prior to commencing demolition.
   6. For components intended for relocation and reuse, remove, store, protect, clean and reinstall and connect to HVAC systems, and recommission.

B. Sequence demolition work so that interference with the use of the building by the Owner and users is minimized and as follows:

   1. Prevent debris from endangering the safe access to and egress from occupied buildings.
   2. Notify Owner and cease operations where safety of occupants appears to be endangered and await additional instructions before resuming demolition work specified in this Section.

3.3 EXECUTION

A. Disconnect and temporarily cap gas supply and electrical services in accordance with requirements of local Authority Having Jurisdiction.

B. Do not disrupt active or energized utilities without approval of the Owner.

C. Erect and maintain dust proof and weather tight partitions to prevent the spread of dust and fumes to occupied building areas; remove partitions when complete.

D. Demolish parts of existing building to accommodate new construction and remedial work as indicated.

E. At end of each work day, leave worksite in safe condition.

F. Perform demolition work in a neat and workmanlike manner:
   1. Remove any tools or equipment after completion of work, and leave site clean and ready for subsequent renovation work.
   2. Repair and restore damages caused as a result of work of this Section to match existing materials and finishes.

G. Conduct demolition of HVAC systems in accordance with local Authority Having Jurisdiction (AHJ) including the requirements of the Iowa Department of Corrections.

H. Coordinate removal of fuel oil tank with Iowa Department of Natural Resources. Provide IDNR with all required information, e.g.-tank registration numbers, soil test reports, etc. and secure all permitting required by the DNR. All expenses associated with meeting IDNR fuel tank decommissioning requirements and regulations are to be included in the contractor’s base bid.

3.4 CLOSEOUT ACTIVITIES

A. Arrange for legal disposal and remove demolished materials to accredited provincial landfill site or alternative disposal site (recycle center). Waste liquid fuels are to be disposed of in a manner acceptable to the Iowa Department of Natural Resources.

END OF SECTION 23 05 05

SECTION 23 05 13 – COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Electrical motors, drives and guards for mechanical equipment and systems.
   2. Supplier and installer responsibility indicated in Motor, Control and Equipment Schedule on electrical drawings and related mechanical responsibility is indicated on Mechanical Equipment Schedule on mechanical drawings.
   3. Control wiring and conduit specified in Division 26. Control wiring 50V or less for systems specified in Division 21, 22, 23 and 25 is by Division 25.

1.2 RELATED SECTIONS:

A. Section 01 33 00 - Submittal Procedures.

B. Section 01 74 21 – Construction/Demolition Waste Management and Disposal

1.3 REFERENCES

A. American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE)
   1. ASHRAE 90.1-2007, Energy Standard for Buildings Except Low-Rise Residential Buildings (IESNA cosponsored; ANSI approved; Continuous Maintenance Standard).

B. International Energy Conservation Code for Buildings (IECC).

C. Hazardous Materials Information System (HMIS).
   1. Material Safety Data Sheets (SDS).

D. National Electrical Manufacturers Association (NEMA).

1.4 SUBMITTALS

A. Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

B. Product Data:
   1. Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.
      a. Submit two copies of Workplace Hazardous Materials Information System (HMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures.
   2. Shop Drawings: Submit drawings stamped and signed for approval by Owner.
   3. Quality Control: in accordance with Section 01 45 00 - Quality Control.
      a. Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
      b. Instructions: submit manufacturer's installation instructions.
      c. Owner will make available one (1) copy of systems supplier's installation instructions.

4. Closeout Submittals
   a. Provide maintenance data for motors, drives and guards for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: work to be performed in compliance with Environmental Protection Agency (EPA), Iowa Department of Natural Resources (IDNR), and all other current and applicable state and local regulations.

B. Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling and unloading:
   1. Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.
   2. Deliver, store and handle materials in accordance with manufacturer's written instructions.

B. Waste Management and Disposal:
   1. Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 GENERAL

A. Motors to be premium efficiency, in accordance with current energy efficiency standards and the requirements of ASHRAE 90.1.

2.2 MOTORS

A. Provide motors for mechanical equipment as specified.

B. Motors under 1/2 HP : speed as indicated, continuous duty, built-in overload protection, resilient mount, single phase, 120 V, unless otherwise specified or indicated.

C. Motors 1/2 HP and larger: NEMA, Class B, 1.15 service factor, squirrel cage induction, premium efficiency, speed as indicated, continuous duty, enclosure as indicated, ball bearing, maximum temperature rise 40^{o} C, 208V 3 phase, unless otherwise indicated, for inverted duty for variable frequency drives.

D. Motors for use with variable frequency drives are to be provided with shaft grounding brushes.

2.3 TEMPORARY MOTORS

A. If delivery of specified motor will delay completion or commissioning work, install motor approved by Owner for temporary use. Work will only be accepted when specified motor is installed.

2.4 DRIVE GUARDS

A. Provide guards for unprotected drives.

B. Provide means to permit lubrication and use of test instruments with guards in place.

C. Guard for flexible coupling:
   1. "U" shaped, minimum 1/16 inch thick galvanized mild steel.
   2. Securely fasten in place.
   3. Removable for servicing.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

A. Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

A. Fasten securely in place.

B. Make removable for servicing, easily returned into, and positively in position.

3.3 FIELD QUALITY CONTROL

A. Site Tests: conduct following tests in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - SUBMITTALS.
   1. As specified in other sections of this specification.

B. Manufacturer's Field Services:
   1. Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
   2. Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
   3. Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.4 CLEANING

A. Proceed in accordance with Section 01 74 00 - Cleaning.

B. Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION 23 05 13

SECTION 23 05 15 – COMMON INSTALLATION REQUIREMENTS FOR HVAC PIPEWORK

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. Section 01 74 00 – Cleaning.

B. Section 01 74 21 – Construction / Demolition Waste Management and Disposal

C. Section 07 84 00 – Firestopping.

D. Section 23 08 02 – Cleaning and Start-up of Mechanical Piping Systems.

1.2 WASTE MANAGEMENT AND DISPOSAL

A. Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

B. Remove from site and dispose of packaging materials at appropriate recycling facilities.

C. Collect and separate for disposal, paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

D. Divert unused metal materials from landfill to metal recycling facility approved by Owner.

1.3 QUALITY ASSURANCE

A. Installers to be certified to journeyperson.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 CONNECTIONS TO EQUIPMENT

A. In accordance with manufacturer's instructions unless otherwise indicated.

B. Use valves and either unions or flanges for isolation and ease of maintenance and assembly.
   1. Unions are not required in installations using grooved mechanical couplings (The couplings shall serve as unions).

C. Use double swing joints when equipment is mounted on vibration isolation and when piping is subject to movement.

D. The flexible type grooved joint couplings may be used in lieu of a flexible connector at equipment connections for vibration attenuation and stress relief. Couplings shall be placed in close proximity to the source of the vibration, as per manufacturer's recommendations.

3.2 CLEARANCES

A. Provide clearance around systems, equipment and components for observation of operation, inspection, servicing, maintenance and as recommended by manufacturer.

B. Provide space for disassembly, removal of equipment and components as recommended by manufacturer or as indicated (whichever is greater) without interrupting operation of other system, equipment, components.

3.3 DRAINS

A. Install piping with grade in direction of flow except as indicated.

B. Install drain valve at low points in piping systems, at equipment and at section isolating valves.

C. Pipe each drain valve discharge separately to above nearest floor drain. Discharge to be visible.

D. Drain valves: NPS 3/4 gate or globe valves unless indicated otherwise, with hose end male thread, cap and chain.

3.4 AIR VENTS

A. Install automatic air vents at high points in piping systems or as indicated on drawings.

B. Install isolating valve at each automatic air valve.

C. Install drain piping to nearest floor drain location and terminate where discharge is visible.

3.5 DIELECTRIC WATERWAY FITTINGS AND COUPLINGS

A. General: Compatible with system, to suit pressure rating of system.

B. Locations: Where dissimilar metals are joined.

C. NPS 2 and under: Isolating waterway fittings, unions or bronze valves.
   1. Waterway fittings shall be complete with thermoplastic liner.

D. Over NPS 2: Isolating waterway fittings and flanges.
   1. Waterway fittings shall be complete with thermoplastic liner.

3.6 PIPEWORK INSTALLATION

A. Installation by certified journeyperson.

B. Screwed fittings jointed with Teflon tape or pipe dope as recommended by manufacturer.

C. Grooved joint couplings and fittings shall be installed in accordance with the manufacturer's written installation instructions.
   1. Gaskets shall be verified as suitable for the intended service prior to installation. Gaskets shall be molded and produced by the coupling manufacturer.
   2. The grooved coupling manufacturer's factory trained representative shall provide on-site training for contractor's field personnel in the use of grooving tools, application of groove, and installation of grooved joint products. The manufacturer's representative shall periodically visit the jobsite and review installation. Contractor shall remove and replace any joints deemed improperly installed.
      a. Pro-Press Piping may be used for ½" to 4" copper piping where approved by the Engineer and the Owner. Pro-Press piping is to be pressure tested and any leaks corrected prior to application of pipe insulation. Transition from copper to steel piping shall be made with approved dielectric flanges.
      b. Protect openings against entry of foreign material.
      c. Install to isolate equipment and allow removal without interrupting operation of other equipment or systems.
      d. Assemble piping using fittings manufactured to ANSI standards.
      e. Saddle type branch fittings may be used on mains if branch line is no larger than half the size of main.
         1. Hole saw (or drill) and ream main to maintain full inside diameter of branch line prior to welding saddle.
      f. Install exposed piping, equipment, rectangular cleanouts and similar items parallel or perpendicular to building lines.
      g. Install concealed pipework to minimize furring space, maximize headroom, conserve space.
      h. Slope piping, except where indicated, in direction of flow for positive drainage and venting.
      i. Install, except where indicated, to permit separate thermal insulation of each pipe.
      j. Group piping wherever possible and as indicated.
      k. Ream pipes, remove scale and other foreign material before assembly.
      l. Use eccentric reducers at pipe size changes to ensure positive drainage and venting. Eccentric reducers are to be installed with level flowline along the change of pipe sizes.
      m. Provide for thermal expansion as indicated.
      n. Valves:
         1. Install in accessible locations.
         2. Remove interior parts before soldering.
         3. Install with stems above horizontal position unless otherwise indicated.
         4. Valves accessible for maintenance without removing adjacent piping.
         5. Install globe valves in bypass around control valves.
         6. Use ball or butterfly valves at branch take-offs for isolating purposes except where otherwise specified.
         7. Install butterfly valves between weld neck flanges to ensure full compression of liner.
         8. Install ball valves for glycol service.
         9. Use chain operators on valves NPS 2-1/2 and larger where installed more than 8 feet above floor in Mechanical Rooms.
      o. Check Valves:
         1. Install silent check valves on discharge of pumps and in vertical pipes with downward flow and elsewhere as indicated.
         2. Install swing check valves in horizontal lines on discharge of pumps and elsewhere as indicated.

3.7 FLUSHING OUT OF PIPING SYSTEMS

A. In accordance with Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.

B. Before start-up, clean interior of piping systems in accordance with requirements of Section 01 74 00 - Cleaning supplemented as specified in relevant sections of other Divisions.

C. Preparatory to acceptance, clean and refurbish equipment and leave in operating condition, including replacement of filters in piping systems.

3.8 PRESSURE TESTING OF EQUIPMENT AND PIPEWORK

A. Advise Owner, 48 hours minimum prior to performance of pressure tests.

B. Pipework: Test as specified in relevant sections of other sections or Divisions.

C. Maintain specified test pressure without loss for four (4) hours minimum unless specified for longer period of time in relevant sections of other Divisions.

D. Prior to tests, isolate equipment and other parts which are not designed to withstand test pressure or media.

E. Conduct tests in presence of Owner. Work to be carried out in off hours after 5 p.m., weekends or holidays.

F. Pay costs for repairs or replacement, retesting, and making good. Owner to determine whether repair or replacement is appropriate.

G. Insulate or conceal work only after approval and certification of tests by Owner.

3.9 EXISTING SYSTEMS

A. Connect into existing piping systems at times approved by Owner. Work to be carried out off hours after 5 p.m., weekends or holidays.

B. Request written approval ten (10) working days minimum, prior to commencement of work.

C. Be responsible for damage to existing plant by this work.

D. Ensure daily clean-up of existing areas.

END OF SECTION 23 05 15

SECTION 23 05 17 – PIPE WELDING

PART 1 - GENERAL

RELATED SECTIONS

A. Section 01 74 21 – Construction/Demolition Waste Management and Disposal

B. Section 23 05 15 - Common Installation Requirements for HVAC Pipework.

C. Section 23 21 13.02 - Hydronic Systems: Steel

REFERENCES

D. American National Standards Institute/American Society of Mechanical Engineers. (ANSI/ASME)
   1. ANSI/ASME B31.1, Power Piping.
   2. ANSI/ASME B31.3, Process Piping.
   3. ANSI/ASME B31.5, Refrigeration Piping and Heat Transfer Components.
   4. ANSI/ASME B31.9 Building Services.
   5. ANSI/ASME Boiler and Pressure Vessel Code
      a. Section I: Power Boilers.
      b. Section V: Nondestructive Examination.
      c. Section IX: Welding and Brazing Qualifications.

E. American National Standards Institute/American Water Works Association (ANSI/AWWA)
   1. ANSI/AWWA C206, Field Welding of Steel Water Pipe.

F. American Welding Society (AWS)
   1. AWS C1.1, Recommended Practices for Resistance Welding.
   2. AWS Z49.1, Safety Welding, Cutting and Allied Process.
   3. AWS W1, Welding Inspection Handbook.

D. American Standards for Testing and Materials (ASTM)
   1. Standards for Welding: 4th Edition
   2. Local and national regulations: Boiler, Pressure Vessel and Compressed Gas Regulations.

QUALIFICATIONS`

G. Welders:
   1. Welding qualifications in accordance with AWS certification.
   2. Use qualified and licensed welders possessing certificate for each procedure performed from authority having jurisdiction.
   3. Furnish welder's qualifications to Owner.
   4. Each welder to possess identification symbol issued by authority having jurisdiction.

H. Inspectors
   1. Inspectors qualified to AWS certification.

QUALITY ASSURANCE

I. Registration of welding procedures in accordance with AWS, state, and local regulations.

J. Copy of welding procedures available for inspection.

WASTE MANAGEMENT AND DISPOSAL

K. Separate and recycle waste materials in accordance with Section 01 74 21 – Construction / Demolition Waste Management and Disposal, and with the Waste Reduction Workplan.

L. Remove from site and dispose of all packaging materials at appropriate recycling facilities.

M. Collect and separate for disposal, paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

N. Divert unused metal materials from landfill to metal recycling facility as approved by Owner.

PART 2 - PRODUCTS

2.1 ELECTRODES

A. Electrodes: in accordance with AWS recommendations.

PART 3 - EXECUTION

3.1 WORKMANSHIP

A. Welding: in accordance with ANSI/ASME B31.1 B31.3, B 31.5, B31.9, ANSI/ASME Boiler and Pressure Vessel Code, Sections I and IX and ANSI/AWWA C206, using procedures conforming to AWS C1.1, and special procedures specified elsewhere in Mechanical Division and applicable requirements of provincial authority having jurisdiction.

3.2 INSTALLATION REQUIREMENTS

A. Identify each weld with welder's identification symbol.

B. Backing rings:
   1. Where used, fit to minimize gaps between ring and pipe bore.
   2. Do not install at orifice flanges.

C. Fittings:
   1. NPS 2 and smaller: install welding type sockets.
   2. Branch connections: install welding tees or forged branch outlet fittings.

3.4 INSPECTION AND TESTS - GENERAL REQUIREMENTS

A. Review weld quality requirements and defect limits of applicable codes and standards with Owner before work is started.

B. Formulate "Inspection and Test Plan" in co-operation with Owner.

C. Do not conceal welds until they have been inspected, tested and approved by inspector.

D. Provide for inspector to visually inspect welds during early stages of welding procedures in accordance with Welding Inspection Handbook. Repair or replace defects as required by codes and as specified.

3.5 SPECIALIST EXAMINATIONS AND TESTS

A. General:

1. To ANSI/ASME Boiler and Pressure Vessels Code, Section V, CSA B51 and requirements of authority having jurisdiction.
2. Inspect and test welds in accordance with "Inspection and Test Plan" by non-destructive visual examination and magnetic particle (hereinafter referred to as "particle") tests and/or spot or full gamma ray radiographic (hereinafter referred to as "radiography") tests. As per applicable reference standard or as specified.

B. Hydrostatically test welds to requirements of ANSI/ASME B31.1.

C. Visual examinations: include entire circumference of weld externally and wherever possible internally.

D. Failure of visual examinations:

1. Upon failure of welds by visual examination, perform additional testing as directed by Owner of total of up to 10 % of welds, selected at random by Owner by radiographic tests.

3.6 DEFECTS CAUSING REJECTION

A. As described in ANSI/ASME B31.1 and ANSI/ASME Boiler and Pressure Vessels Code.

3.7 REPAIR OF WELDS WHICH FAILED TESTS

A. Re-inspect and re-test repaired or re-worked welds at Contractor's expense.

END OF SECTION 23 05 17

SECTION 23 05 19.13 – THERMOMETERS AND PRESSURE GAUGES – PIPING SYSTEMS

PART 1 - GENERAL

SECTION INCLUDES

A. Materials and installation for thermometers and pressure gauges in piping systems.

RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 01 74 21 – Construction/Demolition Waste Management and Disposal

C. Section 23 05 23.01 – Valves - Bronze

D. Section 23 05 53.01 – Mechanical Identification

REFERENCES

A. American Society of Mechanical Engineers (ASME)

1. ASME B40.100, Pressure Gauges and Gauge Attachments.
2. ASME B40.200, Thermometers, Direct Reading and Remote Reading.

SUBMITTALS

A. Submit in accordance with Section 01 33 00 – Submittal Procedures.

B. Submit shop drawings and product data.

C. Submit manufacturer’s product data for following items:
1. Thermometers
2. Pressure Gauges
3. Ball Valves
4. Wells

HEALTH AND SAFETY

A. Do construction occupational health and safety in accordance with Section 01 35 29.06 – Health and Safety Requirements.

WASTE MANAGEMENT AND DISPOSAL

A. Separate waste materials for reuse and recycling in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

B. Collect, separate and place in designated containers for reuse and recycling, paper, plastic, polystyrene, corrugated cardboard packaging, steel, metal, in accordance with Waste Management Plan.

C. Fold up metal banding, flatten and place in designated area for recycling.

D. Place materials defined as hazardous or toxic waste in designated containers.

E. Ensure emptied containers are sealed, labelled and stored safely for disposal away form children.

PART 2 - PRODUCTS

2.1 GENERAL

A. Design point to be at mid point of scale or range.

B. Ranges: dual imperial and metric.

2.2 DIRECT READING THERMOMETERS

A. Industrial, variable angle type, liquid filled, accuracy ± l scale division, 9 inch scale length: to ASME B40.200.

2.3 REMOTE READING THERMOMETERS

A. 4 inch diameter liquid filled or vapor activated dial type: to ASME B40.200, accuracy within one scale division, brass movement, stainless steel capillary, stainless steel spiral armour, stainless steel bulb and polished brass or stainless steel case for wall mounting.

2.4 THERMOMETER WELLS

A. Copper pipe: copper or bronze.

B. Steel pipe: brass or stainless steel.

2.5 PRESSURE GAUGES

A. Dial type: 4-1/2 inch to ASME B40.100, Grade 2A, stainless steel or phosphor bronze bourdon tube having 0.5% accuracy full scale, 1% accuracy for liquid filled.

B. Provide:
   1. Siphon for steam service.
   2. Snubber for pulsating operation.
   3. Diaphragm assembly for corrosive service.
   4. Gasketted pressure relief back with solid front.
   5. Bronze ball valve to Section 23 05 23.01 – Valves – Bronze.
   6. Oil filled for high vibration applications, such as pumps.

PART 3 - EXECUTION

3.1 GENERAL

A. Install so they can be easily read from floor or platform. If this cannot be accomplished, install remote reading units.

B. Install between equipment and first fitting or valve.

3.2 THERMOMETERS

A. Install in wells on piping. Provide heat conductive material inside well.

B. Install on inlet and outlet of:
1. Boilers.
2. In other locations as indicated.

C. Install wells to accommodate thermometers as required.

D. Use extensions where thermometers are installed through insulation.

3.3 PRESSURE GAUGES

A. Install in following locations:
1. Suction and discharge of pumps. (Liquid filled.)
2. Upstream and downstream of PRV's.
3. Upstream and downstream of control valves.
4. Outlet of boilers.
5. In other locations as indicated.

B. Install ball valves.

C. Use extensions where pressure gauges are installed through insulation.

3.4 NAMEPLATES

A. Install engraved plastic nameplates as specified in Section 23 05 53.01 - Mechanical Identification, identifying medium.

END OF SECTION

SECTION 23 05 20 - PIPING SPECIALTIES FOR HVAC PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section describes piping specialties for HVAC piping systems.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 23 05 29, Hangers and Supports for HVAC Piping and Equipment

B. Section 23 05 45, Seismic Restraints for HVAC Piping and Equipment

C. Section 23 05 53, Identification for HVAC Piping and Equipment

D. Section 23 07 19, HVAC Insulation

E. Division 26, Electrical

1.3 REFERENCES

A. ASME: American Society of Mechanical Engineers
   1. ASME BPVC: Boiler and Pressure Vessel Code for Unfired Vessels

B. IEEE: Institute of Electrical and Electronics Engineers
   1. IEEE Bulletin 515: Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Trace Heating for Industrial Applications

C. NEC: National Electric Code

1.4 SUBMITTALS

A. For each item specified herein, submit product/material data; shop drawings; operation and maintenance data; as-constructed data; installation, startup, and testing manuals; operation and maintenance manuals; and as-constructed drawings.

PART 2 - PRODUCTS

2.1 SYSTEM SPECIALTIES

A. Automatic Air Vents:
   1. Acceptable Manufacturers:
      a. Taco
      b. Amtrol
      c. Armstrong

d. Spirax/Sarco
e. Approved equivalent.

2. Description: Water main type, cast brass body, built-in check valve, 1/8-inch I.P.S. top tapping for moisture discharge, 3/4-inch size, 150 psi operating pressure.

B. Pressure/Temperature Test Plug:
1. Acceptable Manufacturers:
a. Petersen Engineering, Inc.,
b. Trerice Flow Design
c. Approved equivalent.
2. General: 1/2-inch N.P.T. fitting to receive either a temperature or pressure probe 1/8-inch o.d., fitted with a color coded and marked cap with gasket.
3. Material: Solid brass with valve core of Nordel.
4. Rating: Minimum 300 psig at 275ºF.
5. Gauges and Thermometers: Provide two pressure gauge adapters with 1/8-inch o.d. probe and two 5-inch stem pocket test thermometers, 25-125ºF for chilled water, 40-240ºF for heating water.

2.2 STRAINERS

A. Acceptable Manufacturers:
1. Taco
2. Armstrong
3. Spirax/Sarco
4. Steamflo
5. Mueller
6. Approved equivalent.
7. For grooved coupling systems: Victaulic Series 732 or approved equivalent.

B. Wye Pattern:
1. Bronze: Bronze body, 2-inch and below screwed, 250 psi, 1/16-inch perforated type 304 stainless steel screen.
2. Cast Iron: Cast iron body, 2-inch and below screwed, 2 1/2-inch and above flanged, 125 psi, 1/16-inch perforated type 304 stainless screen.
3. Cast Iron, High Pressure: Cast iron body, 2-inch and below screwed, 2 1/2-inch and above flanged, 250 psi, 1/16-inch perforated type 304 stainless screen.

2.3 BLADDER EXPANSION TANK SYSTEM (HYDRONIC SYSTEMS)

A. Acceptable Manufacturers:
1. Taco
2. Amtrol
3. Bell & Gossett
4. Armstrong
5. Wheatley
6. Approved equivalent.

B. Expansion Tank: Bladder type expansion type of welded steel, constructed and stamped in accordance with ASME code for 125 psi working pressure. Support with steel legs or bases for vertical installation. Bladder shall be pre-charged with compressed air to minimum fill pressures as indicated.

C. Configure bladder type expansion tanks with a replaceable bladder.

2.4 CENTRIFUGAL AIR SEPARATOR

A. Acceptable Manufacturers:
   1. Taco
   2. Bell & Gossett “Rolairtrol”
   3. Armstrong
   4. Amtrol
   5. Wheatley
   6. Spirotherm “Spirovent”
   7. Approved equivalent.

B. Description: Fabricated steel tank, constructed in accordance with ASME Boiler and Pressure Vessel Code for Unfired Vessels, and stamped for 150 psi design pressure, with tangential inlet and outlet connections with internal perforated stainless steel air collector tube, and blowdown connection.

C. Integral stainless steel strainer. 3/16 inch diameter perforations with not less than 5 times free area of nozzle to prevent excessive pressure drop. Strainer to be removable for cleaning and servicing.

2.5 SUCTION DIFFUSERS

A. Acceptable Manufacturers:
   1. Taco
   2. Bell & Gossett
   3. Armstrong
   4. Wheatley
   5. Grundfos
   6. Mueller
   7. Approved equivalent.
   8. For Grooved Piping Systems: Victaulic, or approved equivalent.

B. Description: Angle-type body with inlet straightening vanes and combination orifice cylinder-diffuser-strainer with 3/16-inch diameter openings. Provide inlet vane length equal to 2-1/2 times pump connection diameter. Provide adjustable support foot to carry the weight of suction piping, drain plug, and pressure gauge tap.

C. Construction: Cast iron body rated for 175 psig operating pressure at 300ºF. Provide steel inlet vanes on closed systems, stainless steel on open systems and domestic water systems. Provide steel orifice cylinders on closed systems, stainless steel on open systems and domestic water systems. Provide bronze mesh start-up strainers on closed systems and domestic water systems, none on open systems.

D. Selection: Outlet size shall match pump inlet size. Inlet size shall match pipe size upstream. Maximum of 2 psi drop without start-up strainer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Automatic Air Vents:
   1. Install automatic air vents at high points where air can collect in water systems where indicated. Route drain lines from vent to nearest floor drain.
   2. Install 3/4-inch globe shut-off valve ahead of air vent.
   3. Insulate to prevent condensation on chilled water systems.

B. Test Plugs:
   1. Install where indicated and in accordance with the manufacturer's recommendations.

C. Strainer:
   1. Provide valved blow off for each strainer of same size as plugs with maximum size of 1 1/2-inch. Pipe blow-off full size and terminate over floor drains.
   2. Insulate strainer as specified in Section 23 07 19.
   3. Insulate blow off valve to prevent condensation on chilled water systems.
   4. Applied Locations: Cast iron wye, heating water supply and return.

D. Expansion Tanks:
   1. Except where seismic restraints are required, support with steel rods and brackets from structure or from structural steel stand as required.
   2. Pipe valved to over-floor drain.

E. Centrifugal Air Separator:
   1. Except where seismic restraints are required, suspend from structure with steel rods or brackets or support from steel stand as required.
   2. Install in accordance with the manufacturer's recommendations.

F. Suction Diffusers:
   1. Install on inlets of pumps where indicated in accordance with the manufacturer's recommendations.
   2. Support suction diffuser and piping from same surface as pump base is supported unless shown otherwise. Adjust foot so that pump inlet does not carry any piping weight.
   3. Pipe pressure gauges to gauge port and blow down to drain with ball shut-off valve.
   4. After operating pumps for 7 days, clean strainer and remove startup strainer.

END OF SECTION 23 05 20

SECTION 23 05 23.02 - VALVES - CAST IRON

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Valves cast iron, gate, globe, and check.

1.2 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 01 35 29.06 – Health and Safety Requirements.

C. Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

D. Section 01 78 00 – Closeout Submittals.

E. Section 23 05 15 - Common Installation Requirements for HVAC Pipework.

1.3 REFERENCES

A. American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME)
   1. ANSI/ASME B16.1, Cast Iron Pipe Flanges and Flanged Fittings.

B. American Society for Testing and Materials International (ASTM)
   1. ASTM A 49, Specification for Heat-Treated Carbon Steel Joint Bars.
   2. ASTM A 126, Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
   3. ASTM B 61, Specification for Steam or Valve Bronze Castings.
   4. ASTM B 62 – Specification for Composition Bronze or Ounce Metal Castings.
   5. ASTM B 85, Specification for Aluminum-Alloy Die Castings.
   6. ASTM B 209, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

C. Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS).
   1. MSS SP-67, Butterfly Valves.
   2. MSS SP-70, Cast Iron Gate Valves, Flanged and Threaded Ends.
   3. MSS SP-71, Grey Iron Swing Check Valves, Flanged and Threaded Ends
   4. MSS SP-82, Valve Pressure Testing Methods
   5. MSS SP-85, Cast Iron Globe and Angle Valves, Flanged and Threaded Ends.

1.4 SUBMITTALS

A. Submittals in accordance with Section 01 33 00 – Submittal Procedures.

B. Product Data: submit HMIS MSDS – Material Safety Data Sheets.
   1. Submit shop drawings and product data in accordance with Section 01 33 00 – Submittal Procedures.

2. Submit data for valves specified this section.

C. Closeout Submittals
1. Submit maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.

1.5 QUALITY ASSURANCE

A. Health and Safety
1. Do construction occupational health and safety in accordance with Section 01 35 29.06 – Health and Safety Requirements.

1.6 DELIVERY, STORAGE AND DISPOSAL

A. Waste Management and Disposal:
1. Separate and recycle waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
2. Collect and separate for disposal, paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

1.7 MAINTENANCE

A. Extra Materials
1. Furnish following spare parts:
a. Valve seats: one for every 10 valves each size. Minimum 1.
b. Discs: one for every 10 valves, each size. Minimum 1.
c. Stem packing: one for every 10 valves, each size. Minimum 1.
d. Valve handles: 2 of each size.
e. Gaskets for flanges: one for every 10 flanged joints.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Except for specialty valves, to be of single manufacturer.

B. Standard specifications:
1. Gate valves: MSS SP-70.
2. Globe valves: MSS SP-85.
3. Check valves: MSS SP-71.

C. Requirements common to valves, unless specified otherwise:
1. Body, bonnet: cast iron to ASTM B209 Class B.
2. Connections: flanged ends, plain face, to ANSI B16.1.
3. Inspection and pressure testing: to MSS SP-82.
4. Bonnet gasket: non-asbestos.
5. Stem: to have precision-machined Acme or 60^{o}V threads, top screwed for handwheel nut.
6. Stuffing box: non-galling two-piece ball-jointed packing gland, gland bolts and nuts.
7. Gland packing: non-asbestos.

8. Handwheel: Die-cast aluminum alloy to ASTM B85 or malleable iron to ASTM A49. Nut of bronze to ASTM B62.
9. Identification tag: with catalogue number, size, other pertinent data.

D. All products to have Canadian Registration Numbers (CRN).

E. Bronze trim for steam, water, air or glycol service, iron trim for oil, gas or gasoline.

F. Acceptable Product: Crane, Jenkins, Milwaukee, Newman Hattersley, Kitz, M.A. Stewart, NIBCO.

2.2 GATE VALVES

A. NPS 2 1/2 - 8, non rising stem, inside screw, bronze or iron trim, solid wedge disc:
1. Body and multiple-bolted bonnet: with bosses in body and bonnet for taps and drains, full length disc guides designed to ensure correct re-assembly, Class 125.
2. Bronze Trim:
   a. Disc: Solid offset taper wedge, bronze to ASTM B62.
   b. Seat rings: renewable bronze to ASTM B62, screwed into body.
   c. Stem: bronze to ASTM B62.
3. Iron Trim:
   a. Disc: Solid offset taper wedge, cast iron to ASTM A126 Class B, secured to wrought steel stem.
   b. Seat: Integral with body.
   c. Stem: wrought steel.
   d. Operator: Handwheel

B. NPS 2 1/2-8, outside screw and yoke (OS&Y), bronze or iron trim, solid wedge disc:
1. Body and multiple-bolted bonnet: with bosses in body and bonnet for taps and drains, full length disc guides designed to ensure correct re-assembly, yoke, yoke hub, yoke sleeve and nut, Class 125.
2. Bronze Trim:
   a. Disc: Solid offset taper wedge, bronze to ASTM B62 up to NPS 3, cast iron with bronze disc rings on other sizes, secured to stem through integral forged T-head disc-stem connection.
   b. Seat rings: renewable bronze screwed into body.
   c. Stem: manganese-bronze.
3. Iron Trim:
   a. Disc: Solid offset taper all-cast iron, secured to stem through integral forged T-head disc-stem connection.
   b. Seat rings: integral with body.
   c. Stem: nickel-plated steel for iron trim.
4. Pressure-lubricated operating mechanism.
5. Operator: Handwheel.

2.3 UNDERWRITERS APPROVED GATE VALVE

A. NPS 2 1/2 - 14, OS&Y:

1. Approvals: UL and FM approved for fire service.
2. UL and FM Label: on valve yoke.
3. Body, Bonnet: cast iron to ASTM A126 Class B. Wall thicknesses to ANSI B16.1 and ULC C-262 (B).
4. Bonnet bushing, yoke sleeve: bronze, to FM requirements.

5. Packing gland: bronze.
6. Stem: manganese bronze. Diameter to ULC C-262 (B).
7. Stuffing box dimensions, gland bolt diameter: to ULC C-262 (B).
8. Bosses for bypass valve, drain: on NPS 4 and over.
9. Disc: solid taper wedge. Up to NPS 3: bronze. NPS 4 and over: cast iron with bronze disc rings.
10. Disc seat ring: self-aligning, Milwood undercut on NPS 3 - 12.
11. Pressure rating:
    a. NPS 2-1/2 - 12: 1.7 MPa CWP
    b. NPS 14:1.2 MPa CWP
12. Operator: Handwheel.

2.4 GLOBE VALVES

A. NPS 2 ½ - 10, OSY:
1. Body: with multiple-bolted bonnet.
2. WP: 860 kPa steam, 1.4 MPa CWP
3. Bonnet-yolk gasket: non-asbestos.
4. Disc: bronze to ASTM B 62, fully guided from bottom, securely yet freely connected to stem for swivel action and accurate engagement with disc.
5. Seat ring: renewable, regrindable, screwed into body.
6. Stem: bronze to ASTM B 62.
7. Operator: handwheel.

2.5 BYPASSES FOR GATE AND GLOBE VALVES

A. Locations: on valves as indicated.

B. Position of bypass valve on main valves: spindle uprights or parallel position.

C. Size of bypass valve:
1. Main valve up to NPS 8: NPS 3/4.

D. Type of bypass valves:
1. On gate valve: globe, with composition disc, trim, to Section 23 05 23.01 – Valves – Bronze. Pressure rating to match main valve.
2. On globe valve: globe, with composition disc, bronze trim, to Section 23 05 23.01 - Valves – Bronze. Pressure rating to match main valve.

2.6 VALVE OPERATORS

A. Install valve operators as follows:
1. Handwheel: on valves except as specified.
2. Handwheel with chain operators: on valves installed more than 8 feet above floor in boiler rooms and mechanical equipment rooms.

2.7 CHECK VALVES

A. Swing check valves, Class 125:
1. Body and bolted cover: with tapped and plugged opening on each side for hinge pin. Flanged ends: plain faced with smooth finish.

a. Up to NPS 16: cast iron to ASTM A126 Class B.
2. Ratings:
a. NPS 2 1/2 - 12: 125 psi steam; 200 psi CWP.
3. Bronze Trim
a. Disc: Rotating for extended life.
1) Up to NPS 6: bronze to ASTM B 62.
b. Seat rings: renewable bronze to ASTM B62 screwed into body.
c. Hinge pin, bushings: renewable bronze to ASTM B62.
4. Iron Trim
a. Disc: A126 Class B, secured to stem, rotating for extended life.
b. Seat: cast iron, integral with body.
c. Hinge pin: exelloy; bushings: malleable iron.
5. Identification tag: fastened to cover.
6. Hinge: galvanized malleable iron.

B. Swing check valves, NPS 2 1/2 - 8 Class 250:
1. Body and bolted cover: cast iron to ASTM A126 Class B with tapped and plugged opening on each side for hinge pin.
2. Flanged ends: 2 mm raised face with serrated finish.
3. Rating: 250 psi steam; 500 psi CWP.
4. Disc: Rotating for extended life.
a. Up to NPS 3: bronze to ASTM B61.
b. NPS 4 - 8: Iron faced with ASTM B61 bronze.
5. Seat rings: renewable bronze to ASTM B61, screwed into body.
6. Hinge pin, bushings: renewable, bronze to ASTM B61.
7. Hinge: galvanized malleable iron.
8. Identification tag: fastened to cover.

2.8 SILENT CHECK VALVES

A. Body: malleable iron or ductile iron with integral seat.

B. Pressure rating: Class 125, 125 psi WP.

C. Connections: grooved ends or flanged.

D. Disc: bronze or stainless steel renewable rotating disc.

E. Seat: renewable, EPDM.

F. Stainless steel spring, heavy duty.

G. Grooved end check valves.

2.9 GROOVED END BUTTERFLY VALVES

A. Butterfly valves: to MSS-SP-67. Application: Isolating cells or section of multiple component equipment (eg. multi-section coils, multi-cell cooling towers).
1. NPS2 and over: Grooved ends.
2. 300psi WOG and be both bi-directional and dead end service capable to full rated pressure. Ductile iron body with blow-out proof stainless steel stems and nickel coated ductile iron disc. Seat shall be “EPDM” and have a full 360° continuous contact with the seating surface.

3. Valve Operators: Lever, gear operator NPS6 and over.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install rising stem valves in upright position with stem above horizontal. Ensure sufficient room for valve stem in fully open position.

B. All valves are to be installed in accessible locations to allow maintenance personnel to operate and maintain each valve.

C. Grooved end valves to be supplied by the same manufacture of the grooved fittings.

D. Grooved end valves to be installed in accordance with the manufacturer's written installation instructions. Grooved ends to be clean and free from indentations and projections. Gaskets to be verified as suitable for the intended service prior to installation. Gaskets to be molded and produced by the coupling manufacturer. The grooved coupling manufacturer's factory trained representative to provide on-site training for contractor's field personnel in the use of grooving tools, application of groove, and installation of grooved joint products. The manufacturer's representative to periodically visit the jobsite and review installation. Contractor to remove and replace any joints deemed improperly installed.

E. Contractor is to provide an allowance in their bid for replacement of six existing valves not initially indicated to be demolished. Provide an individual cost table showing installation costs for each size of valve to 8 inch. Contractor is to check all existing valves at the start of the project and ensure that all valves are operating properly, replacing any faulty valves found. Cost adjustments will be made by the Owner if valve replacements exceed that allowed for in the initial bid according to the listed valve installation cost table provided.

END OF SECTION

SECTION 23 05 23.05 – BUTTERFLY VALVES

PART 1 - GENERAL

1.1 SUMMARY

A. Butterfly valves.

1.2 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 01 35 29.06 – Health and Safety Requirements.

C. Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

D. Section 01 78 00 – Closeout Submittals.

1.3 REFERENCES

A. American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME)
   1. ANSI/ASME B1.20.1, Pipe Threads, General Purpose (Inch.)
   2. ANSI/ASME B16.1, Cast Iron Pipe Flanges and Flanged Fittings.
   3. ANSI/ASME B16.5, Pipe Flanges and Flanged Fittings.
   4. ANSI/ASME B16.11, Forged Fittings, Socket-Welding and Threaded.
   5. ANSI/ASME B16.25, Buttwelding Ends.
   6. ANSI/ASME B16.34, Valves – Flanged, Threaded and Welding Ends.

B. American National Standards Institute (ANSI)/American Petroleum Institute (API).
   1. ANSI/API 609, Lug-and Water-Type Butterfly Valves.

C. American Society for Testing and Materials International, (ASTM)
   1. ASTM A 126, Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
   2. ASTM B 62, Specification for Composition Bronze or Ounce Metal Castings.
   3. ASTM B 209M, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

D. Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS).
   1. MSS SP-67, Butterfly Valves.

1.4 SUBMITTALS

A. Submittals in accordance with Section 01 33 00 – Submittal Procedures.

B. Product Data: submit HMIS MSDS – Material Safety Data Sheets in accordance with Section 01 33 00 – Submittal Procedures.
   1. Submit shop drawings and product data in accordance with Section 01 33 00 – Submittal Procedures.
   2. Submit product data in accordance with Section 01 33 00 – Submittal Procedures.
   3. Submit data for valves specified this section.

C. Closeout Submittals

1. Submit maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.

1.5 QUALITY ASSURANCE

A. Health and Safety

1. Do construction occupational health and safety in accordance with Section 01 35 29.06 – Health and Safety Requirements.

1.6 DELIVERY, STORAGE AND DISPOSAL

A. Waste Management and Disposal
1. Separate and recycle waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
2. Collect and separate for disposal, paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

1.7 MAINTENANCE

A. Extra Materials
1. Furnish following spare parts:
a. Gaskets for flanges: one for every 10 flanged joints.

PART 2 - PRODUCTS

2.1 BUTTERFLY VALVES - RESILIENT SEAT – 200 PSI.

A. Except for specialty valves, to be of single manufacturer.

B. To be suitable for dead-end service.

C. Canadian Registration Number (CRN) required for products.

D. Sizes: Wafer or Lug type: NPS 2 to 30.

E. Pressure rating for tight shut-off at temperatures up to maximum for seat material.
1. NPS 2 - 12: 200 psi CWP.
2. NPS 14 - 30: 200 psi CWP.

F. Minimum seat temperature ratings to 135°C.

G. Application: On-off operation.

H. Full lug body (threaded).

I. Operators:
   1. NPS 2 - 6: Handles capable of locking in any of ten (10) positions - 0° to 90°. Handle and release trigger - ductile iron. Return spring and hinge pin: carbon steel. Latchplate and mounting hardware: cadmium plated carbon steel. Standard coating: Black laquer.

J. Designed to comply with MSS SP-67 and API 609.

K. Compatible with ANSI Class 125/Class 150 flanges.

L. Construction:
   1. Body: ductile iron.
   2. Disc: aluminum bronze.
   3. Seat: EPDM.
   4. Shaft: 416 stainless steel.
   5. Taper pin: 316 SS.
   6. Key: carbon steel stainless.
   7. O-Ring: Buna-N.
   8. Bushings: Luberized bronze Teflon.

2.2 BUTTERFLY VALVES - RESILIENT SEAT -275 PSI

A. Sizes: Lug type: NPS 2 to 30.

B. Pressure rating: 275 psi at 275°F.

C. Lug body: 150 ANSI bolt pattern.

D. Full lug body (threaded).

E. Application: for on-off service.
   1. Operators:
   2. NPS 2 - 6: Handles capable of locking in any of ten (10) positions – 0° to 90°. Handle and release trigger - ductile iron. Return spring and hinge pin: carbon steel. Latch plate and mounting hardware: cadmium plated carbon steel.
   3. NPS 8 - 24: Manual enclosed gear operator.
   4. Install parallel or perpendicular to pipeline.

F. Designed to comply with MSS SP-67 and API 609.

G. Compatible with ANSI B16.1 Class 125 (iron) and ANSI B16.5 Class 150 (steel) flanges.

H. Construction:
   1. Body: ductile iron.
   2. Disc: aluminum bronze.
   3. Seat: EPDM.
   4. Refer to manufacturer’s literature for additional materials.
   5. Shaft: NPS 2 - 12: 416 stainless steel, NPS 14 - 48, 316 stainless steel.
   6. Taper pin: 316 SS.
   7. Blowout proof stem.
   8. O-Ring: Buna-N.
   9. Bushings: Teflon.

10. Disc shall not be pinned to shaft.
11. Bubble tight shutoff with downstream flanges removed, class 6 shutoff.

2.3 BUTTERFLY VALVES- 300 PSI

A. Sizes: grooved ends, NPS-2-12.

B. Pressure rating: 300 psi WOG.

C. Body: Ductile Iron to ASTM A-536 with polypropylene coating.

D. Disc: Ductile Iron to ASTM A-536.

E. Disc coating: EPDM.

F. Body coating: Polyphenylene Sulfide Blend

G. Drive Hub Adapter and Operation Bracket: hot rolled steel, enamel coated.

H. Upper bearing/lower Trunnion seals: EPDM

I. Upper bearing/lower Trunnion: Navel brass or Bronze alloy.

J. Bolts and washers: Cold rolled steel, zinc plated.

K. Operator:

1. NPS 2-3: two position manual handle
2. NPS 3-6: Manual level lock
3. Handwheel with chain operator: on valves installed more than 8 feet above floor in boiler rooms and mechanical equipment rooms.

2.4 MOUNTING FLANGES:

A. Class 125 cast iron to ANSI B16.1 or Class 150 steel to B16.5 pipe flanges.

2.5 ELECTRIC ACTUATORS:

A. Operation: Designed to provide precise quarter turn electric operation.
1. Torque range: Up to 150 in-lb and speed ranges from 10 seconds to 30 seconds to move from fully open to fully closed.
2. Gear train within actuator to provide smooth continuous rotary power stroke for accurate automatic valve positioning. Factory-set, field adjustable cam-actuated travel limit switches to provide precise control of shaft rotation.

B. Construction:
1. Castings: Heavy duty industrial grade for rugged use.
2. Actuators: continuous duty with high efficiency single phase reversing capacitor motor with thermal overload protection.
3. Gears and pinions constructed from hardened steel.

4. Gear train to be permanently lubricated.
5. Mechanical brake to ensure that gear is locked in precise position.

C. Electrical
1. Standard voltage: 120 VAC. 60 Hz.
2. Control options: 4-20 Ma DC or 0-10 V DC.
3. Electrical rating: NEMA IV.

PART 3 - EXECUTION

3.1 PREPARATION

A. Valve and mating flange preparation.

1. Inspect adjacent pipeline, remove rust, scale, welding slag, other foreign material.
2. Ensure that valve seats and pipe flange faces are free of dirt or surface irregularities which may disrupt flange seating and cause external leakage.
3. Install butterfly valves with disc in almost closed position.
4. Inspect valve disc seating surfaces and waterway and eliminate dirt or foreign material.

3.2 INSTALLATION OF VALVES

A. Install in accordance with manufacturer’s instructions.

B. Do not use gaskets between pipe flanges and valves unless instructed otherwise by valve manufacturer.

C. Verify suitability of valve for application by inspection of identification tag.

D. Mount actuator on to valve prior to installation.

E. Handle valve with care so as to prevent damage to disc and seat faces.

F. Valves in horizontal pipe lines should be installed with stem in horizontal position to minimize liner and seal wear.

G. Ensure that valves are centered between bolts before bolts are tightened and then opened and closed to ensure unobstructed disc movement. If interference occurs due, for example to pipe wall thickness, taper bore adjacent piping to remove interference.

3.3 ACTUATOR INSTALLATION

A. Air hoses or electrical connections to be made by actuator manufacturer.

B. Cycle valve operation from fully closed to fully open then back to fully closed.

C. At same time, check travel stop settings for proper disc alignment.

END OF SECTION 23 05 23.05

SECTION 23 05 29 – HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Concrete housekeeping pads, hangers and supports for mechanical piping, ducting and equipment.

1.2 RELATED SECTIONS

A. Section 01 33 00 - Submittal Procedures.

B. Section 01 74 21 – Construction/Demolition Waste Management and Disposal

C. Section 03 30 00 - Cast-in-Place Concrete.

1.3 REFERENCES

A. American National Standards Institute/ American Society of Mechanical Engineers (ANSI/ASME)
   1. ANSI/ASME B31.1, Power Piping, (IP Edition).

B. American Society for Testing and Materials (ASTM)
   1. ASTM A125, Specification for Steel Springs, Helical, Heat-Treated.
   2. ASTM A307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
   3. ASTM A563, Specification for Carbon and Alloy Steel Nuts.

C. Factory Mutual (FM)

D. Hazardous Materials Information System (HMIS).
   1. Material Safety Data Sheets (MSDS).

E. Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)
   1. MSS SP-58, Pipe Hangers and Supports - Materials, Design and Manufacture.
   2. ANSI/MSS SP-69, Pipe Hangers and Supports - Selection and Application.
   3. MSS SP-89, Pipe Hangers and Supports - Fabrication and Installation Practices.

F. Underwriter's Laboratories (UL)

1.4 SYSTEM DESCRIPTION

A. Design Requirements
   1. Construct pipe hanger and support to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies.
   2. Base maximum load ratings on allowable stresses prescribed by MSS SP58 or ASME B31.1.

3. Ensure that supports, guides, anchors do not transmit excessive quantities of heat to building structure.
4. Design hangers and supports to support systems under all conditions of operation, allow free expansion and contraction, prevent excessive stresses from being introduced into pipework or connected equipment.
5. Provide for vertical adjustments after erection and during commissioning. Amount of adjustment to be in accordance with MSS SP58.

B. Performance Requirements
1. Design supports, platforms, catwalks, hangers, to withstand seismic events for location as per the National Building Code

1.5 SUBMITTALS

A. Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

B. Shop drawings: submit drawings stamped and signed for approval by Owner.

C. Submit shop drawings and product data for following items:
1. Bases, hangers and supports.
2. Connections to equipment and structure.
3. Structural assemblies.

D. Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.
1. Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
2. Instructions: submit manufacturer's installation instructions.
3. Owner will make available one (1) copy of systems supplier's installation instructions.

E. Closeout Submittals:
1. Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals

1.6 QUALITY ASSURANCE

A. Health and Safety:
1. Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling and unloading:
1. Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.
2. Deliver, store and handle materials in accordance with manufacturer's written instructions.

B. Waste Management and Disposal:
1. Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 GENERAL

A. Fabricate hangers, supports and sway braces in accordance with ANSI B31.1 and MSS SP-58 and SP-89.

B. Use components for intended design purpose only. Do not use for rigging or erection purposes.

2.2 PIPE HANGERS

A. Finishes:
   1. Pipe hangers and supports: galvanized painted with zinc-rich paint after manufacture.
   2. Use electro-plating galvanizing process or hot dipped galvanizing process.
   3. Ensure steel hangers in contact with copper piping are copper plated or epoxy coated.

B. Upper attachment structural: Suspension from lower flange of I-Beam.
   1. Piping NPS 2 maximum: malleable iron C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip.
      a. Rod: 3/8 inch UL listed, 1/2 inch FM approved.
   2. Piping NPS 2 1/2 or greater, hot piping: Malleable iron beam clamp, eye rod, jaws and extension with carbon steel retaining clip, tie rod, nuts and washers, UL listed, FM approved where required to MSS-SP58 and MSS-SP69.

C. Upper attachment structural: Suspension from upper flange of I-Beam.
   1. Piping NPS 2 maximum: Ductile iron top-of-beam C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip, UL listed FM approved where required to MSS SP69.
   2. Piping NPS 2 1/2 or greater, all hot piping: Malleable iron top-of-beam jaw-clamp with hooked rod, spring washer, plain washer and nut UL listed, FM approved where required.

D. Upper attachment to concrete.
   1. Ceiling: Carbon steel welded eye rod, clevis plate, clevis pin and cotters with weldless forged steel eye nut. Ensure eye 1/4 inch minimum greater than rod diameter.
   2. Concrete inserts: wedge shaped body with knockout protector plate UL listed FM approved where required to MSS SP-69.

E. Shop and field-fabricated assemblies.
   1. Trapeze hanger assemblies: MSS SP-89.
   2. Steel brackets: MSS SP-89.
   3. Sway braces for seismic restraint systems: to MSS SP-89.

F. Hanger rods: threaded rod material to MSS SP-58.
   1. Ensure that hanger rods are subject to tensile loading only.
   2. Provide linkages where lateral or axial movement of pipework is anticipated.
   3. Do not use 7/8 inch or 1-1/8 inch rod.

G. Pipe attachments: material to MSS SP-58.
   1. Attachments for steel piping: carbon steel galvanized.
   2. Attachments for copper piping: copper plated black steel.
   3. Use insulation saddles for hot pipework.
   4. Oversize pipe hangers and supports for insulated pipes.

H. Adjustable clevis: material to MSS SP-69, UL listed FM approved, where required clevis bolt with nipple spacer and vertical adjustment nuts above and below clevis.
   1. Ensure "U" has hole in bottom for rivetting to insulation shields.

I. Yoke style pipe roll: carbon steel yoke, rod and nuts with cast iron roll, to MSS SP-69.

J. U-bolts: carbon steel to MSS SP-69 with 2 nuts at each end to ASTM A563.
   1. Finishes for steel pipework: galvanized.
   2. Finishes for copper pipework: black with formed portion plastic coated or epoxy coated.

K. Pipe rollers: cast iron roll and roll stand with carbon steel rod to MSS SP-69.

2.3 RISER CLAMPS

A. Steel or cast iron pipe: galvanized black carbon steel to MSS SP-58, type 42, UL listed FM approved where required.

B. Copper pipe: carbon steel copper plated to MSS SP-58, type 42.

C. Bolts: to ASTM A307.

D. Nuts: to ASTM A563.

2.4 INSULATION PROTECTION SHIELDS

A. Insulated hot piping:
   1. Curved plate 1 ft long, with edges turned up, welded-in centre plate for pipe sizes NPS 12 and over, carbon steel to comply with MSS SP-69.

2.5 CONSTANT SUPPORT SPRING HANGERS

A. Springs: alloy steel to ASTM A125, shot peened, magnetic particle inspected, with +/-5% spring rate tolerance, tested for free height, spring rate, loaded height and provided with Certified Mill Test Report(CMTR).

B. Load adjustability: 10 % minimum adjustability each side of calibrated load. Adjustment without special tools. Adjustments not to affect travel capabilities.

C. Provide upper and lower factory set travel stops.

D. Provide load adjustment scale for field adjustments.

E. Total travel to be actual travel + 20%. Difference between total travel and actual travel 1/8 inch minimum.

F. Individually calibrated scales on each side of support calibrated prior to shipment, complete with calibration record.

2.6 VARIABLE SUPPORT SPRING HANGERS

A. Vertical movement: 1/2 inch minimum, 2 inch maximum, use single spring pre-compressed variable spring hangers.

B. Vertical movement greater than 2 inch: use double spring pre-compressed variable spring hanger with 2 springs in series in single casing.

C. Variable spring hanger to be complete with factory calibrated travel stops. Provide certificate of calibration for each hanger.

D. Steel alloy springs: to ASTM A125, shot peened, magnetic particle inspected, with +/-5 % spring rate tolerance, tested for free height, spring rate, and loaded height.

2.7 EQUIPMENT SUPPORTS

A. Fabricate equipment supports not provided by equipment manufacturer from structural grade steel. Submit calculations with shop drawings.

2.8 EQUIPMENT ANCHOR BOLTS AND TEMPLATES

A. Provide templates to ensure accurate location of anchor bolts.

2.9 HOUSE-KEEPING PADS

A. For base-mounted equipment: Concrete, at least 4 inch high, 2 inch larger all around than equipment, and with chamfered edges.

B. Concrete: to Section 03 30 00 - Cast-in-place Concrete by Division 3.

2.10 OTHER EQUIPMENT SUPPORTS

A. From structural grade steel.

B. Submit structural calculations with shop drawings.

PART 3 - EXECUTION

3.1 MANUFACTURER’S INSTRUCTIONS

A. Compliance: comply with manufacturer’s written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

A. Install in accordance with:

1. Manufacturer's instructions and recommendations.

B. Vibration Control Devices:
1. Install on piping systems at pumps, boilers, chillers, cooling towers, elsewhere as indicated.

C. Clamps on riser piping:
1. Support independent of connected horizontal pipework using riser clamps and riser clamp lugs welded to riser.
2. Bolt-tightening torques to be to industry standards.
3. Steel pipes: Install below coupling or shear lugs welded to pipe.
4. Cast iron pipes: Install below joint.

D. Clevis plates:
1. Attach to concrete with 4 minimum concrete inserts, one at each corner.

E. Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.

F. Use approved constant support type hangers where:
1. Vertical movement of pipework is 1/2 inch or more,
2. Transfer of load to adjacent hangers or connected equipment is not permitted.

G. Use variable support spring hangers where:
1. Transfer of load to adjacent piping or to connected equipment is not critical.
2. Variation in supporting effect does not exceed 25 % of total load.

3.3 HANGER SPACING

A. Plumbing piping: most stringent requirements of International Plumbing Code

B. Gas and fuel oil piping: up to NPS 1/2: Per International Fuel Code

C. Copper piping: up to NPS 1/2: every 5 ft.

D. Hydronic, rigid, and flexible joint roll groove pipe: in accordance with table below, but not less than one hanger at joints.

Maximum Pipe Size: NPS	Maximum Spacing: Steel	Maximum Spacing: Copper
up to 1-1/4	6.75 ft	6 ft
1-1/2	8.83 ft	7.83 ft
2	10.0 ft	8.83 ft
2-1/2	11.83 ft	10.0 ft
3	11.83 ft	10.0 ft
3-1/2	12.83 ft	10.83 ft
4	13.75 ft	11.83 ft
5	15.75 ft	
6	16.75 ft	

E. Within 12 inches of each elbow.

F. Pipework greater than NPS 12: to MSS SP69.

3.4 HANGER INSTALLATION

A. Install hanger so that rod is vertical under operating conditions.

B. Adjust hangers to equalize load.

C. Support from structural members. Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members, comprised of angel iron or c-channel.

3.5 HORIZONTAL MOVEMENT

A. Angularity of rod hanger resulting from horizontal movement of pipework from cold to hot position not to exceed 4 degrees from vertical.

B. Where horizontal pipe movement is less than 1/2 inch, offset pipe hanger and support so that rod hanger is vertical in the hot position.

3.6 FINAL ADJUSTMENT

A. Adjust hangers and supports:
   1. Ensure that rod is vertical under operating conditions.
   2. Equalize loads.

B. Adjustable clevis:
   1. Tighten hanger load nut securely to ensure proper hanger performance.
   2. Tighten upper nut after adjustment.

C. C-clamps:
   1. Follow manufacturer's recommended written instructions and torque values when tightening C-clamps to bottom flange of beam.

D. Beam clamps:
   1. Hammer jaw firmly against underside of beam.

END OF SECTION 23 05 29

SECTION 23 05 53.01 – MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Materials and requirements for the identification of piping systems, duct work, valves and controllers, including the installation and location of identification systems.
   2. Sustainable requirements for construction and verification.

1.2 RELATED SECTIONS

A. Section 01 33 00 - Submittal Procedures.

B. Section 01 74 21 – Construction/Demolition Waste Management and Disposal

1.3 REFERENCES

A. ANSI/ASME A13.1

1.4 SUBMITTALS

A. Product Data:
   1. Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
   2. Product data to include paint colour chips, other products specified in this section.
   3. Samples:
      a. Submit samples in accordance with Section 01 33 00 – Submittal Procedures.
      b. Samples to include nameplates, labels, tags, lists of proposed legends.

1.5 QUALITY ASSURANCE

A. Quality assurance submittals: submit following in accordance with Section 01 33 00 – Submittal Procedures.

B. Health and Safety:
   1. Do construction occupational health and safety in accordance with Section 01 35 29.06 – Health and Safety Requirements.

DELIVERY, STORAGE, AND HANDLING

C. Packing, shipping, handling and unloading:
   1. Deliver, store and handle in accordance with Section 01 61 00 – Common Product Requirements.
   2. Deliver, store and handle materials in accordance with manufacturer’s written instructions.

D. Waste Management and Disposal:
   1. Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
   2. Dispose of unused paint coating material at official hazardous material collections site approved by Owner.
   3. Do not dispose of unused paint coating material into sewer system, into streams, lakes, onto ground or in locations where it will pose health or environmental hazard.

PART 2 – PRODUCTS`

2.1 MANUFACTURER'S EQUIPMENT NAMEPLATES

A. Metal or plastic laminate nameplate mechanically fastened to each piece of equipment by manufacturer.

B. Lettering and numbers to be raised or recessed.

C. Information to include, as appropriate:
   1. Equipment: Manufacturer's name, model, size, serial number, capacity.
   2. Motor: voltage, Hz, phase, power factor, duty, frame size.

2.2 PIPING SYSTEMS GOVERNED BY CODES

A. Identification:
   1. System tag color and size per ANSI/ASME A13.1

2.3 IDENTIFICATION OF PIPING SYSTEMS

A. Identify contents by background colour marking, pictogram (as necessary), legend; direction of flow by arrows. To ANSI/ASME A13.1 except where specified otherwise.

B. Pictograms:
   1. Where required, to Hazardous Materials Information System (HMIS) regulations.

C. Legend:
   1. Block capitals to sizes and colours listed in ANSI/ASME A13.1.

D. Arrows showing direction of flow:
   1. Outside diameter of pipe or insulation less than 3 in.: 4 in. long x 2 in. high.
   2. Outside diameter of pipe or insulation 3 in. and greater: 6 in. long x 2 in. high.
   3. Use double-headed arrows where flow is reversible.

E. Extent of background colour marking:
   1. To full circumference of pipe or insulation.
   2. Length to accommodate pictogram, full length of legend and arrows.

F. Materials for background colour marking, legend, arrows:
   1. Pipes and tubing 3/4 in. and smaller: Waterproof and heat-resistant pressure sensitive plastic marker tags.

2. All other pipes: Pressure sensitive plastic-coated cloth or vinyl with protective overcoating, waterproof contact adhesive undercoating, suitable for ambient of 100%RH and continuous operating temperature of 300°F and intermittent temperature of 400°F.

G. Colours and Legends:
1. Where not listed, obtain direction from Owner.
2. Colours for legends, arrows, to following table:

Background colour	Legend, arrows
Yellow	BLACK
Green	WHITE
Red	WHITE

3. Background color marking and legends for piping systems:

Contents	Background color marking	Legend
Raw water	Green	RAW WATER
Treated water	Green	TREATED WATER
Hot water heating supply	Yellow	HEATING SUPPLY
Hot water heating return	Yellow	HEATING RETURN
Make-up water	Yellow	MAKE-UP WTR
Boiler feed water	Yellow	BLR. FEED WTR
Safety valve vent	Yellow	STEAM VENT
Waste water	Green	WASTE WATER
Acid waste	Yellow	ACID WASTE (add source)
Natural gas	to Codes	
Propane	to Codes	
Gas regulator vents	to Codes	

2.4 VALVES, CONTROLLERS

A. Brass tags 1/2 in. diameter with stamped identification data filled with black paint.

B. Include flow diagrams for each system, of approved size, showing charts and schedules with identification of each tagged item, valve type, service, function, normal position, location of tagged item.

2.5 CONTROLS COMPONENTS IDENTIFICATION

A. Identify all systems, equipment, components, controls, sensors with system nameplates specified in section 25 05 54 – EMCS: Identification. If no EMCS included in project, identification as per this section.

B. Inscriptions to include function and (where appropriate) fail-safe position, component ID name.

2.6 LANGUAGE

A. Identification to be in English.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

A. Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 TIMING

A. Provide identification only after all painting specified in Section 09 91 23 - Interior Painting has been completed.

3.3 INSTALLATION

A. Perform work in accordance with ANSI/ASME A13.1 except as specified otherwise.

3.4 NAMEPLATES

A. Locations:
   1. In conspicuous location to facilitate easy reading and identification from operating floor.

B. Standoffs:
   1. Provide for nameplates on hot and/or insulated surfaces.

C. Protection
   1. Do not paint, insulate or cover in any way.

3.5 LOCATION OF IDENTIFICATION ON PIPING AND DUCTWORK SYSTEMS

A. On long straight runs in open areas in boiler rooms, equipment rooms, galleries, tunnels: At not more than 50 foot intervals and more frequently if required to ensure that at least one is visible from any one viewpoint in operating areas and walking aisles.

B. Adjacent to each change in direction.

C. At least once in each small room through which piping or ductwork passes.

D. On both sides of visual obstruction or where run is difficult to follow.

E. On both sides of separations such as walls, floors, partitions.

F. Where system is installed in pipe chases, ceiling spaces, galleries, confined spaces, at entry and exit points, and at access openings.

G. At beginning and end points of each run and at each piece of equipment in run.

H. At point immediately upstream of major manually operated or automatically controlled valves, dampers, etc. Where this is not possible, place identification as close as possible, preferably on upstream side.

I. Identification to be easily and accurately readable from usual operating areas and from access points.
   1. Position of identification to be approximately at right angles to most convenient line of sight, considering operating positions, lighting conditions, risk of physical damage or injury and reduced visibility over time due to dust and dirt.

3.6 VALVES, CONTROLLERS

A. Valves and operating controllers, except at plumbing fixtures, radiation, or where in plain sight of equipment they serve: Secure tags with non-ferrous chains or closed "S"hooks.

B. Install one copy of flow diagrams, valve schedules mounted in frame behind non-glare glass where directed by Owner. Provide one copy (reduced in size if required) in each operating and maintenance manual.

C. Number valves in each system consecutively.

3.7 CLEANING

A. Proceed in accordance with Section 01 74 00 – Cleaning.

B. Upon completion and verification of performance of installation, remove surplus materials, rubbish, tools and equipment.

END OF SECTION 23 05 53.01

Section 23 05 93 – Testing, Adjusting and Balancing for HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. TAB is used throughout this Section to describe the process, methods and requirements of testing, adjusting and balancing for HVAC.

B. TAB means to test, adjust and balance to perform in accordance with requirements of Contract Documents and to do other work as specified in this Section.

1.2 QUALIFICATIONS OF TAB PERSONNEL

A. Submit names of personnel certified to AABC, NEBB or SMACNA to perform TAB to Owner within 90 days of award of contract.

B. Provide documentation confirming qualifications, successful experience. TAB contractor shall have a minimum of 5 (five) years experience to AABC, NEBB or SMACNA.

C. TAB: performed in accordance with the requirements of standard under which TAB Firm's qualifications are approved:
   1. Associated Air Balance Council, (AABC) National Standards for Total System Balance, MN-1.
   2. National Environmental Balancing Bureau (NEBB) TABES, Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems.
   3. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA), HVAC TAB HVAC Systems – Testing, Adjusting and Balancing.

D. Recommendations and suggested practices contained in the TAB Standard: mandatory.

E. Use TAB Standard provisions, including checklists, and report forms to satisfy Contract requirements.

F. Use TAB standard for TAB, including qualifications for TAB Firm and Specialist and calibration of TAB instruments.

G. Where instrument manufacturer calibration recommendations are more stringent than those listed in the TAB standard, use manufacturer's recommendations.

H. TAB Standard quality assurance provisions such as performance guarantees form part of this contract.
   1. For systems or system components not covered in TAB standard, use TAB procedures developed by TAB Specialist.
   2. Where new procedures and requirements are applicable to Contract requirements have been published or adopted by body responsible for TAB Standard used (AABC, NEBB, or SMACNA), requirements and recommendations contained in these procedures and requirements are mandatory.

1.3 PURPOSE OF TAB

A. Test to verify proper and safe operation, determine actual point of performance, evaluate qualitative and quantitative performance of equipment, systems and controls at design, average and low loads using actual or simulated loads.

B. Adjust and regulate equipment and systems to meet specified performance requirements and to achieve specified interaction with other related systems under normal and emergency loads and operating conditions.

C. Balance systems and equipment to regulate flow rates to match load requirements over full operating ranges.

1.4 EXCEPTIONS

A. TAB of systems and equipment regulated by codes, standards to be to satisfaction of authority having jurisdiction.

1.5 CO-ORDINATION

A. Schedule time required for TAB (including repairs, re-testing) into project construction and completion schedule to ensure completion before acceptance of project.

B. Do TAB of each system independently and subsequently, where interlocked with other systems, in unison with those systems.

1.6 PRE-TAB REVIEW

A. Review contract documents before project construction is started and confirm in writing to Owner adequacy of provisions for TAB and other aspects of design and installation pertinent to success of TAB.

B. Review specified standards and report to Owner in writing all proposed procedures which vary from standard.

C. During construction, co-ordinate location and installation of TAB devices, equipment, accessories, measurement ports and fittings.

1.7 START-UP

A. Follow start-up procedures as recommended by equipment manufacturer unless specified otherwise.

B. Follow special start-up procedures specified elsewhere in other Divisions.

1.8 OPERATION OF SYSTEMS DURING TAB

A. Operate systems for length of time required for TAB and as required by Owner for verification of TAB reports.

1.9 START OF TAB

A. Notify Owner seven (7) working days prior to start of TAB.

B. Start-up, verification for proper, normal and safe operation of mechanical and associated electrical and control systems affecting TAB including but not limited to:
   1. Proper thermal overload protection in place for electrical equipment.
   2. Liquid systems:
      a. Flushed, filled, vented.
      b. Correct pump rotation.
      c. Strainers in place, baskets clean.
      d. Isolating and balancing valves installed, open.
      e. Calibrated balancing valves installed, at factory settings.
      f. Chemical treatment systems complete, operational.

1.10 APPLICATION TOLERANCES

A. Do TAB to following tolerances of design values:
   1. Other HVAC systems: plus 5%, minus 5%.
   2. Hydronic systems: plus or minus 10 %.

1.11 ACCURACY TOLERANCES

A. Measured values to be accurate to within plus or minus 2 % of actual values.

1.12 INSTRUMENTS

A. Prior to TAB, submit to Owner list of instruments to be used together with serial numbers.

B. Calibrate in accordance with requirements of most stringent of referenced standard for either applicable system or HVAC system.

C. Calibrate within 3 (three) months of TAB. Provide certificate of calibration to Owner.

1.13 SUBMITTALS

A. Submit, prior to commencement of TAB:

B. Proposed methodology and procedures for performing TAB if different from referenced standard.

1.14 PRELIMINARY TAB REPORT

A. Submit for checking and approval of Owner, prior to submission of formal TAB report, sample of rough TAB sheets. Include:
   1. Details of instruments used.
   2. Details of TAB procedures employed.
   3. Calculations procedures.
   4. Summaries.

1.15 TAB REPORT

A. Format to be in accordance with referenced standard.

B. TAB report to show results in IP units and to include:
   1. Project record drawings.
   2. System schematics.

C. Submit 3 (three) copies of TAB Report to Owner for verification and approval, in English in D-ring binders, complete with index tabs.

1.16 VERIFICATION

A. Reported results subject to verification by Owner.

B. Provide manpower and instrumentation to verify up to 30% of reported results.

C. Number and location of verified results to be at discretion of Owner.

D. Bear costs to repeat TAB as required to satisfaction of Owner.

1.17 SETTINGS

A. After TAB is completed to satisfaction of Owner, replace drive guards, close access doors, lock devices in set positions, ensure sensors are at required settings.

B. Permanently mark settings to allow restoration at any time during life of facility. Markings not to be eradicated or covered in any way.

1.18 COMPLETION OF TAB

A. TAB to be considered complete when final TAB Report received and approved by Owner.

1.19 AIR SYSTEMS

A. Standard: TAB to be to most stringent of this section or TAB standards of AABC or NEBB.

B. Do TAB of systems, equipment, components, controls specified in other Divisions.

C. Qualifications: personnel performing TAB to be qualified to standards of AABC or NEBB.

D. Quality assurance: Perform TAB under direction of supervisor qualified to standards of AABC or NEBB.

E. Measurements: to include, but not limited to, following as appropriate for systems, equipment, components, controls: static pressure, flow rate, pressure drop (or loss), temperatures, RPM, electrical power, voltage, noise, vibration, amperage and volts.

F. Locations of system measurements to include, but not be limited to suction and discharge of pumps, return and supply connections at boilers.

1.20 HYDRONIC SYSTEMS

A. Definitions: for purposes of this section, to include low pressure hot water heating, condenser water, glycol systems.

B. Standard: TAB to be to most stringent of TAB standards of AABC or NEBB.

C. Do TAB of systems, equipment, components, controls specified in other Divisions.

D. Qualifications: personnel performing TAB to be qualified to standards of AABC or NEBB.

E. Quality assurance: perform TAB under direction of supervisor qualified to standards of AABC or NEBB.

F. Measurements: to include, but not limited to, following as appropriate for systems, equipment, components, controls: flow rate, static pressure, pressure drop (or loss), temperature, specific gravity, density, RPM, electrical power, voltage, noise, vibration.

G. Locations of equipment measurement: to include, but not be limited to, following as appropriate:
   1. Inlet and outlet of piping loops (primary and secondary), boiler, pump, PRV, control valve, other equipment causing changes in conditions.
   2. At controllers, controlled device.

H. Locations of systems measurements to include, but not be limited to, following as appropriate: supply and return of primary and secondary loops (main, main branch, branch, sub-branch) of all hydronic systems, inlet connection of make-up water.

1.21 OTHER TAB REQUIREMENTS

A. Measurement of noise and vibration from equipment specified in Mechanical Division.
   1. Standard: 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment and 23 32 48 – Acoustical Air Plenums.
   2. Vibration measurements around each piece of rotating equipment.
   3. Sound measurements in each octave band around each piece of rotating equipment.

1.22 POST- OCCUPANCY TAB

A. Participate in systems checks twice during Warranty Period - #1 approximately three (3) months after acceptance and #2 within three (3) months of termination of Warranty Period.

PRODUCTS (NOT APPLICABLE)

EXECUTION (NOT APPLICABLE)

END OF SECTION 25 05 93

SECTION 23 07 19 - HVAC PIPING INSULATION

PART 1 - GENERAL

1.1 1.1 SUMMARY

A. Section Includes:
   1. Thermal insulation for piping and piping accessories in commercial type applications.

1.2 1.2 RELATED SECTIONS

A. Section 01 74 21 – Construction/Demolition Waste Management and Disposal

B. Section 01 33 00 – Submittal Procedures.

C. Section 23 07 16 – HVAC Equipment Insulation.

D. Section 23 05 53.01 – Mechanical Identification.

1.3 1.3 REFERENCES

A. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
   1. ASHRAE Standard 90.1, Energy Efficient Design of New Buildings Except Low-Rise Residential Buildings (Including all Addenda).

B. American Society for Testing and Materials (ASTM)
   1. ASTM B209M, Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate Metric.
   2. ASTM C335, Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
   3. ASTM C411, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
   4. ASTM C449/C449M, Standard Specification for Mineral Fibre-Hydraulic-Setting Thermal Insulating and Finishing Cement.
   5. ASTM C533 Standard specification for Calium Silicate Insulation Block and Pipe.
   6. ASTM C547 Standard Specification for Mineral Fibre Pipe Insulation.
   7. ASTM C795, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
   8. ASTM C921, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
   9. ASTM D1784, Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.

C. Hazardous Materials Information System (HMIS)
   1. Material Safety Data Sheets.

D. Manufacturer's Trade Associations
   1. Thermal Insulation Association of Canada (TIAC): National Insulation Standards.

E. Underwriters' Laboratories (UL)

1.4 DEFINITIONS

A. For purposes of this section:
   1. "CONCEALED" - insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces.
   2. "EXPOSED" - will mean "not concealed" as defined herein.

B. TIAC ss:
   1. CRF: Commercial Rectangular Finish
   2. CPF: Commercial Piping Finish.

1.5 SUBMITTALS

A. Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

B. Product Data:
   1. Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.
      a. Submit two copies of Hazardous Materials Information System (HMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures.

C. Shop Drawings:
   1. Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

D. Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.
   1. Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
   2. Instructions: submit manufacturer's installation instructions to Owner.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Installer: certified in performing work of this Section, and have at least 5 years successful experience in this size and type of project.

B. Health and Safety:
   1. Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.6 DELIVERY, STORAGE AND HANDLING

A. Packing, shipping, handling and unloading:
   1. Deliver, store and handle in accordance with manufacturer's written instructions and Section 01 61 00 - Common Product Requirements.
   2. Deliver, store and handle materials in accordance with manufacturer's written instructions.
   3. Deliver materials to site in original factory packaging, labeled with manufacturer's name, address.

B. Storage and Protection:
   1. Protect from weather, construction traffic.
   2. Protect against damage.
   3. Store at temperatures and conditions required by manufacturer.

C. Waste Management and Disposal:
   1. Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
   2. Place excess or unused insulation and insulation accessory materials in designated containers.
   3. Divert unused materials from landfill to recycling facility approved by Owner.
   4. Dispose of unused adhesive material at official hazardous material collections site approved by Owner.

PART 2 - PRODUCTS

2.1 FIRE AND SMOKE RATING

A. In accordance with UL requirements.
   1. Maximum flame spread rating: 25.
   2. Maximum smoke developed rating: 50.

2.2 INSULATION

A. Mineral fibre specified includes glass fibre, rock wool, slag wool.

B. Thermal conductivity ("k" factor) not to exceed specified values at 75 ^{o}F mean temperature when tested in accordance with ASTM C335.

C. Rigid moulded calcium silicate in sections and blocks, and with special shapes to suit project requirements.
   1. Insulation: to ASTM C533.
   2. Maximum "k" factor: to 0.54 Btu/in ^{o}F @ 500 ^{o}F.
   3. Design to permit periodic removal and re-installation.

D. Rigid moulded mineral fibre with factory applied vapour retarder jacket.
   1. Mineral fibre: to ASTM C547.
   2. Maximum "k" factor: per ASTM C547

E. Flexible unicellular tubular elastomer.
   1. Insulation: with vapour retarder jacket to ASTM C534.
   2. To be certified by manufacturer to be free of potential stress corrosion cracking corrodants
   3. Flame spread index less than 25, and smoke developed index less than 50.

2.3 INSULATION SECUREMENT

A. Tape: Self-adhesive, aluminum, plain reinforced, 50 mm wide minimum.

B. Contact adhesive: Quick setting.

C. Canvas adhesive: Washable.

D. Tie wire: 16 ga. diameter stainless steel.

E. Bands: Stainless steel, 3/4 inch, 18 ga. thick.

2.4 CEMENT

A. Thermal insulating and finishing cement:
1. Hydraulic setting or air drying on mineral wool, to ASTM C449/C449M.

2.8 JACKETS

A. Polyvinyl Chloride (PVC):
1. One-piece moulded type and sheet to ASTM D1784 with pre-formed shapes as required.
2. Colours: to match adjacent finish paint. Confirm colour with Owner.
3. Minimum service temperatures: -4 ^{o}F.
4. Maximum service temperature: 150 ^{o}F.
5. Moisture vapour transmission: 0.02 perm.
6. Thickness: 30 mil.
7. Fastenings:
   a. Use solvent weld adhesive compatible with insulation to seal laps and joints.
   b. Tacks.
   c. Pressure sensitive vinyl tape of matching colour.
   d. Indoor: flame spread rating 25, smoke developed rating 50.

B. Canvas:
1. 8 oz/sq ft cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.
2. Lagging adhesive: Compatible with insulation.

C. Aluminum:
1. To ASTM B209.
2. Thickness: 18 ga sheet.
3. Finish: Embossed or corrugated.
4. Joining: Longitudinal and circumferential slip joints with 2 inch laps.
5. Fittings: 18 ga thick die-shaped fitting covers with factory-attached protective liner.
6. Metal jacket banding and mechanical seals: stainless steel, 3/4 inch wide, 18 ga thick at 12 inch spacing.

PART 3 - EXECUTION

3.1 MANUFACTURE'S INSTRUCTIONS

A. Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 PRE- INSTALLATION REQUIREMENT

A. Pressure testing of piping systems and adjacent equipment to be complete, witnessed and certified.

B. Surfaces to be clean, dry, free from foreign material.

3.3 INSTALLATION

A. Install in accordance with Insulation Manufacturers Association National Standards.

B. Apply materials in accordance with manufacturers instructions and this specification.

C. Use two layers with staggered joints when required nominal wall thickness exceeds 3 inch.

D. Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
   1. Install hangers, supports outside vapour retarder jacket.

E. Supports, Hangers:
   1. Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.

3.4 REMOVABLE, PRE-FABRICATED, INSULATION AND ENCLOSURES

A. See Section 23 07 16 – HVAC Equipment Insulation.

3.5 INSTALLATION OF ELASTOMERIC INSULATION

A. Insulation to remain dry. Overlaps to manufacturers instructions. Ensure tight joints.

B. Provide vapour retarder as recommended by manufacturer.

3.6 PIPING INSULATION SCHEDULES

A. Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified. Insulate vent pipes 10 feet from roof penetration.

B. Code: A-3.
   1. Securements: Tape at 12 inches oc.
   2. Seals: VR lap seal adhesive, VR lagging adhesive.

C. Thickness of insulation to be as listed in following table.
   1. Run-outs to individual units and equipment not exceeding 12 feet long.
   2. Do not insulate exposed runouts to plumbing fixtures, chrome plated piping, valves, fittings.

Application	Temp °F	TIAC code	Pipe sizes (NPS) and insulation thickness (inch)					
	Run out			*to 1*	*1 1/4 to 2*	*2 1/2 to 4*	*5 to 6*	*8 & over*
Boiler Feed Water		A-3	1	1	1	1	1	1
Hot Water Heating	140 – 200	A-3	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2
Hot Water Heating	up to 140	A-3	1	1	1	1	1-1/2	1-1/2
Glycol Heating	140 – 200	A-3	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2
Glycol Heating	up to 140	A-3	1	1	1	1	1-1/2	1-1/2
Dual Temp. Heating		A-3	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2

D. Finishes:
   1. Exposed indoors: PVC jacket.
   2. Exposed in mechanical rooms: PVC jacket.
   3. Concealed, indoors: canvas on valves, fittings. No further finish.
   4. Finish attachments: SS screws or bands, at 6 inch oc. Seals: wing or closed.

3.7 CLEANING

A. Proceed in accordance with Section 01 74 00 – Cleaning.

B. Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION 23 07 19

SECTION 23 08 02 – CLEANING AND START-UP OF MECHANICAL PIPING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Procedures and cleaning solutions for cleaning mechanical piping systems.

1.2 RELATED SECTIONS

A. Section 01 74 21 – Construction/Demolition Waste Management and Disposal

B. Section 23 05 93 - Testing, Adjusting and Balancing of HVAC

C. Section 23 25 00 - HVAC Water Treatment.

1.3 REFERENCES

A. American Society for Testing and Materials International (ASTM)
   1. ASTM E202 – Standard Test Methods for Analysis of Ethylene Glycols and Propylene Glycols.

B. Hazardous Materials Information System (HMIS).
   1. Material Safety Data Sheets (MSDS).

1.4 SUBMITTALS

A. Product Data:
   1. Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 – Submittal Procedures. Include product characteristics, performance criteria, and limitations.
   2. Quality assurance submittals: submit following in accordance with Section 01 33 00 – Submittal Procedures.
      a. Instructions: submit manufacturer's installation instructions.
         1) Owner will make available one (1) copy of systems supplier installation instructions.

1.5 QUALITY ASSURANCE

A. Health and Safety:
   1. Do construction occupational health and safety in accordance with Section 01 35 29.06 – Health and Safety Requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling and unloading.
   1. Deliver, store and handle in accordance with manufacturer's written instructions and Section 01 61 00 – Common Product Requirements.

B. Waste Management and Disposal:
   1. Construction / Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction / Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 CLEANING SOLUTIONS

A. Low foaming detergent at all temperatures

B. No pH neutralization required

C. Designed for use on most metals including aluminium

D. Bio-degradable

E. Phosphate Free

F. Nitrite Free

PART 3 - EXECUTION

3.1 CLEANING HYDRONIC AND STEAM SYSTEMS

A. Timing

   1. Systems to be operational, hydrostatically tested and with safety devices functional, before cleaning is carried out.

B. Cleaning Agency:

   1. Retain qualified water treatment specialist to perform system cleaning.

C. Install instrumentation such as flow meters, orifice plates, pitot tubes, flow metering valves only after cleaning is certified as complete by water treatment specialist.

D. Cleaning procedures:

   1. Provide detailed report outlining proposed cleaning procedures at least 4 weeks prior to proposed starting date. Report to include:

a. Cleaning procedures, flow rates, elapsed time.
b. Chemicals and concentrations to be used.
c. Inhibitors and concentrations.
d. Specific requirements for completion of work.
e. Special precautions for protecting piping system materials and components.
f. Complete analysis of water to be used to ensure water will not damage systems or equipment.

E. Conditions at time of cleaning of systems
1. Systems to be free from construction debris, dirt and other foreign material.
2. Control valves to be operational, fully open to ensure that terminal units can be cleaned properly.
3. Strainers to be clean prior to initial fill.
4. Install temporary filters on pumps not equipped with permanent filters.
5. Install pressure gauges on strainers to detect plugging.

F. Report on Completion of Cleaning
1. When cleaning is completed, submit report, complete with certificate of compliance with specifications of cleaning component supplier.

G. Hydronic Systems:

1. Flush system thoroughly with water, back flush pump, strainers, blow down drain valves and risers to remove all loose debris. Remove accumulated sludge in boilers if necessary.
2. Then add 2% solution of low foaming detergent to the system through a by-pass feeder or another feeding device.
3. Circulate for 36 hours at 180^{o} F. For chilled systems, circulate at least 48 hours at ambient temperature.
4. During recirculation, back flush strainers, drain valves and risers at their lowest point once every 8 hours.
5. Drain cleaning water completely.
6. Then fill and drain system several times. Circulate 30 minutes every time the system is refilled.
7. Bleed system at several points until water is clear and non-foaming. Clean pump strainers.
8. Draw a water sample from the system and send it to out laboratory for analysis.
9. If the laboratory report is satisfactory, the system must then be treated with the appropriate formula.

H. Glycol Systems:
1. In addition to procedures specified above perform procedures specified herein.
2. Test to prove concentration will prevent freezing to minus 40^{o} F. Test inhibitor strength and include in procedural report. Refer to ASTM E202.

3.2 START-UP OF HYDRONIC SYSTEMS

A. After cleaning is completed and system is filled:

1. Establish circulation and expansion tank level, set pressure controls.
2. Ensure air is removed.
3. Check pumps to be free from air, debris, possibility of cavitation when system is at design temperature.
4. Dismantle system pumps used for cleaning, inspect, replace worn parts, install new gaskets and new set of seals.
5. Clean out strainers repeatedly until system is clean.
6. Commission water treatment systems as specified in Section 23 25 00 - HVAC Water Treatment.
7. Check water level in expansion tank with cold water with circulating pumps OFF and again with pumps ON.
8. Repeat with water at design temperature.
9. Check pressurization to ensure proper operation and to prevent water hammer, flashing, cavitation. Eliminate water hammer and other noises.
10. Bring system up to design temperature and pressure slowly over a 48 hour period.
11. Perform TAB as specified in Section 23 05 93 - Testing, Adjusting and Balancing (TAB).
12. Adjust pipe supports, hangers, springs as necessary.
13. Monitor pipe movement, performance of expansion joints, loops, guides, anchors.
14. If sliding type expansion joints bind or if bellows type expansion joints flex incorrectly, shut down system, re-align, repeat start-up procedures.
15. Re-tighten bolts, etc. using torque wrench, to compensate for heat-caused relaxation. Repeat several times during commissioning.
16. Check operation of drain valves.
17. Adjust valve stem packings as systems settle down.
18. Fully open all balancing valves (except those that are factory-set).
19. Check operation of over-temperature protection devices on circulating pumps.
20. Adjust alignment of piping at pumps to ensure flexibility, adequacy of pipe movement, absence of noise or vibration transmission.

3.3 CLEANING

A. Provide in accordance with Section 01 74 00 – Cleaning.

B. Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION 23 08 02

23 09 23 SEQUENCE OF OPERATION

PART 1 GENERAL

1.1 Section includes

A. Sequence of operation for hot water heating boilers.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Owner will be replacing facility BMS backbone as part of a future project.

B. Existing pneumatic JCI control cabinet in boiler room to remain.

C. Contractor to provide digital to analog interface module to allow current connection of the new boilers to the existing pneumatic analog controls. Owner cannot identify manufacturer of the new facility BMS system until such time as said project is bid. Interface should therefore be compatible with BACnet, LONworks, and other open protocol controllers in order to provide interface with the future facility BMS.

PART 3 SEQUENCE OF OPERATION

3.1 HEATING HOT WATER – CONTROL SEQUENCE

A. All heating hot water equipment shall function in both normal and emergency power mode.

B. Space heating shall be provided via circulation of hot water as provided by two hot water boilers. Hot water pumps are designed to operate as duty-standby units for circulation of heating hot water to all points of use.

C. Each hot water pump is to be controlled by the existing BAS controlling a motor VFD. VFD's are to have have hand-off auto (h-o-a) switches; units shall be in auto position when available for operation as controlled by the BAS.

D. Upon a call for heating, either by any air handler unit, cabinet unit heater, fan coil unit, terminal box or unit heater, the following shall occur.

a. Pumps shall lead/lag on a weekly basis based upon runtime. (one pump is duty and one pump is stand-by)

b. BAS shall alternate pumps weekly on Tuesday at 11:00 am based upon runtime, sequencing equipment in order of least to greatest accumulated yearly runtime, where the lowest runtime unit is indexed as lead/first, and highest runtime unit is indexed as lag/last.

c. If unit selected as duty pump is unavailable for operation due to maintenance, failure, or selection of off position at unit (H-O-A) switch, the standby pump shall become the duty pump.

E. Upon failure of the duty hot water pump, the BAS shall automatically initiate the start-up of the standby pump, and signal an alarm to the BAS.

F. Hot water pump flow shall be maintained until there are no systems requesting heating. Each pump shall be provided with a current sensor to operate as a flow proof of that pumping unit. Any pump energized through the EMS system which does not give positive indication of flow shall signal an alarm after 90 seconds. Continued lack of flow proof for an energized pump to a period of 180 seconds shall de-energize thapump and initiate the startup of the standby unit.

G. Two differential pressure sensors will provide input to the BAS. Each sensor shall have an adjustable set point (provided by TAB contractor). The BAS shall modulate the VFD's of both duty pumps to maintain DP setpoint for both sensors by calculating the difference between each sensor and its set point. The maximum difference shall be input into the VFD control loop.

H. On the call for heating, the BAS is to signal the individual control panel on the selected duty boiler. Boilers will be scheduled for duty/standby by the BAS similar to the pump scheduling above.

I. The two boilers will be set to operate shall operate in a lead/lag configuration.. Upon initiation of heating system, the duty boiler shall slowly ramp up while the boiler circulation pump simultaneously energizes. System loop circulation pumps will simultaneously energize. The boiler shall modulate the boiler burner to maintain hot water supply temperature based on an outdoor air temperature reset schedule. The ratio shall be 180°F HW at 5° of outside air and 130°F HW at 60°F of outside air (field adjustable).

J. Should one boiler fail to maintain proper hot water supply temperature alone, BAS will signal the designated lag boiler to fire to maintain hot water supply temperature.

K. System is to shut down if discharge water temperature is +15°F (adj.) from setpoint, or on loss of water flow. Alarm BMS.

L. Upon a loss or inability to maintain hot water supply temperature, an alarm shall signal the BAS.

M. Incoming hot water supply temperature and flow rate shall be monitored and totalized by the B.A.S. Provide vortex shedding type meter.

END OF SECTION 23 09 23.09

SECTION 23 11 23 FACILITY GAS PIPING

PART 1 GENERAL

1.1 SUMMARY

.1 Section Includes

.1 Materials and installation for piping, valves and fittings for gas fired equipment.
.2 Coordinate any required electrical connections with Electrical Contractor.

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures.

.2 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

.3 Section 01 78 00 - Closeout Submittals.

.4 Section 01 45 00 – Quality Control

1.3 REFERENCES

.1 American Society of Mechanical Engineers (ASME)

.1 ASME B16.5, Pipe Flanges and Flanged Fittings
.2 ASME B16.18, Cast Copper Alloy Solder Joint Pressure Fittings
.3 ASME B16.22, Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings
.4 ASME B18.2.1, Square and Hex Bolts and Screws Inch Series.

.2 American Society for Testing and Materials International (ASTM)

.1 ASTM A 47/A47M, Standard Specification for Ferritic Malleable Iron Castings.
.2 ASTM A 53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.
.3 ASTM B 75M, Standard Specification for Seamless Copper Tube (Metric).
.4 ASTM B 837, Standard Specification for Seamless Copper Tube for Natural Gas and Liquefied Petroleum (LP) Gas Fuel Distribution Systems.

.3 National Propane Gas Association requirements and regulations

.4 Code of Federal Regulations, 49 CFR Parts 191 and 192.

.5 NFPA 54, International Fuel Gas Code.

.6 Comply with all applicable locally enforced codes and standards.

1.4 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer’s printed product literature, specifications and datasheet for piping, fitting and equipment.

.2 Indicate on manufacturer's catalogue literature following: valves.

.3 Test Reports: Submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.

.4 Certificates: Submit certificates signed by manufacturer certifying that materials and assembly comply with specified performance characteristics and physical properties.

.5 Instructions: Submit manufacturer's installation instructions.

.6 Closeout Submittals: Submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.

1.5 QUALITY ASSURANCE

.1 Pre-Installation Meeting:

.1 Convene pre-installation meeting one week prior to beginning work of this Section and on-site installations.

.1 Verify Project requirements.

.2 Review Installation and substrate conditions.

.3 Co-ordination with other building subtrades.

.4 Review manufacturer's installation instructions and warranty requirements.

.2 All installation to be done by qualified experienced and licensed contractors.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 – Construction /Demolition Waste Management and Disposal.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal, paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan (WMP).

.4 Separate for reuse and recycling and place in designated containers, steel, metal, plastic waste in accordance with WMP.

.5 Divert unused metal materials from landfill to metal recycling facility as approved by Owner.

PART 2 PRODUCTS

2.1 PIPE

.1 Steel pipe: to ASTM A 53/A53M, Schedule 40, seamless as follows:

.1 NPS ½ to 2, screwed.

.2 NPS2 ½ and over, plain end.

.2 Copper pipe: to ASTM B 75M.

2.2 JOINTING MATERIAL

.1 Screwed fittings: pulverized lead paste

.2 Welded fittings: to CSA W47.1.

.3 Flange gaskets: non-metallic flat.

.4 Brazing: to ASTM B 75M.

2.3 FITTINGS

.1 Steel pipe fittings, screwed:

.1 Malleable iron: screwed to ANSI B16.3, Class 150 for service pressures up to and including 861 kPa.

.2 Unions: malleable iron, brass to iron, ground seat, to ASTM A47M.

.3 Nipples: schedule 40, to ASTM A53.

.2 Copper tube fittings:

.1 Service line riser and transition fittings.

.1 Wrought copper and copper alloy, solder type 1 to ANSI/ASME B16.22.

2.4 EVAPORATOR

.1 Electric dry heat evaporator, sized as scheduled.

.2 Acceptable manufacturers:

.1 Algas-SDI

.2 TransTech Energy

.3 Ransome Manufacturing

.4 Approved equivalent.

2.5 MANUAL SHUT-OFF VALVES

.1 NPS 4 and under, full port, forged brass ball valve for two piece body construction complete with the following:

.1 Blowout-proof stem.

.2 Adjustable packing gland.

.3 Chrome-plated ball.

.4 Class 150 WSP, 600 WOG.

.5 Lever handle.

.6 ANSI B1.20.1 NPT end connections

PART 3 EXECUTION

3.1 MANUFACTURER’S INSTRUCTIONS

.1 Compliance: Comply with manufacturer’s written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions and datasheet.

3.2 PIPING

.1 Slope piping down in direction to flow to low points.

.2 Install drip points:

.1 At low points in piping system and where indicated.

.2 Provide complete with blowdown valve i.e. manual shut-off valve as specified above.

.3 Minimum 75 mm in length from tee connection in riser to top of valve. Size to be minimum NPS ¾. Provide complete with threaded end cap.

.3 Use eccentric reducers at pipe size change installed to provide positive drainage.

.4 Provide clearance for access and for maintenance.

.5 Ream pipes, clean scale and dirt, inside and out.

.6 Install piping to minimize pipe dismantling for equipment removal.

.7 Field ending of piping to be prohibited.

.8 Nesting of bushings to be prohibited. Utilize properly sized reducing fittings.

.9 Do not utilize propane piping as an electrical ground.

3.3 LP STORAGE TANK

.1 One used 12,000 gallon LP bulk storage tank is to be provided and installed as part of this contract.

.2 Used tank is to be fully reconditioned and repaired to meet all requirements of a new tank as outlined in NFPA 58, NFPA 59, and 49 CFR Parts 191 and 192. Any additional requirements by DOT are also to be adhered to during the reconditioning process.

.3 Reconditioning of existing tank is to be done only by a trained and experience workman certified to repair the particular manufacturer’s tanks back to original factory specifications.

.4 Reconditioned tanks must be provided with a certificate stating that the reconditioning work was done to all code requirements and performed under the direct supervision of a factory trained technician. This certificate shall be attached and filed with the submittal materials for the LP system.

.5 Concrete support pillars are to be provided by the tank vendor. The support piers may be pre-cast but are required to be designed and certified by a licensed structural engineer, verifying that these supports meet or exceed all code requirements for support of this particular tank. Contractor will be responsible for costs of retaining the required structural engineering services.

.6 Excavation and backfill around LP tank support is to be done by the LP vendor according to the recommendation of a qualified geotechnical engineer. Soil analysis will be required to determine optimum backfill compaction procedure around concrete support tanks to avoid shifting or moving of the tank in the course of the annual weather changes and maximum load of the tank and contents. Contractor will be responsible for costs of retaining qualified geotechnical engineering services.

.7 LP vendor is to install a locked and secured fill station to allow delivery of LP to the tank. Location of the fill station is to be coordinated with the Owner and located such that a standard length delivery hose can reach from the bulk tanker truck to the fill station.

.8 Delivery and filling of LP to the tank will be responsibility of the Owner under a separate contract. This contract will be with the LP vendor directly.

3.4 VALVES

.1 Install valves with stems upright or horizontal unless approved otherwise by Owner.

.2 Install valves as indicated.

3.5 FIELD QUALITY CONTROL

.1 Site Tests/Inspection:

.1 Test system in accordance with NFPA 54 and requirements of authorities having jurisdiction.

.2 Manufacturer's Field Services:

.1 Have manufacturer of products supplied under this Section review work involved in handling, installation/application, protection and cleaning of its products, and submit written reports, in acceptable format, to verify compliance of work with contract.

.2 Provide manufacturer's field services, consisting of product use recommendations and periodic site visits for inspection of product installation, in accordance with manufacturer's instructions.

.3 Schedule site visits to review work at stages listed:

.1 After delivery and storage of products, and when preparatory work on which work of this Section depends is complete, but before installation begins.

.2 Twice during progress of work at 25% and 60% complete.

.3 Upon completion of work, after cleaning is carried out.

.3 Obtain reports within three (3) working days of review and submit immediately to Owner.

.4 PV procedures:

.1 Test performance of components.

3.6 ADJUSTING

.1 Purging: purge line after pressure test.

.2 Pre-Start-Up Inspections:

.1 Check vents from regulators, control valves, terminate outside building in approved location, protected against blockage, damage.

.2 Check gas trains, entire installation is approved by authority having jurisdiction.

3.7 CLEANING

.1 Perform cleaning operations as specified in Section 01 74 00 – Cleaning, and in accordance with manufacturer's recommendations.

SECTION 23 21 23 – HYDRONIC PUMPS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Materials, equipment selection, installation and start up for hydronic system pumps.

1.2 RELATED SECTIONS

A. Section 01 33 00 - Submittal Procedures.

B. Section 01 74 21 - Construction/Demolition Waste Management and Disposal

C. Section 01 35 29.06- Health and Safety Requirements.

D. Section 01 78 00 - Closeout Submittals.

1.3 REFERENCES

A. American Society of Heating Refrigeration and Air-Conditioning Engineers (ASHRAE).
   1. Standard 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings.

B. National Energy Conservation Code (NECC).

C. National Electrical Manufacturer’s Association (NEMA)
   1. NEMA MG 1, Motors and Generators.

D. American National Standards Institute/Hydraulics Institute (ANSI/HI)
   1. ANSI/HI 1.3, Rotodynamic (Centrifugal) Pumps for Design and Application.

1.4 SUBMITTALS

A. Submittals in accordance with Section 01 33 00 – Submittal Procedures.

B. Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.

C. Submit manufacturer's detailed composite wiring diagrams for control systems showing factory installed wiring and equipment on packaged equipment or required for controlling devices or ancillaries, accessories and controllers.

D. Submit product data of pump curves for review showing point of operation.

E. Indicate piping, valves and fittings shipped loose by packaged equipment supplier, showing their final location in field assembly.

F. Provide maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.

1.5 HEALTH AND SAFETY

A. Do construction occupational health and safety in accordance with Section 01 35 29.06 – Health and Safety Requirements.

1.6 WASTE MANAGEMENT AND DISPOSAL

A. Separate waste material for reuse and recycling in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

B. Remove from site and dispose of packaging materials at appropriate recycling facilities.

C. Collect and separate for disposal, paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

D. Separate for reuse and recycling and place in designated containers, steel, metal, plastic waste in accordance with Waste Management Plan.

E. Fold up metal banding, flatten and place in designated area for recycling.

1.7 EXTRA MATERIALS

A. Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.

B. Furnish following spare parts:
   1. Mechanical seal for each pump.
   2. Packing for each pump.
   3. Set of gaskets for each pump.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Acceptable manufacturers
   1. Taco
   2. Bell & Gossett
   3. Xylem
   4. Gould
   5. Approved equivalent

2.2 IN-LINE CIRCULATORS

A. Volute: cast iron radially split, with screwed or flanged design suction and discharge connections.

B. Impeller: alloy steel, cast bronze, or cast iron to suit application.

C. Shaft: stainless steel with bronze sleeve bearing, integral thrust collar.

D. Seal assembly: mechanical for service to 275 ^{0}F.

E. Coupling: flexible self-aligning.

F. Motor: as per Section 23 05 13 – Common Motor Requirements for HVAC Equipment and as per manufacturer's recommendations. Speed and power as indicated in the pump schedule.

G. Capacity: as indicated in the pump schedule.

H. Design pressure: 175 psia.

1.3 SINGLE SUCTION CENTRIFUGAL PUMP

A. General: all iron pump complete with motor.

B. Base: common cast iron or fabricated steel with drip rim and tapping for drain connection.

C. Volute: cast iron radially split, back pull out end suction, screwed or flanged suction and discharge, with drain plug and vent cock, suction and discharge pressure gauge tappings.

D. Impeller: cast iron or stainless steel enclosed type, keyed drive with locking nut or screw, dynamically balanced.

E. Shaft: stainless steel with two point support for ball bearing mounting hardened wear rings at packing gland.

F. Seal assembly: mechanical seal, oil or grease lubricated. On open system flush line with 50 micron filter and site flow indicator. When differential exceeds 30 psig use cyclone type separator.

G. Coupling: flexible self-aligning complete with coupling guard.

H. Motor: NEMA Class B, squirrel cage induction, premium efficiency continuous duty, drip proof, ball bearing, maximum temperature rise 125^0 F, as per Section 23 05 13 - Common Motor Requirements for HVAC Equipment, speed and power as indicated in pump schedule.

I. Capacity: as indicated in pump schedule.

J. Design pressure: 175 psig.

PART 3 - EXECUTION

3.1 INSTALLATION

A. In line circulators: install as indicated by flow arrows. Support at inlet and outlet flanges or unions. Install with bearing lubrication points accessible.

B. Base mounted type: supply templates for anchor bolt placement. Furnish anchor bolts with sleeves. Place level, shim unit and grout. Align coupling in accordance with manufacturer's recommended tolerance. Check oil level and lubricate.

C. Ensure that pump body does not support piping or equipment. Provide stanchions or hangers for this purpose. Refer to manufacturer's installation instructions for details.

D. Pipe drain tapping to floor drain.

E. Install volute venting pet cock in accessible location.

F. Check rotation prior to start-up.

G. Install pressure gauge ball valves.

3.4 START-UP

A. General

1. In accordance with manufacturer's recommendations.

B. Procedures:

1. Before starting pump, check that cooling water system, over-temperature and other protective devices are installed and operative.
2. After starting pump, check for proper, safe operation.
3. Check installation, operation of mechanical seals, packing gland type seals. Adjust as necessary.
4. Check base for free-floating, no obstructions under base.
5. Run-in pumps for 12 continuous hours.
6. Verify operation of over-temperature and other protective devices under low- and no-flow condition.
7. Eliminate air from scroll casing.
8. Adjust alignment of piping and conduit to ensure true flexibility at all times.
9. Eliminate cavitation, flashing and air entrainment.
10. Adjust pump shaft seals.
11. Measure pressure drop across strainer when clean and with flow rates as finally set.
12. Replace seals if pump used to degrease system or if pump used for temporary heat.
13. Verify lubricating oil levels.

END OF SECTION

SECTION 23 52 00 - NON-CONDENSING HOT WATER BOILERS

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes non-condensing hot water boilers for indoor space-heating application.

1.2 REFERENCES

A. Intertek (ETL)
   1. ETL certified to UL 795/CGA 3.1

B. American Society of Mechanical Engineers:
   1. ASME Section IV - Boiler and Pressure Vessel Code - Heating Boilers
   2. ASME CSD-1 – Controls and Safety Devices for Automatically Fired Boilers

C. American Society of Heating, Refrigeration and Air Conditioning Engineers
   1. ASHRAE: Standard 90.1 Energy Standard for Buildings

D. Hydronics Institute, Division of Air Conditioning, Heating & Refrigeration Institute (AHRI):
   1. AHRI1500: Testing Standard to Determine Efficiency of Commercial Space Heating Boilers as defined by Department of Energy in 10 CFR Part 431.

E. National Fire Protection Association:
   1. NFPA 54 - National Fuel Gas Code (ANSI Z223.1)

F. Underwriters Laboratories:
   1. UL 795: Commercial-Industrial Gas Heating Equipment.

G. International Mechanical Code (IMC) 2015

1.3 SUBMITTALS

A. In accordance with Contract Documents. Minimum product data to include:
   1. Capacities, accessories and options included with boiler.
   2. General layout, dimensions, size and location of all required connections.
   3. Electrical characteristics
   4. Weight and mounting loads.
   5. Manufacturer's installation and start-up instructions.
   6. Equipment Operation and Maintenance Manuals.

1.4 QUALITY ASSURANCE

A. Use an adequate number of skilled workers, trained and experienced in the necessary crafts, and who are completely familiar with the specified requirements, pertinent contract documents, and methods needed for proper performance of the work described therein.

B. Provide the services of a manufacturer's factory-authorized representative to inspect and verify proper installation of this equipment, and to provide equipment start-up and operator training.

1.5 DELIVERY, STORAGE, AND HANDLING

A. In accordance with Contract Documents.

B. Accept equipment and accessories in Factory shipping packaging. Inspect for damage. Keep boiler in a horizontal position from time of delivery to final installation.

C. While stored, all equipment must be protected from external elements such as inclement weather, job site construction activity, etc. Protect equipment from damage by leaving packaging in place until installation.

1.6 WARRANTY

A. The boiler shall come with the warranties stated below from date of original installation.
1. Heat Exchanger: 10-year pro-rated warranty.
2. All other parts: 1-year limited warranty.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS
1. Thermal Solutions
2. Aerco
3. Lochinvar
4. Fulton
5. Hamilton
6. Approved equivalent.
7. It shall be the responsibility of the Contractor to insure that any substituted equipment is equivalent in fit, form and function to the specified equipment. The cost of any additional work caused by the substitution of equipment shall be borne by the Contractor.

2.2 GENERAL REQUIREMENTS

A. Boiler
1. The boiler shall be assembled, fire tested and shipped as a factory-packaged unit, complete with jacket, gas manifold, burner and controls mounted & wired, with boiler connections specified in this Section.
2. The boiler shall be constructed in conformance to ASME Section IV, ASME CSD-1 and UL 795. The boiler shall bear the ASME “H” stamp with a maximum allowable working pressure (MAWP) of 160 PSI. Pressure vessel shall be subjected to a hydrostatic pressure test of 240 PSIG at the factory.
3. The boiler shall be a high efficiency non-condensing boiler with a pressure vessel, constructed of 316L stainless steel and of water tube design, which shall not require a refractory combustion chamber.
4. The boiler shall be equipped with an integral pre-mix, stainless steel forced draft burner for natural gas or propane, firing incorporating full modulation with 5:1 minimum turndown

ratio. The burner shall be of high flame retention design and have a static swirl device to get uniform flame stability all around the combustion surface. Burner shall be equipped with a sliding guide rail with hinged door to gain full access and inspection of the burner and combustion chamber.

5. The boiler gas valve will be designed with zero pressure regulation and equipped with a variable speed blower system to precisely control the fuel/air mixture, providing fully modulating firing rates for maximum efficiency.
3. The flue passages and combustion chamber shall be accessible from the front of the boiler for cleaning.
4. The boiler shall be provided with a heavy duty 16 gauge steel jacket with a rust resistant powder coat finish. Jackets made of plastic or resin material shall not be acceptable. The boiler jacket shall contain an internal electrical cabinet for power and limit circuit wiring, providing a clean finished look when the jacket is installed. Electrical connections shall be accessible with fused connections for protection and clear labeling for simple and accurate wiring.
   a. The electrical components shall be separated from incoming combustion air gas, which may contain excess humidity, dust and other contaminants brought through ducted combustion air.
5. Electrical input to the boiler shall be 208v/3ph/60hz
6. The boiler shall be of compact design with a footprint no larger than 70 sq/ft.
7. Boiler shall be capable of variable primary or primary/secondary piping arrangements.
8. The boiler shall come on a base with forklift opening all sides and lifting lugs for ease of moving and rigging.

B. Boiler Control System

1. Scope of Supply

   Boiler Control System shall provide safety interlocks and water temperature control. The control system shall be fully integrated into the boiler control cabinet and incorporate single and multiple boiler control logic, inputs, outputs and communication interfaces. The control system shall coordinate the operation of up to eight (8) fully modulating hot water boilers and circulation pumps. The control system shall simply control boiler modulation and on/off outputs based on the boiler water supply temperature and an operator-adjusted setpoint. However, using parameter menu selections, the control system shall allow the boiler to respond to remote system water temperature and outside air temperatures with warm weather shut down (WWSD) or energy management system (EMS) firing rate demand, remote setpoint or remote start/stop commands.

2. Boiler Control

   Using PID (proportional-integral-derivative) based control, the remote system water temperature shall be compared with a setpoint to establish a target boiler firing rate. If the secondary loop flow speed is greater than the primary loop flow speed, firing rate is increased in response to the decrease in secondary loop temperature. When the remote system temperature is near the boiler high limit temperature, the boiler supply sensor shall limit the maximum boiler supply temperature to prevent boiler high limit events. Alternately, using parameter menu selections, the control system shall allow the boiler to respond directly to boiler supply temperature and setpoint to establish a target boiler firing rate while remote system water temperature is used for display purposes only. Each boiler's fuel flow control valve shall be mechanically linked to the air flow control device to assure an air rich fuel/air ratio. All the automated logic required to ensure that pre-purge, post-purge, light-off, and burner modulation shall be provided.

3. Hot Water Temperature Setpoint

   When the controller is in the local control mode, the control system shall establish the setpoint based on outside air temperature and a reset function curve, or be manually

adjusted by the operator. When enabled, the setpoint shall be adjusted above a preset minimum setpoint upon sensing a domestic hot water demand contact input. When in remote mode, the control system shall accept a 4-20ma or Modbus remote setpoint or firing rate demand signal from an external BMS.

4. Multiple Boiler Sequence
   The controller shall incorporate its peer-to-peer communications on each connected boiler by using standard RJ45 ethernet cables. The control system shall allow the connected boilers to exchange signals as required to provide coordinated fully modulating lead/lag functions. It shall not be required to wire individual control signals between boilers. To increase operational efficiency, the control system shall utilize both water temperature and firing rate based boiler sequencing algorithms to start and stop the boilers and shall minimize the total number of boilers in operation. The control system shall start and stop boilers when the water temperature is outside the adjustable temperature limit for longer than the adjustable time delay. In order to minimize temperature deviations, the control system shall start and stop the next boiler when the “lead” boiler is at an adjustable firing rate limit for longer than the adjustable time delay. The control system shall monitor both boiler lockout and limit circuits to automatically skip over those boilers that are powered down for maintenance, tripped or otherwise will not start. The boiler shall be run at low fire for warm-up for a preset low fire hold time. When enabled, warm weather shut down control logic shall prevent boiler operation. The controller shall also be capable of auto-rotation of the boilers based on user-selected run time hours.
5. User Interface
   A touch screen message display shall be provided to display real time BTU/hr, numeric data, startup and shutdown sequence status, alarm, system diagnostic, first-out messages and boiler historical information. In the event of a fault condition, the display shall provide help screens to determine the cause of the problem and corrective actions. Historical information shall include graphical trends, lockout history, boiler & circulator cycle counts and run time hours.
6. Circulator Control
   The controller shall be capable of sequencing the boiler, domestic hot water or system circulators. Simple parameter selections shall allow all three pumps to respond properly to various hydronic piping arrangements including either a boiler or primary piped indirect water heater. The controller shall perform circulator exercise to help prevent pump rotor seizing.
7. EMS Communication
   Control and monitor the boiler via communication RS485 Modbus or direct wiring. The control shall allow for simultaneous communication for boiler peer-to-peer communication and EMS communication interfaces. Loss of EMS communication shall automatically transfer the boiler control to local operation. Boiler operation shall not be lost due to corrupt or loss of EMS communication. The boiler control system shall allow individual boiler limits, lockout, boiler and system temperatures and firing rate status to be readable and water setpoint, boiler firing rate, and start/stop command to be readable and writable. The control shall provide easy parameter selection and options for the following: Modulation Source 4-20ma or Modbus; Setpoint Source 4-20ma or Modbus; and Enable/Disable (contact wired or Modbus). The control shall allow a real time, live & convenient list of all interface signals to allow for quick interface verification. OPTION: The boiler control system shall network with a communication gateway to connect with BACnet, LonWorks, or Johnson Controls Metasys N2 communication protocol. Contractor to coordinate with Owner to determine exact control protocol required to interface with BMS.
8. External Data Transfer
   The control system shall include the ability to transfer parameters from boiler to boiler. Upon completion of commissioning the first boiler, a USB flash drive shall allow settings to be “downloaded” from one boiler and “uploaded” into the next. Additionally, these files shall be able to be sent via email and “uploaded” to a remote technical support system.

Additionally, it shall be possible to restore parameters to the “as shipped state” by selecting a “Factory Default” Button.

9. Archive History
All hard lockouts, soft lockouts (holds), sensor faults, Energy Management System (EMS) signal faults, sequencer faults and limit string faults shall be recorded with a time and date stamp. The time and date log shall stores up to 3000 alarm & events even after power cycle.” The alarm & event log must be downloadable to a USB thumb drive. The control shall include collect and store supply & return temperature, flame intensity and firing rate for at least 4 months. It shall be a simple matter to page through the boiler’s operation using the boiler mounted display or download the historical data to a USB thumb drive for off-site analysis. All data must be stored in standardly compatible CRV files.

10. Quality Assurance
The boiler control system shall be supplied as part of a factory-assembled and tested burner control cabinet.

B. Boiler Trim

1. Combination pressure-temperature gauge, 3-1/2 inch diameter.
2. Supply and return temperature sensors - shall be mounted on the supply and return connections outside of the boiler jacket. Each sensor shall be accessible from the top of the boiler. The boiler control shall measure supply and return temperatures and notify the operator if the direction of flow is reversed.
   a. The boiler control shall adjust to impending temperature changes in such a way to minimize fuel consumption and maximize efficiency. The control shall measure temperatures and the rate of change in those temperatures and respond early, rather than waiting for temperatures to exceed limit control settings.
3. Flue gas temperature sensor shall be mounted in the flue vent connector to monitor flue gas temperatures and reduce the blower speed when flue gas temperatures exceed 189°F. If the flue temperatures exceed 195°F, a forced boiler reset results.
4. ASME Section IV safety relief valve sized to exceed the gross output of the boiler which shall be factory set to relieve pressure at 75 psi water working pressure.
5. Water flow switch to prevent the burner operation during low water flow conditions.
6. High Temperature Limit, automatic and manual reset, to prevent burner operation if water temperature conditions rise above maximum boiler design temperature, wired to put the boiler into a hard lockout, requiring manual reset of the boiler primary control.
7. High and low gas pressure switches with manual reset and a range of 4 - 14 in W.C., wired to put the boiler into a hard lockout, requiring manual reset of the boiler primary control.
8. Low water cutoff (LWCO) device with manual reset. Boiler shall be fitted with a probe type LWCO located above the lowest safe permissible water level established by the boiler manufacturer. LWCO shall be UL listed and suitable for commercial hydronic heating service.

C. Vent Connections

1. The exhaust vent must be Type B listed for use with Category I and II appliances and compatible with operating temperatures up to 210°F, negative pressure, non-condensing flue gas service. UL certified vent material shall be double wall Stainless Steel.
2. The exhaust vent system shall be in accordance with National Fuel Code, NFPA 54/ANSI Z221.3, or, applicable provisions of local building codes.
3. Combustion air intake shall be capable of drawing air from inside the room.
4. Boiler shall be capable of common venting with an engineered vent system.
5. Venting shall have an equivalent length of up to 200 feet maximum when drawing air from inside the room or Venting shall have an equivalent length of up to 100 feet maximum and ducted combustion intake air shall have an equivalent length of up to 100 feet maximum.

2.3 PERFORMANCE

A. Boiler thermal efficiency shall be certified with no less than 97.0%.
B. The burner shall emit low NOx (corrected to 3% O_2) emissions at all firing rates.
C. Provide services of a manufacturer's authorized representative to perform combustion test including boiler firing rate, gas flow rate, heat input, burner manifold gas pressure, percent carbon monoxide, percent oxygen, percent excess air, flue gas temperature at outlet, ambient temperature, net stack temperature, percent stack loss, percent combustion efficiency, and heat output. Perform test at minimum, mid-range, and high fire.

PART 3 EXECUTION

3.1 INSTALLATION

A. In accordance with Contract Documents and boiler manufacturer's printed instructions.
B. Flush and clean the boiler upon completion of installation in accordance with manufacturer's start-up instructions. The boiler must be isolated when any cleaning or testing of system piping is being performed.
C. Install skid plumb and level, to plus or minus 1/16 inch over base.
D. Maintain manufacturer's recommended clearances around and over equipment, and as required by local Code.
E. Arrange all electrical conduit, piping, exhaust vent, and air intake with clearances for burner removal and service of all equipment.
F. Connect exhaust vent to boiler vent connection.
G. If shown in Contract Drawings, connect full sized air inlet vent to flanged connector on boiler.
H. Connect fuel piping in accordance with NFPA 54. Pipe size to be the same, or greater, than the gas train inlet connection.
I. Use full size (minimum) pipe/tubing on all gas vent connections.
J. Connect water piping, full size, to supply and return connections.
K. Install all piping accessories per the details on the contract drawings.
L. Install discharge piping from relief valves (open termination for viewing) and all drains to nearest floor drain.
M. Provide necessary water treatment to satisfy manufacturer’s specified water quality limits.

END OF SECTION 23 52 00

SECTION 26 05 00 COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.01 WORK INCLUDES

A. All labor, materials, equipment, tools and services required to perform all work and services for execution, installation and completion of all electrical work including all parts lists, operating instructions, wiring and control diagrams as shown on the drawings and as specified and completely coordinated with work of all other trades.

B. All supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete electrical installation, although such work is not specifically indicated.

C. Complete, in operative condition and to approval of Engineer, materials contemplated herein and shown on drawings.

D. Equipment, materials and accessories for electrical systems as shown and noted on the drawings including but not limited to the following:
   1. A complete rough-in system including conduit, outlet boxes, pull boxes, junction boxes, sleeves and hangers.
   2. Complete wiring system.
   3. All cutting and patching.
   4. Wiring devices and coverplates.
      a. Interconnecting power raceway and wiring for specified heating and refrigeration equipment, unless otherwise shown.
      b. Interconnecting power raceway and wiring for specified ventilating equipment, unless otherwise shown.
      c. Starters, controllers and interconnecting power and control raceway and wiring for specified pumps unless otherwise shown.
      d. Flashing and sealing of all raceway roof penetration.

1.02 DELIVERY, STORAGE AND HANDLING

A. Manufacturer to prevent damage during shipment shall suitably package materials. Damaged materials will not be acceptable for use.

B. Store materials on site in clean, dry storage area; when outside, elevated above grade and enclosed with durable watertight wrapping.

C. Handle all materials carefully to prevent damage. Minor scratches, marks or blemishes to finish shall be repaired to satisfaction of Engineer.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Permits: Arrange and pay for all permits, inspections and utility connections required.
   2. Comply with ANSI C1, National Electrical Code, 2011.
   3. Reference Publications:
      a. American National Standards Institute, ANSI.
         1) C80.1 - Specification for Rigid Steel Conduit, zinc coated.
         2) C80.3 - Specification for Electrical Metallic Tubing, zinc coated.
         3) C80.4 - Specification for fittings for Rigid Metal Conduit and EMT.
      b. National Electrical Manufacturers Association, NEMA.
         1) OS-1 - Sheet steel outlet boxes, device boxes, covers and box supports.
         2) 250 Enclosures for electrical equipment.
         3) WC-5 - Thermoplastic insulated wire and cable.

4) WD-1, WD-5 - General Purpose Wiring Devices.
5) FB-1 - Conduit and cable assemblies.
6) KS-1 - Switches.

c. Manufacturer's Catalog.
1) Catalogs of specified manufactures current at date of contract documents are incorporated by reference to same force and effect as if repeated herein. In conflicts between catalogs and project manual. Project Manual governs.

4. Provide all new materials, without blemish or defect, in accord with standards specified and NRTL (Nationally Recognized Testing Laboratory) listed or labeled.

1.04 STANDARDS

A. Provide materials, perform work and install materials in strict accordance with the latest requirements of the following:
1. National Electrical Code (NEC) of National Fire Protection Association (NFPA).
2. Other applicable codes and standards of NFPA.
3. Factory Mutual System (FM).
4. American National Standards Institute (ANSI).
5. Occupational Safety and Health Act (OSHA).
6. Federal and state codes, laws, ordinances; and rules and regulations of authorities having jurisdiction.
7. In case of conflict or disagreement between codes, laws, ordinances, rules and regulations or within either document itself, the more stringent condition shall govern.
8. Use electrical materials tested, listed and labeled by NRTL and bearing the NRTL label.
a. All fabricated assemblies, manufactured items or electrically operated equipment shall have NRTL approval or NRTL re-examination listing in every case where such approval has been established for the particular type of materials or devices in question.

1.05 DEFINITIONS

A. Wherever the words “the Contractor”, “this Contractor” or “Electrical Contractor”, appear in this section, they refer to the Contractor for Electrical Work.

B. The term “provide” includes such labor, methods, materials, equipment and transportation or other facilities required to complete the Contract, and the performance of all duties thereby upon the Contractor.

1.06 GUARANTEE

A. In entering into a contract covering this work, the contractor accepts the specifications and guarantees that the work will be carried out in accordance with the requirements of this specification or such modifications as may be made under the contract documents.

B. Contractor further guarantees that the workmanship and material will be of the best procurable and that none but experienced workmen familiar with each particular class of work will be employed.

C. Contractor further guarantees to replace and make good at his own expense all defects, which may develop within 1 year after substantial completion, due to faulty workmanship or material, upon, receipt of written notification from the Owner.

1.07 JOB CONDITIONS

A. Existing conditions:
1. In order to become familiar with the scope of the work involved, visit the existing site, before submitting bid, and carefully examine the existing condition in order to have full knowledge and understanding of the conditions and restrictions affecting the performance of the work required. Include in bid all work which is reasonably inferred by the contract drawings and specifications, whether specifically shown or not, as a result of existing conditions, construction, irregularities

and interferences which may affect work. No additional compensation will be considered for misunderstanding the conditions to be met.

2. The layout shown on the drawings is necessarily diagrammatic but shall be followed as closely as other work will permit. Changes from these drawings required to make this work conform to the building construction shall be made only with prior written approval of the Engineer. All proposed changes shall be shown on shop drawings. All measurements shall be verified by actual observation and all work shall fit in place meeting the approval of the Engineer.
3. The contractor shall provide openings required in new and existing construction that may be necessary for the installation of electrical work and all patching and workmen competent in the trade required, at the expense of the contractor shall do repairing. The contractor shall be responsible for arranging the work so that minimum cutting will be required. All rubbish and excess materials involved in such cutting shall be promptly removed from the site and disposed of by the contractor. Cutting through the floor or roof systems or load bearing walls shall be done only with the prior written approval of Engineer so as to avoid damaging the structural system.
4. Sequencing, scheduling:
    a. Confer with the contractor regarding the location and size of conduits, equipment, rough-in openings and special architectural treatments in order that there may be no interferences between the installation or the progress of the work of the contractor on the project. The order of space preference shall be as listed above.
    b. In the case of interconnection of the work of two or more contractors, verify at the site or on shop drawings all dimensions relating to such work. All errors due to the failure to so verify any such dimensions shall be promptly rectified.
    c. Items of equipment may be specified in the singular however, provide and install the number of items of equipment as indicated on the drawings and as required for a complete system.
    d. Each contractor shall provide excavating, pumping, backfilling, and compacting required for the installation of their respective work as shown on the drawings.
    e. Equipment and devices furnished and installed by electrical contractors, which have factory prime coat, or final surface finish shall be replaced, repaired or refinished if defective or damaged during installation.
    f. Arrange all work so a minimum period of interruption or outages will occur in the temporary or permanent transfer of services as required for all electrical revisions. Not less than 10 Day notification to the Owner shall be required before approval will be granted for any disruption of gas, electric, or telephone services. The outage request shall include the extent of the work to be done, length of outage time required, and the time at which the outage is to begin.
    g. Submit a "Sequence of Work Schedule" in respect to all temporary and permanent utility and service cutovers after final determination. This schedule shall be submitted for approval to the Engineer. The submittal shall designate priority order, service or utility affected, date of cutover, and time of day to start and finish.

PART 2 - PRODUCTS

2.01 RACEWAYS AND CONDUIT

A. Electrical Metallic Tubing (thin wall conduit, EMT)
    1. All electrical metallic tubing shall be hot dipped galvanized coated, bear a NRTL label and shall conform to Federal Specifications WW-C-563, ANSI C80-3, and UL 797.
    2. Allied Tube and Conduit Corp., Republic Steel Corp., Wheatland Tube Co., Southwire Co. shall manufacture all electrical metallic tubing, or Engineer approved equal.

B. Rigid Steel Conduit
    1. All rigid steel conduits shall be hot dipped galvanized coated plus a secondary coat with galvanized threads bears a NRTL label and shall conform to Federal Specifications WW-C-581d, ANSI C80-1.

2. Allied Tube and Conduit Corp., Republic Steel Corp, Wheatland Tube Co., Southwire Co. shall manufacture all rigid steel conduits, or Engineer approved equal.

C. Intermediate Metal Conduit (IMC)
1. Intermediate metal conduit shall be hot dipped galvanized coated; galvanized coated threads bear a NRTL label and shall conform to a NRTL standard for IMC.
2. Allied Tube and Conduit Corp., Republic Steel Corp., Wheatland Tube Co., Southwire Co. shall manufacture intermediate metal conduit or Engineer approved equal.

D. Flexible Steel Conduit
1. All flexible steel conduits shall be hot dipped galvanized coated bears a NRTL label and shall conform to Federal Specifications WW-C-566C.
2. Triangle PWC, American Flexible Conduit Co., Inc., Anaconda Metal Hose, shall manufacture all flexible steel conduits or Engineer approved equal.

E. Liquid-tight Flexible Steel Conduit
1. All liquid-tight flexible steel conduit shall be interlocking flexible galvanized steel conduit with a special polyvinyl chloride covering extruded over the flexible conduit to make the conduit liquid-tight resistant to moisture, oil, chemicals and corrosive fumes.
2. Anaconda Metal Hose, O-Z/Gedney, Triangle PWC shall manufacture all liquid-tight flexible steel conduits, or Engineer approved equal.

F. PVC Plastic Conduit
1. All PVC conduits shall be schedule 40 heavy wall duct. Conduit shall be composed of high impact PVC (Polyvinyl Chloride-C-200 compound) and shall conform to industry NEMA Standards and be NRTL listed for underground and exposed use. Material shall have tensile strength of 7,000 psi at 73.4°F, flexural strength of 11,000 psi, compression strength of 8,600 psi, and minimum wall thickness in various sizes.
2. All conduit fittings, couplings, terminal adapters, junction boxes and necessary fittings shall be of the solvent welding material.
3. Carlon, Can-Tex, Triangle PWC Inc., shall manufacture all PVC conduits or Engineer approved equal.

2.02 CONDUIT HANGERS AND SUPPORTS

A. Surface Mounted Conduits
1. Rigid steel, IMC and EMT conduits 1 inch and smaller shall be supported with hot dipped galvanized one hole steel pipe straps.
2. Rigid steel, IMC and EMT conduits 1 1/4 inches and larger shall be supported with hot dipped galvanized one hole malleable iron pipe straps with pipe spacers.
3. Raco, Efcor, T & B, Appleton shall manufacture all pipe straps, or Engineer approved equal.

B. Suspended Conduits
1. Individual rigid steel, IMC and EMT conduit 1 inch and smaller shall be supported with conduit clips of high carbon spring steel or zinc plated steel and support 100 pounds static load. Conduit clip shall be provided with 1/4” 20 threaded impression for attachment to 1/4 inch 20 threaded rod.
2. Individual rigid steel, IMC and EMT conduit 1 1/4 inches and larger shall be supported with stamped steel conduit clamps with 1/4 inch 20 bolt and nut and support 150 pounds static load. Provide conduit clamps with 3/8 inch 16 threaded boss for attachment to 3/8 inch 16 threaded rod.
3. Support two or more rigid steel, IMC or EMT conduits adjacent to each other by 1 5/8 inches by 1 5/8 inches metal framing channel with minimum of two 1/2 inch 13 threaded rod at each end. Attach conduits to metal framing channel with electro-galvanized split pipe clamps with screw and nut.
4. Raco, Efcor, T & B, Appleton shall manufacture conduit clips and clamps, or Engineer approved equal.

5. Unistrut, Super Strut, Kindorf shall manufacture metal framing channel and split pipe clamps, or Engineer approved equal.
6. Conduit shall not be supported from plumbing lines or ductwork.

C. Anchors
1. Toggle bolts or spider type expansion anchors shall be used for hollow masonry.
2. Lead expansion anchors or preset anchors shall be used for solid masonry.
3. Self-drilling anchors or preset anchors shall be used for concrete.
4. Machine screws, bolts, self-tapping screws or welded studs shall be used for metal.
5. Wood screws shall be used for wood.

2.03 CONDUIT FITTINGS

A. All conduit fittings and box connectors shall be strong in construction and shall be of such material and finish as not to cause any chemical reaction between itself and the conduit or outlet box which it is fastened or supported.

B. All conduit fittings and box connectors shall be listed by a NRTL.

C. Insulated throat fittings are only required on conduits 2” and larger.

D. All conduit fittings, box connectors and lock nuts shall be of steel or malleable iron materials.

E. Fittings for EMT shall be set compression type, rain-tight and concrete-tight. Connectors, couplings, locknuts and other fittings for rigid steel heavy wall and IMC conduit shall be threaded type.

F. Connectors specified in this paragraph can be zinc plated steel in lieu of malleable iron.

G. Liquid-tight flexible conduit connectors shall be steel or malleable iron compression type with insulated throat and “O” ring assembly.

H. Fittings for flexible conduit or liquid-tight flexible conduit shall be of the straight 45 degree or 90 degree connectors and approved for grounding purposes.

I. Provide expansion joint fittings where expansion joints are shown on architectural drawings.

2.04 BOXES AND COVERS

A. All junction boxes pull boxes, fixture outlet boxes and switch boxes shall be listed by a NRTL.

B. All boxes and covers shall meet all requirements of the National Electrical Code.

C. All boxes and covers shall be made of code gauge steel.

D. All boxes shall be of proper size and shape for all conduits and conductors entering them.

E. Install device boxes with bracket attached to box and wall stud to eliminate movement of box in wall.

F. All boxes installed in poured concrete, block, brick or tile shall be masonry type.

G. All multiple gang switch boxes of more than three-gang shall be solid gang box.

H. Surface mount boxes on the ceiling are note required to be FS or FD type boxes. Stamped steel boxes are acceptable for boxes on the ceiling.

II. Where two or more conduits enter a box, the minimum size of boxes shall be 4 inches by 4 inches by 1 1/2 inches minimum depth. For single device installation, install square cut single device cover.

J. Install all device boxes with square cut device covers for number of devices required.

K. All boxes shall have tapped hole for 10-32 ground screw.

L. Raco, Steel City, Appleton shall manufacture boxes and covers, or Engineer approved equal.

2.05 CABLE AND WIRE

A. All wire shall have copper conductors and be listed by a NRTL.

B. Service entrance conductors shall be 600 volts insulation type XHHW-2 90°C. All other wire shall be 600 volts insulation type THWN 90°C insulation for sizes No. 6 to 500 MCM and type THHN 90°C insulation for sizes No. 12 to No. 8.

C. All pulling lubricants shall be water based, no exceptions.

D. Minimum wire size shall be No. 12 except for internal fixture wire that shall be minimum size of No. 14 type AF, CF or TFN, 300 volt.

E. All wire (excluding fire alarm and low voltage wiring) shall be stranded, including #12 AWG and #10 AWG branch circuit wiring.

F. All branch circuit wiring and feeder cables for circuits over 20 amperes shall be sized as noted on the drawings. If size is not specifically noted, size all branch circuit wiring and feeder cables in accordance with the National Electrical Code.

G Cable and wire not installed in conduit shall be #12 AWG SO or SJO type grounded cord. Cord shall terminate at junction boxes and devices with strain relief cord grids.

H Triangle, Crescent, Colleyer, and General Cable shall manufacture all wire, or Engineer approved equal.

2.06 METAL CLAD CABLE

A. MC cable is not allowed.

2.07 ELECTRICAL WIRING DEVICES

A. All devices are specified as having black finish in wood, white finish if in drywall. The Engineer reserves the right to change the color.

B. Furnish all special outlets with mating caps with cord grips.

C. Schedule of all electrical devices:
   1. Single Pole Switch - 20 amperes at 120 volts
      a. Hubbell DS120 (P&S and Plug tail approved equal) or engineer pre-approved equal
   2. Three Way Switch - 20 amperes at 120 volts
      a. Hubbell DS320 (P&S and Plug tail approved equal) or engineer pre-approved equal
   3. Four Way Switch - 20 amperes at 120 volts
      a. Hubbell DS420 (P&S and Plug tail approved equal) or engineer pre-approved equal
   4. Duplex Convenience Outlet - 20 amperes at 120 volts
      a. Hubbell DR20 (P&S and Plug tail approved equal) or engineer pre-approved equal
   5. Duplex Convenience Tamper Resistant Outlet - 20 amperes at 120 volts
      a. Hubbell D20TR or engineer pre-approved equal
   6. Duplex Convenience Outlet - GFI - 20 amperes at 120 volts

a. Hubbell GF20 or engineer pre-approved equal

D. Forward submittals to Engineer for review.

2.08 WIRING DEVICE PLATES

A. All device plates shall be furnished with proper openings for the device with which it is being used. Where required, multiple gang plates for correct combination shall be used.

B. Device plates shall fit tight against the finished walls and shall completely cover the openings in the walls for the boxes.

C. Device plates shall be attached and adjusted so they finish straight and level.

D. Where more than one light switch is gained or a light switch and outlet are installed in a two gang box, install multiple gang device plates with proper openings.

E. Provide 1/2 inch raised galvanized device covers where used for exposed conduit work.

F. All device plates shall be black if located on wood and stainless steel if located on drywall, with the proper openings for the device with which they are being used.

G. All device plates for exterior weatherproof outlets and switches shall be lockable. Cover shall meet NRTL WDL “in use” listing requirement. Cover shall be suitable for standard boxes or FS type boxes.

H. Mounting screws for all plates shall have the same finish as the plate.

I. The same manufacturer shall furnish all device plates as devices for proper color match except stainless steel covers.

J. Forward submittals to Engineer for review.

2.09 SEALS

A. Fire Seal:
1. Seal penetrations of fire-rated walls, floors or ceilings by raceways for compliance with NEC 300-21. Fill void around raceway. Sleeves shall be heavy wall steel pipe, anchored to building construction and finished plug with wall or ceiling. Fire stop material shall be Dow Corning #-6548 Silicone RTV Foam, Chase Technology Corp, CTC PR-855 fire resistant foam sealant, 3M 303 Fire Barrier, T & B S-101 Fire Barrier or Nelson Flameseal or engineer pre-approved equal.
2. Must be listed as part of a NRTL approved assembly.

B. Water Seal:
1. Seal penetrations of perimeter walls or floors below grade to prevent entry of water. Use materials compatible with wall or floor construction and approved by Engineer.
2. Seal all conduit penetrating air handling units air tight including conduit installed by the air handling unit manufacturer.

PART 3 - EXECUTION

3.01 FIELD CORRECTIONS AND CHANGES

A. Carefully and accurately record on field set of drawings, any deviations or changes in location of conduit, wiring and/or equipment made in the field and shall keep the Engineer informed on all deviations and changes.

B. At the completion of the job, furnish the Engineer three complete sets (not the field set) of drawings

indicating these deviations or changes. Extra sets of drawings will be provided to the contractor for this purpose. Any changes in the exterior work shall be recorded by dimension.

3.02 LOCATION OF EQUIPMENT

A. The approximate location of all equipment is shown on the drawings.

B. The Engineer reserves the right to change the location of all equipment 5 feet in any direction without these changes being made the subject of an extra charge provided such changes are made before final installation.

3.03 LINES AND LEVELS

A. Determine all grades, maintain necessary lines and levels throughout the progress of the work, and assume full responsibility for their correctness. Where levels are indicated on the drawings, work shall be installed at those levels unless prior written approval to change is obtained from the Engineer.

3.04 CLEANING

A. Upon completion of the contract all remaining materials and rubbish shall be removed from the building and premises and the work areas shall be left clean and free from stains, mortar, paint spots, etc.

B. All switches, controls, and safety devices shall be clearly and permanently marked with embossed or printed plates as to purpose and as to operation and shall be tested in the presence of the Owner's designated representative to insure that their function and purpose is understood.

C. Upon completion of the work, put systems into service maintaining responsibility for the equipment during all testing operations including turning on and off of such apparatus.

3.05 PROTECTION OF WORK

A. Protect work from damage by keeping all conduit and boxes capped and plugged or otherwise protected. This includes damage by freezing and/or stoppage from building materials, sand, dirt or concrete.

3.06 INSTALLATION

A. Coordinate with other contractors engaged in project. Execute work in a manner not to interfere with other contractors or Owner's operation.

B. Coordinate work with other contractors regarding location and size of pipes, raceways, ducts, openings, switches, outlets, so there is no interference between installations or of progress of any contractor.

C. Install all equipment with ample space allowed for removal, repair, or changes to equipment. Provide ready accessibility to removable parts of equipment and to all wiring without moving equipment installed or already in place. Provide access panels for all devices installed above non-accessible ceilings or within walls or partitions.

D. At project completion, clean all equipment to the original finish. Remove all shipping labels.

E. Provide touch-up painting of all equipment marred in any way during shipment or installation.

3.7 INSTALLATION OF RACEWAYS AND CONDUITS

E. The routing of conduit shown on the drawings is diagrammatic only, and this contractor shall install conduit as required to complete the systems so as not to interfere with other trades in both elevation and location.

F. The location of all conduit, boxes, fixtures, etc., in all areas finished and unfinished shall be coordinated.

G. Route conduit through roof openings for piping and ductwork where possible. Provide flashing making waterproof joints where conduits pass through roof or roofing membrane.

H. Provide conduit expansion joints at building expansion joints for conduit runs 1 1/2 inches and larger. Provide conduit expansion joints or flexible conduit connection at building expansion joints for conduits less than 1 1/2 inches.

I. Conduit shall be a minimum of 3/4 inch unless otherwise noted on the drawings.

J. All conduit bends shall be long radius with not more than the equivalent of three 90-degree bends between pull points.

K. Provide all open ends of conduit with bush caps to exclude any foreign material during construction.

L. All conduits installed in or under concrete or underground shall have joints sealed to exclude all water or other foreign material.

M. Coordinate the installation of all conduits in mechanical equipment spaces or where large amounts of ductwork and piping are present, with the other contractors so as to avoid interferences.

N. Unless otherwise noted on the drawings, size all conduits according to the National Electrical Code.

O. Install all exposed conduits parallel or perpendicular to adjacent walls, ceilings or floors.

P. All conduit couplings and fittings shall be made up wrench tight.

Q. Make all conduit systems mechanically and electrically continuous from source of current to all outlets, and ground in accordance with the National Electrical Code.

R. Where building construction or other conditions make it impossible to use standard threaded couplings, install watertight threaded unions.

S. Install rigid steel conduit for the following:
   1. All conduit in poured concrete construction (unless noted as PVC).
   2. All conduit underground (unless noted as PVC).
   3. All conduit exposed in exterior areas.
   4. All conduit installed through foundation or basement wall, below grade, to a minimum of 10'0” beyond wall.
   5. All service entrance conduit and all exterior conduit larger than 2” trade size.

T. Install electrical metallic tubing (thin wall) conduit for the following:
   1. All conduits in block, brick, tile or stud walls.
   2. All feeders for panelboards and distribution equipment.
   3. All conduit exposed in interior areas.

U. Install flexible steel conduit for the following:
   1. Final connections for all recessed lighting fixtures (fluorescent and incandescent).
   2. All vibration generating equipment except where flexible liquid-tight is specifically called for.
   3. A maximum length of flexible steel conduit shall be limited to 6'0”.

V. Install liquid-tight flexible steel conduit for the following:
   1. Final connections to all motors, except exhaust fans in ceiling space and wall 1/8 horsepower and less.
   2. All vibration generating equipment exposed to exterior conditions.
   3. Maximum length of liquid-tight flexible conduit shall be limited to 6'0".

W. Install PVC conduit for the following:
   1. All conduit for underground exterior circuits 2" and smaller. PVC conduit shall be complete with all accessories, such as, couplings, male and female adapters, expansion couplings, elbows and support straps. Install one expansion coupling for every 100 feet of run, or in any run solidly connected at both ends. Use solvent welding cement recommended by the duct manufacturer, for all conduit terminations at fittings of all types to seal and secure the connections. Support the plastic conduit horizontal conduit runs 4 feet on center and vertical runs every 8 feet.

X. Communications
   1. Minimum communications raceway size to be 1" conduit, unless otherwise noted on drawings.
   2. Provide one conduit from each communications box. Horizontal conduit runs between wall boxes are not allowed.
   3. Provide insulated grounding bushings on end of conduit.
   4. Provide flush two-gang box with single gang plaster ring for each communications outlet or as noted on drawings.
   5. Conduit bends to be no less than 10 times outside diameter of conduit.
   6. Conduits shall have no more that (2) 90 degree bends or total of 180 degree bends or offsets without a pull box. Pull boxes shall be installed in accessible locations.
   7. No underslab installations allowed.

3.8 RACEWAY SUPPORTS AND HANGERS

A. Securely fasten raceways in place and support from ceiling or walls.

1. Maximum Spacing of Supports	Material
a. 1/2" through 1" trade size	6 feet
b. 1 1/4" through 1 1/2" trade size	8 feet
c. 2" through 4" trade size	10 feet
d. Flexible metal conduit	4 1/2 feet

B. Support IMC or EMT conduit within three feet of every outlet box, junction box, pull box, cabinet or termination. Support flexible conduit within 12 inches of every outlet box or fitting.

C. Support vertical runs or conduits at each floor level and at interval not to exceed ten feet.

D. Support conduits by pipe straps, wall brackets, hangers, or ceiling trapeze. The use of perforated iron on wire for supporting conduits is prohibited. Fasten with wood screws or screw nails to wood; by toggle bolts on hollow masonry units, by concrete inserts, or expansion steel conduits on steel. Do not weld conduits or pipe straps to steel structures unless specifically indicated.

E. The load applied to fasteners shall not exceed one-third the proof test load of the fasteners.

F. For fasteners attached to concrete, use vibration and shock resistant.

G. In partitions of light steel construction, use sheet metal screws.

H. Conduit shall not be supported from suspended ceiling hangers, ductwork or plumbing lines.

I. Where two or more conduits one inch trade size or larger run parallel, trapeze hangers may be used consisting of threaded solid rods, washers, nuts and galvanized "L" angle or channel iron. Individually fasten conduits to the cross member of every other trapeze hanger with one hole straps or clamp backs with proper size bolts, washers and nuts. When adjustable trapeze hangers are

used, use U-bolt type clamps at end of conduit runs, at each elbow and at each third intermediate hanger to fasten each conduit.

J. Make hangers of durable materials suitable for the application involved. Applied loads shall not exceed one-third of their loading capacity.

K. Fabricate all screws, bolts, washers and miscellaneous hardware used for conduit supports from rust-resisting metal. Trapeze hangers shall have hanger assemblies' protected galvanized finish.

3.9 INSTALLATION OF BOXES

A. Provide pull boxes, junction boxes or outlet boxes as shown on the drawings and/or in all runs of conduit having the equivalent of three 90 degree bends or more than 100 feet in length.
   1. Communications conduit runs shall have no more than 100 linear feet and/or no more than two (2) 90-degree bends without a pull box.
   2. Do not provide pull box in lieu of 90-degree bend for communications cable.
   3. LB type fittings are not to be used for communications cable.

B. Location of outlets shown on the drawings is diagrammatic only. Coordinate exact location of outlets with architectural details, equipment connection requirements and all ceiling outlets with due consideration to clearance from ventilating ducts and piping.

C. Locations of all junction boxes shall be verified on the job.

D. All junction boxes shall be installed so that they are accessible by removing an access door, recessed fixture, coverplate, etc.

E. Where flush coverplates are required in finished areas, they shall be painted to match adjacent wall or ceiling finishes.

F. All junction boxes, other than for power or lighting, shall be identified as to their usage; such as, television, telephone, door security, fire alarm, etc., by permanently attached labels on the inside or outside of the coverplate.

G. Power and communication outlets shall not be installed in the same junction box.

3.10 METHOD OF WIRING

A. Install all the conductors in conduits.

B. Equipment and devices installed and not constructed with cases especially suited for mounting and enclosing all live parts shall be installed in metal cabinets.

C. A complete metal raceway or enclosure shall be provided for all circuiting throughout the extent of the systems specified.

D. Make conductors continuous from outlet to outlet. Do not make splices except in outlet or junction boxes. Make all feeder cables continuous from origin to panel or equipment terminations without running splices in intermediate pull or boxes, unless specifically indicated on the drawings or approved in writing by Engineer.

E. Blow out and swab all conduit until all moisture and grit is removed before any wires are pulled or installed. Use water-based pulling lubricant, compatible with insulation and covering, that will not cause deterioration of insulation or jacket covers of cables on conductors. Use pulling lubricant recommended by wire manufacturer.

F. Provide each cable or conductor in panels, pullboxes or troughs with a permanent pressure-sensitive label with suitable numbers or letter for easy identification. Identify control wires at each end and in junction boxes with designated wire numbers corresponding to control schematic

drawings.

G. Provide wires and cables entering equipment or panels with enough slack to eliminate stretched, angular connection. Neatly arrange wiring, bundle and fan out to termination panels. Make minimum bending radius for conductors in accord with National Electrical Code.

H. Support all conductors in vertical raceways in accord with National Electrical Code.

I. Leave at least six-inch loops or ends at each outlet for installation of devices or fixtures. Roll up all wires in outlet boxes not for connection to fixture or device at that outlet, connect together and tape.

J. Size all branch circuit wiring for circuits over 20 amperes as shown on the drawings and/or as required by the National Electrical Code. All home run branch circuit wiring from the first outlet, fixture or device on 120 volt, 1 phase, or 277 volt, 1 phase circuit to the panelboard shall conform to the following wire sizes for amp circuits unless otherwise noted on the drawings:
   1. 120-VOLT CIRCUITS
      a. 0 to 50 feet #12 wire
      b. 51 to 100 feet #10 wire
      c. 101 to 150 feet # 8 wire
      d. 151 to 200 feet #6 wire

K. Clarification to the color-coding of conductors is as follows: For all voltages and systems equipment grounds shall be green, isolated grounds shall be green with yellow stripe or with yellow tape bands and travelers for 3-way switches shall be violet.

L. At the Electrical Contractor's option, the three phase power circuits and feeder cables can be installed with color-coded conductors or with three conductors of the same color. If they are installed with the same color of insulation, mark with colored tape in the panelboard and starter.

M. Phase all distribution equipment left-to-right, A, B, and C for continuity of phasing throughout the installation.

N. All stranded cables shall terminate into mechanical type or compression type lugs at termination points.

O. Neatly group all circuits in all distribution equipment and tie with Seine Twine, Ty-Rap or Wrap Tabs.

P. Special care shall be taken to balance connections of circuit wires on different phases at the lighting panelboards using distinguishing colors for identifying the particular phase on which the circuit belongs.

Q. In general, lighting and outlet circuits shall distribute from single pole 20-ampere breakers, 2 wire with solid neutral. Where noted on drawings, run single phase or 3 phase power circuits from two or three pole breakers.

R. A separate neutral conductor shall be pulled for each phase conductor for all 120 volt and 277 volt branch circuits. Common neutrals are not allowed. Provide color tracer matching phase conductor.

3.11 WIRING JOINTS

A. Joints in conductors shall be as few in number as practicable and where they are necessary they shall be mechanically strong, well made and shall provide complete electrical contact.

B. Joints shall be so made that they have an electrical resistance not in excess of that of two feet of the conductor.

C. Make all branch circuit joints for wire up to and including No. 10 AWG with expandable steel spring and polypropylene body type connectors and wire nuts manufactured by Ideal, Scotch, Buchanan or

Engineer approved equal.

D. Make all wire splices in wire No. 6 and larger with mechanical compression crimp type connectors of proper size and wire configuration. Cover all connectors with a minimum of three layers of 600 volts tape or heat shrinkable insulation equivalent to 150 percent conductor insulation.

E. Neutral conductors in outlet boxes at receptacles shall be jointed and pigtailed to the outlet. The removal of a receptacle from the circuit shall not affect the continuity of the neutral conductor.

3.12 HEIGHTS OF WALL SWITCHES AND RECEPTACLES

A. Determine the exact height of each light, receptacle outlets, and outlet boxes on the premises and examine the general drawings and details to see that outlets are properly spaced and located with relation to the interior finish and treatment.

B. In order that all outlets may be located in proper relation to paneling and decorated areas, become familiar with the details of these areas. Consult with the other contractors on the project and procure all details of the various areas so as to make the outlet boxes and panelboards come in proper relation to the work of all other contractors. Be responsible for the exact and proper location of the various portions of work. Such work must be entirely satisfactory to the Engineer.

C. Mounting heights of devices shall comply with ADA. The following is a list of mounting heights for equipment:
   1. Locate wall switches 3'6” above the floor, except where special treatment requires a higher or lower setting.
   2. Locate receptacles as follows:
      a. In general, locate 18 inches above finished floor except as hereinafter specified or as indicated on the architectural drawings.
      b. In block walls, locate either in the bottom or top of the nearest block course.
      c. In brick walls, mount in the horizontal position, in the fourth brick course.
      d. In spaces where noted to be above counters, mount in the horizontal position, 4 inches from backsplash to bottom of box.
      e. In rooms that house mechanical and electrical equipment, locate 40 inches above finished floor.
      f. Locate weatherproof receptacles 24 inches above finished grade.
   3. F.A. Speakers and Visual Indicators: 84” above finished floor to bottom of device.
   4. F.A. Pull Stations: 3'6” above finished floor to center of device.
   5. Disconnect Switches: 5'0” above finished floor.
   6. Manual and Magnetic Starters or Pushbutton Controls: 5'0” above finished floor.
   7. Telephone/Data Outlets: Same as receptacles above.

D. All of the above mounting heights shall be held as near as possible to the center line of the equipment.

E. The above list is general in nature. Examine all Architectural Drawings and consult with the Engineer and vary mounting heights as directed.

3.13 TESTING 600 VOLT

A. After wires and cables are in place and before connection to the devices and equipment is made, test the system for shorts and grounds by means of an approved type of constant potential “Megger”, which is to be furnished by the Electrical Contractor.

B. Remove and replace all hot wires if shorted or grounded.

END OF SECTION

SECTION 31 20 00 EARTHWORK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Excavation, filling, compacting and grading operations both outside building limits as required for below-grade improvements and to achieve grades and elevations indicated. Provide trenching and backfill for mechanical and electrical work and utilities.

B. Subbase materials, drainage fill, common fill, and structural fill materials for slabs, pavements, and improvements.

C. Suitable fill from off-site if on-site quantities are insufficient or unacceptable, and legal disposal of excess fill off-site.

1.2 SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Test Reports: Submit for approval test reports, list of materials and gradations proposed for use.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Minimum 2 year experience installing similar products.

1.4 PRE-INSTALLATION MEETINGS

A. Convene minimum two weeks prior to starting work of this section.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.

B. Handling: Handle materials to avoid damage.

1.6 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.7 SEQUENCING

A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

PART 2 PRODUCTS

2.1 MATERIALS

A. Earthwork:
1. Subbase Material: Graded gravel or crushed stone.
2. Bedding Course: Graded crushed gravel and sand.
3. Borrow Soil: Off-site soil for fill or backfill.
4. Drainage Fill: ashed gravel or crushed stone.
5. Common Fill: Mineral soil free from unsuitable materials.
6. Structural Fill: Graded gravel.
7. Impervious Fill: Gravel and sand mixture.

PART 3 EXECUTION

3.1 PREPARATION

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

3.2 INSTALLATION

A. Excavation is unclassified and includes excavation to subgrade regardless of materials encountered. Repair excavations beyond elevations and dimensions indicated as follows:
1. At Structure: Concrete or compacted structural fill.
2. Elsewhere: Backfill and compact as directed.

B. Maintain stability of excavations; coordinate shoring and bracing as required by authorities having jurisdiction. Prevent surface and subsurface water from accumulating in excavations. Stockpile satisfactory materials for reuse, allow for proper drainage and do not stockpile materials within drip line of trees to remain.

C. Compact materials at the optimum moisture content as determined by ASTM D 1557 by aeration or wetting to the following percentages of maximum dry density:
1. Structure, Pavement, Walkways: Subgrade and each fill layer to 95 percent of maximum dry density to suitable depth.
2. Unpaved Areas: Top 6 inches of subgrade and each fill layer to 90 percent maximum dry density.

D. Place acceptable materials in layers not more than 8 inches loose depth for materials compacted by heavy equipment and not more than 4 inches loose depth for materials compacted by hand equipment to subgrades indicated as follows:
1. Structural Fill: Use under foundations, slabs on grade in layers as indicated.
2. Drainage Fill: Use under designated building slabs, at foundation drainage and elsewhere as indicated.
3. Common Fill: Use under unpaved areas.
4. Subbase Material: Use under pavement, walks, steps, piping and conduit.

E. Grading Tolerances Outside Building Lines:
1. Lawns, unpaved areas, and walks, plus or minus 1 inch.
2. Pavements, plus or minus 1/2 inch.

F. Grading Tolerance for Fill Under Building Slabs: Plus or minus 1/2 inch measured with 10-foot straightedge.

G. Protect newly graded areas from traffic and erosion. Recompact and regrade settled, disturbed and damaged areas as necessary to restore quality, appearance, and condition of work.

H. Control erosion to prevent runoff into sewers or damage to sloped or surfaced areas.

I. Control dust to prevent hazards to adjacent properties and vehicles. Immediately repair or remedy damage caused by dust including air filters in equipment and vehicles. Clean soiled surfaces.

J. Dispose of waste and unsuitable materials off-site in a legal manner.

END OF SECTION