

LSU NEW ORLEANS

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PROJECT MANUAL FOR  
JOB ENTITLED

**REPLACEMENT OF BOILER AND CHILLER  
NET CHARTER SCHOOL (THE ATHLETIC CENTER)  
EAST CAMPUS  
SP#5331**

Request for Quote: #BTB 2933

Quotes Due: **OCTOBER 22, 2026**  
Delivered to Purchasing Office  
Administration Annex, Room 1004-G  
By 2:00 p.m.

Prequote Site Visit:

Date: **OCTOBER 14, 2026**

10:00 a.m. at the

Facility Services – Administration Building Room 112

LSU NEW ORLEANS



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PREPARED BY

LSU NEW ORLEANS

FACILITY SERVICES

LAKEFRONT - NEW ORLEANS - LOUISIANA – 70148

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Date: June 19, 2026

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**BID INFORMATION**

**LSU NEW ORLEANS**

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# INSTRUCTIONS TO BIDDERS

## ARTICLE I

### PROJECT TITLE AND BID OPENING DATE & TIME

- 1.1 Project Title: **REPLACEMENT OF BOILER AND CHILLER  
NET CHARTER SCHOOL (THE ATHLETIC CENTER)  
EAST CAMPUS**

Bid Opening Date & Time: **OCTOBER 22, 2026 at 2:00 p.m.**

Location of Bid Opening:

LSU New Orleans – Main Campus  
Purchasing Office  
Administration Annex, Room 1004G  
New Orleans, Louisiana 70148

### 1.2 DEFINITIONS

1.2.1 The Bidding Documents include the following

- a. Bid Information & Forms dated 6-23-2026
- b. Specifications Sections 01000 through 16900 dated 06/19/2026.
- c. Drawings Sheets No. T1, ME1 and ME2.
- d. Addenda issued during the bid period and acknowledged in the Bid Form

1.2.2 All definitions set forth in the General Conditions of the Contract for Construction, AIA Documents A201, or in other Contract Documents are applicable to the Bidding Documents.

1.2.3 Addenda are written or graphic instruments issued by the Architect prior to the opening of bids which modify or interpret the bidding documents by addition, deletions, clarifications, or corrections.

1.2.4 A Bid is a complete and properly signed proposal to do the Work or designated portion thereof for the sums stipulated therein supported by data called for by the Bidding Documents.

1.2.5 Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described as the base, to which work may be added for sums stated in Alternate Bids.

1.2.6 An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to the amount of the Base Bid if the corresponding change in project scope or materials or methods of construction described in the Bidding Documents is accepted.

1.2.7 A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials or services as described in the proposed Contract Documents.

1.2.8 A Bidder is one who submits a Bid for a prime contract with the Owner for the Work described in the proposed Contract Documents.

1.2.9 A Sub-bidder is one who submits a bid to a Bidder for materials or labor for a portion of the Work

## ARTICLE 2

### BIDDER'S REPRESENTATION

2.1 Each Bidder by making his bid represents that:

2.1.1 He has read and understands the Bidding Documents and his bid is made in accordance therewith.

2.1.2 He has visited the site and familiarized himself with the local conditions under which the work is to be performed.

The Bidder is advised to carefully consider all University physical features and activities and occupancies by faculty, staff and students, and to plan construction activities so as not to disrupt the normal operations and activities of the University except as expressly permitted by the University in writing. The Bidder shall be especially aware of existing electric, gas, water, telephone and/or other utilities and facilities which may be in the way of or adjacent to the Work, and shall take appropriate action to protect these utilities during the Work.

Every effort has been made to accurately show all pertinent surface and subsurface features accurately. For self-assurance, the Bidder may examine available drawings and documents related to University premises. Such examinations may be made only in the offices of the University Facility Services as part of the Mandatory Pre-Bid Conference.

2.1.3 His bid is based solely upon the materials, systems and equipment described in the Bidding Documents as advertised and as modified by addenda.

2.1.4 When a discrepancy or ambiguity arises between the written specifications and the drawings, the document which is more stringent, or which benefits the University more as determined by the Director, shall govern.

2.1.5 His bid is not based on any verbal instructions contrary to the Bidding Documents and addenda.

2.2 The Bidder must be fully qualified under any State or local licensing law for Contractors in effect at the time and at the location of the work before submitting his bid. In the State of Louisiana, only the bids of Contractors and Subcontractors duly licensed under Louisiana Revised Statutes 37:2150, et seq. will be considered, if applicable. The Contractor shall be responsible for determining that all of his Subbidders or prospective Subcontractors are duly licensed in accordance with law. (See paragraph 4.1.8)

2.3 The University reserves the right to examine the Successful Bidder's past payroll records and those of any subcontractor to determine whether the employees being used on the contract are regularly employed. The University also reserves the right to question the use of an employee whom it feels is unskilled or untrained on a task that requires a skill. If the bidder intends to use laborers or unskilled workmen on any aspect of the contract, the bidder must furnish a list of the tasks to be performed by said laborers and unskilled workmen with their bid.

2.4 If the Contractor is required to replace any employees because of their failure to comply with these requirements, any time lost on the job shall be the responsibility of the Contractor and shall not be an acceptable reason for requesting extensions of any

completion deadlines or waiver of any liquidated damages specified elsewhere in the bid specifications.

- 2.5 In the event of inconsistencies within or between parts of the Contract Documents, or between the Contract Documents and applicable standards, codes, and ordinances, the Contractor shall: (1) Provide the better quality, upgrade, or quantity of Work, or (2) Comply with the more stringent requirement, either or both in accordance with the Architect's interpretation.

## ARTICLE 3

### BIDDING DOCUMENTS

#### 3.1 Copies

- 3.1.1 Complete bid documents may be obtained from the LSU New Orleans Purchasing Office.

The Bidding Documents consist of the Drawings, the Bid Instructions and all Addenda issued prior to bid opening. Changes to the work made after the contract signing shall be documented by Change Order.

These INSTRUCTIONS TO BIDDERS, including amendments and additions thereto, apply to each and every heading of the TECHNICAL SPECIFICATIONS with the same force as though repeated in full under each heading.

- 3.1.2 Complete sets of Bidding Documents shall be used in preparing bids; neither the University nor the Consultant assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
- 3.1.3 The University or Consultant in making copies of the Bidding Documents available on the above terms, do so only for the purpose of obtaining bids on the work and do not confer a license or grant for any other use.

#### 3.2 Interpretation or Correction of Bidding Documents

- 3.2.1 Bidders shall promptly notify the Architect of any ambiguity, inconsistency, or error which they may discover upon examination of the Bidding Documents or of the site and local conditions
- 3.2.2 Bidders requiring clarification or interpretation of the Bidding Documents shall make a written request to the Architect, submitted through **jcrumb@crumbengineering.com** to reach him at least seven (7) days prior to the date for receipt of bids.
- 3.2.3 It shall be the Bidder's responsibility to make inquiry as to addenda issued. All issued addenda shall be acknowledged on the Bid Form and shall become part of the Contract. Neither the University nor its Consultant(s) will be responsible for any explanation or interpretations of the Documents not covered by written, issued addenda.
- 3.2.4 Any interpretation, correction or change of the Bidding Documents will be made by addendum. 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 and changes.

### 3.3 Substitutions

- 3.3.1 The materials, products and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution. No substitutions shall be allowed after bid opening.
- 3.3.2 No substitution will be considered unless written request for approval has been submitted by the Proposer and has been received by the Architect at least seven (7) days prior to the date for receipt of bids. Each such request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute including model numbers, drawings, cuts, performance and test data and any other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment or work that incorporation of the substitute would require shall be included. It shall be the responsibility of the proposer to include in his proposal all changes required of the Contract Documents if the proposed substitute is used. The burden of proof of the merit of the proposed substitute is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

Approval, if granted, is given contingent upon Contractor being responsible for any costs which may be necessary to modify the space or facilities needed to accommodate the materials and equipment approved.

- 3.3.3 If the Architect approves any proposed substitution, such approval will be set forth in an addendum. Bidders shall not rely upon approvals made in any other manner.
- 3.3.4 It is incumbent upon the bidder, once a substitution is accepted, to assure that the substitution will meet the requirements of the project as an acceptable and contributing operating component of the completed project. The bidder and proposer of the substitution if used in the project shall provide all information, drawings and other necessary equipment, and coordination to ensure that the substitution will operate, fit and be able to be maintained as an acceptable operating component of the project.

### 3.4 Addenda

- 3.4.1 Addenda will be e-mailed or delivered to all Contractors in attendance at the mandatory Pre-Bid Conference or to all known bidders by the Purchasing Department of the LSU New Orleans to have received a complete set of bidding documents if no mandatory Pre-Bid Conference is scheduled.
- 3.4.2 Copies of addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.
- 3.4.3 Addenda shall not be issued within a period of seventy-two (72) hours prior to the time set for the opening of bids, excluding Saturdays, Sundays, and any other legal holidays; however, if the necessity arises to issue an addendum modifying plans and specifications within the seventy-two-hour (72) period prior to the time for the opening of bids, then the opening of bids shall be extended exactly one week, without the requirement of re-advertising.

- 3.4.4 The University shall have the right to extend the bid date by up to (30) thirty days without the requirement of re-advertising. Any such extension shall be made by addendum issued by the LSU New Orleans Purchasing Office.
- 3.4.5 Each Bidder shall ascertain from the LSU New Orleans Purchasing Office prior to submitting his bid that he has received all addenda issued, and he shall acknowledge their receipt on the Bid Form.

#### ARTICLE 4

##### BIDDING PROCEDURE

#### 4.1 Form and Style of Bids

- 4.1.1 Bids shall be submitted on the forms provided by the University.
- 4.1.2 All blanks on the Bid Form shall be filled in by electronic means, typewriter or manually in ink. Signature is required manually by ink.
- 4.1.3 Where so indicated by the makeup of the Bid Form, sums shall be expressed in both words and figures, and in case of discrepancy between the two, the written words shall govern.
- 4.1.4 Any interlineations, alteration or erasure must be initialed by the signer of the bid or his authorized representative.
- 4.1.5 Bidders are cautioned to complete all alternates and unit prices should such be required in the Bid Form. Failure to submit alternate and unit prices will render the proposal informal and shall cause its rejection.
- 4.1.6 Bidder shall make no additional stipulations on the Bid Form nor qualify his bid in any other manner.
- 4.1.7 The bid shall include the legal name of Bidder and the bid shall be signed by the person or persons legally authorized to bind the Bidder to a Contract. The authority of the signature of the person submitting the bid shall be deemed sufficient and acceptable under any of the following conditions:
- a. Signature on bid is that of any corporate officer or member of a partnership or partnership in commendam listed on most current annual report on file with Secretary of State.
  - b. Signature on bid is that of authorized representative of corporation, partnership, or other legal entity and bid is accompanied by corporate resolution, certification as to the corporate principal, or other documents indicating authority which are acceptable to the University
  - c. Corporation, partnership, or other legal entity has filed in the records of the Secretary of State, an affidavit, resolution or other acknowledged or authentic document indicating the names of all parties authorized to submit bids for public contracts. A bid submitted by an agency shall have a current

Power of Attorney attached certifying agent's authority to bind Bidder. The name and license number on the envelope shall be the same as the entity identified on the Bid Form

By signing this bid, the bidder certifies compliance with the above

- 4.1.8 On any bid of Ten Thousand Dollars (\$10,000) or more, the Contractor shall certify that he is licensed under R. S. 37: 2150-2173 by placing his signature on the appropriate blank on the Bid Form.

The contractor shall place his Louisiana Contractor License Number on the appropriate blank on the Bid Form.

The Contractor shall be licensed by the Louisiana State Licensing Board for Contractors under Category **Mechanical Work**.

Bids in excess of Ten Thousand Dollars (\$10,000.00) received from contractors not licensed under the above classification will not be considered.

#### 4.2 Bid Security

- 4.2.1 No bid shall be considered or accepted unless the bid is accompanied by bid security. Bid Security must accompany the bid in the sealed envelope. Bidders to attach a certified check, cashier's check, or LSU New Orleans Bid Bond Form in the amount of five percent (5%) of the sum of the base bid and all alternates, as an evidence of good faith. Bidders are hereby notified that Bank Checks, Official Bank Checks or similar are not acceptable as bid security. Certified or cashier's checks to be drawn on a bank insured by the Federal Deposit Insurance Corporation in favor of The LSU New Orleans or the bid bond shall be written by a surety or insurance company currently on the U.S. Department of the Treasury Financial Management Service list of approved bonding companies which is published annually in the Federal Register, or by a Louisiana-domiciled insurance company with at least an A- rating in the latest printing of the A.M. Best's Key Rating Guide to write individual bonds up to ten percent of policyholder's surplus as shown in the A.M. Best's Key Rating Guide. If the bid security for this project is a Bond, then such Bond shall be submitted on the Bid Bond Form included in the specifications. Any Bond submitted other than on this bond form shall cause the bid to be rejected.

Bid Security furnished by the Contractor shall guarantee that the Contractor will, if awarded the work according to the terms of his proposal, enter into the Contract and furnish Performance and Payment Bonds as required by these Bidding Documents, within ten (10) days after written notice that the instrument is ready for his signature.

Should the Bidder refuse to enter into such Contract or fail to furnish such bonds, the amount of the bid security shall be forfeited to the University as liquidated damages, not as penalty.

- 4.2.2 The University will have the right to retain the bid security of Bidders until either (a) the Contract has been executed and bonds have been furnished, or (b) the specified

time has elapsed so that bids may be withdrawn, or (c) all bids have been rejected.

#### 4.3 Submission of Bids

4.3.1 Bids shall be sealed in the envelope furnished with bid documents and will be received until the time specified and at the place specified in these bid documents. It shall be the specific responsibility of the Bidder to deliver his sealed bid to the LSU New Orleans Purchasing Office at the appointed place and prior to the announced time for the opening of bids. Late delivery of a bid for any reason, including late delivery by United States Mail, or express delivery, shall disqualify the bid. The bid envelope shall be identified legibly on the outside with the following:

- a. Project Name and Owner
- b. Architect
- c. Date
- d. Name , Address, and license number of the Bidder.

If the bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "Bid Enclosed" on the face thereof. Such bids shall be sent by Registered or Certified Mail, Return Receipt Requested, addressed to: LSU New Orleans, Purchasing Office, Administration Annex Building, Room 1004-G, New Orleans, Louisiana 70148. Bids sent by express delivery shall be delivered to: LSU New Orleans, Purchasing Office, Administration Annex Building, Room 1004-G, Lakefront, New Orleans, Louisiana 70148.

4.3.2 Bids shall be deposited at the designated location prior to the time on the date for receipt of bids indicated in these Bid documents, or any extension thereof made by addendum. Bids received after the time and date for receipt of bids will be returned unopened.

4.3.3 Bidder shall assume full responsibility for timely delivery at location designated for receipt of bids.

4.3.4 Oral, telephonic, telegraphic, or faxed bids are invalid and shall not receive consideration.

4.3.5 The University shall not consider notations written on outside of bid envelope which have the effect of amending the bid. Written modifications enclosed in the bid envelope, and signed or initialed by the Contractor or his representative, shall be accepted.

4.36 The bid submission shall include the following documents:

- a. Bid Form and *Unit Price Form if unit prices are included.*
- b. Bid Security
- c. Document authorizing execution of signature on Bid Form if not submitting as a sole proprietor.

#### 4.4 Modification or Withdrawal of Bid

4.4.1 A bid may not be modified, withdrawn, or canceled by the Bidder for a period of thirty (30) calendar days for the period following the time and bid date designated for the receipt of bids, and Bidder so agrees in submitting his bid, except in accordance with R.S. 38:2214 which states, in part, "Bids containing patently obvious, unintentional, and substantial mechanical, clerical, or mathematical

errors, or errors of unintentional omission of a substantial quantity of work, labor, material, or services made directly in the compilation of the bid, may be withdrawn by the contractor if clear and convincing sworn, written evidence of such errors is furnished to the LSU New Orleans Purchasing Office within forty-eight hours of the bid opening excluding Saturdays, Sundays, and legal holidays. Such errors must be clearly shown by objective evidence drawn from inspection of the original work papers, documents, or materials used in the preparation of the bid sought to be withdrawn. If the LSU New Orleans Purchasing Office determines that the error is a patently obvious mechanical, clerical, or mathematical error, or unintentional omission of a substantial quantity of work, labor, material, or services, as opposed to a judgment error, and the bid was submitted in good faith it shall accept the withdrawal and return the bid security to the contractor."

- 4.4.2 Prior to the time and date designated for receipt of bids, bids submitted early may be modified or withdrawn by notice to the LSU New Orleans Purchasing Office at the place and prior to the time designated for receipt of bids.
- 4.4.3 Withdrawn bids may be resubmitted up to the time designated for the receipt of bids provided that they are then fully in conformance with these Instructions to Bidders.
- 4.4.4 Bid Security shall be in an amount sufficient for the bid as modified or resubmitted.

## ARTICLE 5

### CONSIDERATION OF BIDS

#### 5.1 Opening of Bids

- 5.1.1 The properly identified Bids received on time will be opened publicly and will be read aloud, and a tabulation abstract of the amounts of the base bids and alternates, if any, will be made available to Bidders.

#### 5.2 Rejection of Bids

- 5.2.1 The University shall have the right to reject any or all bids and in particular to reject a bid not accompanied by any required bid security or data required by the Bidding Documents or a bid in any way incomplete or irregular. The provisions and requirements of the Instructions to Bidders, the Advertisement for bids, and those required on the bid form shall not be considered as informalities and shall not be waived.
- 5.2.2 The University reserves the right to reject any and all bids at its discretion.

#### 5.3 Acceptance of Bid

- 5.3.1 It is the intent of the University, if any alternates are accepted, to accept them in the order in which they are listed in the Bid Form. Determination of the Low Bidder shall be on the basis of the sum of the base bid and the alternates accepted.

However, the University shall reserve the right to accept alternates in any order which does not affect determination of the Low Bidder.

- 5.3.2 LSU New Orleans upon receipt of bids, shall act within thirty calendar days of such receipt to award contract to the lowest responsible bidder provided the Bid has been submitted in accordance with the requirements of the Bidding Documents is judged to be reasonable and does not exceed the funds available or reject all bids. However, LSU New Orleans, by mutually written consent, may agree to extend the deadline of award by one or more extensions of thirty calendar days.

## ARTICLE 6

### PERFORMANCE AND PAYMENT BOND

#### 6.1 Bond Required

- 6.1.1 The Contractor shall pay for and provide a Performance and Labor and Material Payment Bond in the full amount of the bid within ten (10) days after written notice from the University or its Consultant that the work has been awarded to him. Bond furnished shall be a statutory bond and no modification, omissions, additions in or to the terms of the contract, in the plans and specifications or in the manner and mode of payment shall in any manner diminish, enlarge, or otherwise modify the obligations of the bond. Surety bond shall be written by a surety or insurance company currently on the U.S. Department of the Treasury Financial Management Service list of approved bonding companies which is published annually in the Federal Register or by an insurance company that is either domiciled in Louisiana or owned by Louisiana residents and is licensed to write surety bonds. For any public works project, no surety or insurance company shall write a bond which is in excess of the amount indicated as approved by the U.S. Department of the Treasury Financial Management Service list; companies authorized by this paragraph who are not on the treasury list shall not write a bond when the penalty exceeds fifteen percent of its capital and surplus, such capital and surplus being the amount by which the company's assets exceed its liabilities as reflected by the most recent financial statements filed by the company with the Department of Insurance. In addition, any surety bond written for a public works project shall be written by a surety or insurance company that is currently licensed to do business in the State of Louisiana. Bond shall be in favor of The LSU New Orleans.

#### 6.2 Time of Delivery and Form of Bond

- 6.2.1 The Bidder shall deliver the required bond to the University simultaneous with the execution of the Contract.
- 6.2.2 Bond shall be in the form furnished by LSU New Orleans Purchasing Office, entitled CONTRACT BETWEEN OWNER AND CONTRACTOR AND PERFORMANCE AND PAYMENT BOND, a copy of which is included in the Contract Documents.
- 6.2.3 The Bidder shall require the Attorney-in-Fact who executes the required bond on behalf of the surety to affix thereto a certified and current copy of his power of Attorney.

## ARTICLE 7

### FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

7.1 Form to be Used

- 7.1.1 Form of the Contract to be used shall be furnished by the LSU New Orleans Purchasing Office, a copy of which is bound in the Bidding Documents.

7.2 Post Bid Information & Award

- 7.2.1 Submissions: Within ten (10) days after the Bid, the following documents shall be submitted to the Owner. **Failure to submit these documents within the specified time frame will result in disqualification of the Bidder.**

- a. Attestation Affidavit (Past Criminal Convictions of Bidders and Verification of Employees) form found within this bid package, in accordance with La. R.S. 38:2227 and LA. R.S. 38:2212.10.
- b. Non-Collusion Affidavit form bound within this bid package, in accordance with La. R.S. 38:2224

- 7.2.2 The Bidder shall, prior to the award of a Contract for the Work, submit the following information to the Architect.

- a. A designation of the work to be performed by the Bidder with his own forces.
- b. The proprietary names and the suppliers of principal items or systems of material and equipment proposed for the work.
- c. A list of names of the subcontractors or other persons or organizations (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the work.
- d. A Schedule of Values set up by trade item with labor and material separated for each phase of work.
- e. The name of the proposed superintendent along with a resume of same. The resume shall cover biographical data, past experience, and references.

- 7.2.3 The Bidder will be required to establish to the satisfaction of the Architect and the Owner the reliability and responsibility of the proposed Subcontractors to furnish and perform the work described in the Sections of the Specifications pertaining to such proposed Subcontractors' respective trades.

- 7.2.4 Prior to the award of the Contract, the Architect will notify the Bidder if either the Owner or the Architect, after due investigation, has reasonable and substantial objection to any person or organization on the Contractor's list of proposed Subcontractors.

- 7.2.5 Subcontractors and other persons and organizations proposed by the Bidder and accepted by the Owner and the Architect must be used on the work for which they were proposed and accepted and shall not be changed except with the written approval of the Owner and the Architect.

- 7.2.6 As soon as the contract has been fully awarded according to law, certified checks will be returned to all bidders other than the successful Bidder; the latter's check will be returned on the signing of the Contract.

- 7.2.7 Upon the execution of the contract, LSU New Orleans, within thirty days thereafter, shall issue to the contractor a Notice to Proceed with the project. However, upon mutual consent by both parties, the Notice to Proceed may be extended.

- 7.2.8 After the purchase order has been awarded, no changes will be made to any part without written approval from the Director of the Department issuing these bid documents. The proposed change will be submitted in writing, with a complete breakdown of all material and labor, and the individual cost of each.

### 7.3 Successful Bidder's Delivery Schedule

- 7.3.1 The Successful Bidder will provide a delivery construction schedule. Submit within fifteen (15) days after the date established "Commencement of the Work".
- 7.3.2 Schedule Updating: Revise the schedule after each meeting, event, or activity where schedule revisions have been recognized or made. Distribute updated schedule with in seventy-two (72) hours to Project Manager for review.

### 7.4 Affirmative Action/Non-Discrimination

- 7.4.1 If the amount of the Contract is over \$10,000, the successful Bidder shall be required to execute the Equal Employment Opportunity Clause and Assurance of non-discrimination prior to the University entering into a contract. These documents will be in accordance with Chapter 60 of the rules and regulations, Office of Federal Contract Compliance, Equal Opportunity, U.S. Department of Labor.

### 7.5 Compliance Agreement

- 7.5.1 If the amount of the contract is \$50,000 or more, the successful Bidder shall be required to execute the Affirmative Action Compliance agreement prior to the University entering into a contract.

### 7.6 Recording Contract

- 7.6.1 The Contractor at his own expense, shall record the original executed Contract and the Performance and Labor and Material Bond with the Recorder of Mortgages, Orleans Parish, within five (5) working days of Contract signing. A NOTICE OF THIS RECORDING SHALL BE SENT TO THE PURCHASING OFFICE BEFORE PURCHASE ORDER AND NOTICE TO PROCEED ARE ISSUED.
- 7.6.2 Recordation of certain Change Orders, see General Conditions 1.16 CHANGES TO THE WORK.

### 7.7 Payments

- 7.7.1 The Contract shall provide payment equal to not more than ninety per cent (90%) of the total contract amount upon completion of the work. The remaining ten per cent (10%) shall be paid forty-five (45) days after the acceptance of the work by the University, provided a clear lien certificate is provided by the Contractor.
- 7.7.2 University standard forms for "Schedule of Values" and "Payment Request" will be provided to the Contractor at the Pre-Construction Conference. An original invoice must accompany the LSU pay request forms. **ONLY PAYMENT REQUESTS SUBMITTED ON THE UNIVERSITY FORM WILL BE PROCESSED FOR PAYMENT.**

**ALL OTHERS WILL BE RETURNED FOR COMPLIANCE TO THIS REQUIREMENT.**

7.7.3 When an engineer, designer, or architect is involved with the project, all pay requests must have his or her original signature on the original pay request forms **before** they are submitted to the University for processing.

7.7.4 No notice of completion, delivery memo, invoice, or other document will be signed, or approvals of any type given for any part of the job or delivery of any equipment or materials, except by the Director of the Department issuing these bidding documents, or his designee, such designation to be made in writing and signed by the Director. All work will be done during normal working hours unless the Director grants prior written approval, or the scope of Work requires that the work be done after hours.

7.8 Termination of Contract for Convenience

7.8.1 The University may, at any time, terminate the Contract for the University's convenience and without cause. Upon receipt of written notice from the University of such termination for the University's convenience, the Contractor shall: cease operations as directed by the University in the notice; take actions necessary, or that the University may direct, for the protection and preservation of the Material, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

7.8.2 In case of such termination for the University's convenience, Contractor shall be entitled to receive payment for Work executed along with reasonable overhead and profit.

7.8.3 University shall not be responsible or otherwise liable for any demobilization costs or Incidental or consequential damages resulting from such termination.

7.9 Acceptance of the Work

7.9.1 Upon substantial completion of the Work, the University shall execute a certificate that the whole work provided for in this agreement has been completed and approved under the terms and conditions thereof.

The Contractor shall then file the acceptance of the whole work at his expense with the Recorder of Mortgage of the Parish of Orleans.

ARTICLE 8

COMPLETION TIME AND LIQUIDATED DAMAGES

8.1 Contract Time:

8.1.1 The Bidder agrees to guarantee completion of the work within **One Hundred and Eighty (180)** calendar days starting from the Notice to Proceed, subject to extensions as may be granted or the Contractor will be subject to pay to the University liquidated damages in the amount stated on this document. The Bidder's attention is especially directed to the urgency of this work and that time is of the essence.

- a. Extensions for weather conditions shall not be given unless weather conditions prevailing are deemed by the Architect to be abnormal.

## 8.2 Liquidated Damages

- 8.2.1 Time is of the essence and completion of the work must be within the Contract Time for Completion-stated in Paragraph 8.1.1, subject to such extensions as may be granted by the University for delays identified as beyond the Contractor's control.

The Contractor will be assessed **Three Hundred Dollars (\$300.00)** for each consecutive calendar day during which the work remains incomplete beyond the Contract Completion date stated on the "Notice to Proceed" or as amended by Change order, Sundays and holidays included. This amount is agreed upon as the proper measure of liquidated damages which the University will sustain per day by the failure of the undersigned to complete the work at the stipulated time and is not to be construed in any sense as a penalty.

## ARTICLE 9

### PRE-BID CONFERENCE

- 9.1 A Pre-Bid Conference shall be held at the project site. Provisions for the site inspection are included as part of the **Pre-Bid Conference to be held in Facility Services Office, Administration Bldg, Suite 112 at 10:00 A.M. on OCTOBER 14, 2026.** The Pre-Bid Conference shall also provide opportunity for a review of the Bid Documents. The purpose of the Pre-Bid Conference is to familiarize Bidders with the requirements of the Project and the intent of the Bidding Documents, and to receive comments and information from interested Bidders.
- 9.2 Any revision of the Bidding Documents made as a result of the Pre-Bid Conference shall not be valid unless included in an addendum issued in accordance with Paragraph 3.4.1 of the Instructions to Bidders.

## ARTICLE 10

### INSURANCE

- 10.1 The Contractor, prior to commencing work, shall provide at his expense, proof of insurance coverage with insurance companies licensed in the State of Louisiana. Insurance shall be placed with insurers with an A.M. Best's rating of no less than A-:VI.
- 10.2 Insurance requirements are set forth in "Supplement I" of these documents.

## ARTICLE 11

### FEDERAL & STATE CLAUSES FOR CONTRACTS

- 11.1 Federal clauses, if applicable

- 11.1.1 Anti-Kickback Clause: The contractor hereby agrees to adhere to the mandate dictated by the Copeland "Anti-Kickback" Act which provides that each contractor or subgrantee shall be prohibited from inducing, by any means, any person employed in the completion of work, to give up any part of the compensation to which he is otherwise entitled.
- 11.1.2 Clean Air Act: For contracts over \$150,000, the contractor hereby agrees to adhere to the provisions which require compliance with all applicable standards, orders or requirements issued under Section 306 of the Clean Air Act which prohibits the use under non-exempt federal contracts, grants, or loans of facilities included on the EPA list of violating facilities.
- 11.1.3 Energy Policy and Conservation Act: The contractor hereby recognizes the mandatory standards and policies relating to energy efficiency which are contained in the State energy conservation plan issues in compliance with the Energy Policy and Conservation Act (P.L. 94-163).
- 11.1.4 Clean Water Act: For contracts over \$150,000, the contractor hereby agrees to adhere to the provisions which require compliance with all applicable standards, orders or requirements issued under Section 508 of the Clean Water Act which prohibits the use under non-exempt federal contracts, grants or loans of facilities included on the EPA list of violating facilities.
- 11.1.5 Anti-Lobbying and Debarment Act: The contractor will be expected to comply with federal statutes in the Anti-Lobbying Act and the Debarment Act.
- 11.2 Prohibition of discriminatory boycotts of Israel in accordance with LA R.S. 39:1602.1 the following applies to any bid with a value of \$100,000 or more and to vendors with five or more employees: by submitting a response to this solicitation, the bidder or proposer certifies and agrees that the following information is correct: in preparing its response, the bidder or proposer has considered all proposals submitted from qualified, potential subcontractors and suppliers, and has not, in the solicitation, selection, or commercial treatment of any subcontractor or supplier, refused to transact or terminated business activities, or taken other actions intended to limit commercial relations, with a person or entity that is engaging in commercial transactions in Israel or Israel-controlled territories, with the specific intent to accomplish a boycott or divestment of Israel. The bidder has also not retaliated against any person or other entity for reporting such refusal, termination, or commercially limiting actions. The state reserves the right to reject the response of the bidder or proposer if this certification is subsequently determined to be false, and to terminate any contract awarded based on such a false response.
- 11.3 Certification of no federal suspension or debarment: By signing and submitting any bid for \$25,000 or more, the bidder certifies that their company, any subcontractors, or principals are not suspended or debarred by the General Services Administration (GSA) in accordance with the requirements in "audit requirements in subpart F of the Office of Management and Budget's Uniform Administrative Requirements, Cost Principles, and Audit Requirements for federal awards" (formerly OMB Circular A-133).

A list of parties who have been suspended or debarred can be viewed via the internet at <https://www.sam.gov>.

- 11.4 In accordance with Louisiana law, all corporations (see LA R.S. 12:262.1) and limited liability companies (see LA R.S. 12:1308.2) must be registered and in good standing with the Louisiana Secretary of State in order to hold a purchase order and/or contract over \$25,000.

**SUPPLEMENT I**  
**INSURANCE REQUIREMENTS**

**\*\*\* INSURANCE \*\*\***

**STANDARDIZED INSURANCE REQUIREMENTS FOR ALL AGENCY CONTRACTS**

- I. The following Indemnification Agreement shall be, and is hereby, a provision of the contract:

The other party agrees to protect, defend, indemnify, save and hold harmless the State of Louisiana, all State Departments, Agencies, Boards and Commissions, its officers, agents, servants and employees, including volunteers, from and against any and all claims, demands, expense and liability arising out of injury or death to any person or the damage, loss or destruction of any property which may occur or in any way grow out of any act or omission of the other party, its agents, servants, and employees, or any and all costs, expense and/or attorney fees incurred by the other party as a result of any claim, demands, and/or causes of action except of those claims, demands, and/or causes of action arising out of the negligence of the State of Louisiana, all State Departments, Agencies, Boards, Commissions, its agents, representatives, and/or employees. The other party agrees to investigate, handle, respond to, provide defense for and defend any such claims, demand, or suit at its sole expense and agrees to bear all other costs and expenses related thereto, even if it (claims, etc.) is groundless, false or fraudulent.

- II. All policies and certificates of insurance of the Contractor/Subcontractor shall contain the following clauses:

- A. The Contractor/Subcontractor's insurer will have no right of recovery or subrogation against the Agency, it being the intention of the parties that the insurance policies so affected shall protect both parties and the primary coverage for any and all losses covered by the below described insurance.
- B. The Agency shall be named as an additional insured as regards negligence by the contractor (ISO Form CG 20 10 – current form approved for use in Louisiana).
- C. The insurance companies issuing the policy or policies shall have no recourse against the Agency for payment of any premiums or for assessments under any form of policy.
- D. Any and all deductibles in the below described insurance policies shall be assumed by and be for the amount of, and at the sole risk of the Contractor/Subcontractor.

- III. **INSURANCE:** The Contractor/Subcontractor, prior to commencing work, shall provide at his own expense, proof of the following insurance coverages required by the contract to the Agency in insurance companies authorized in the State of Louisiana. Insurance is to be placed with insurers with an A. M. Best's rating of **A-:VI or higher**. This rating requirement may be waived for workers' compensation coverage only.

Thirty days prior notice of cancellation shall be given to the Agency by registered mail, return receipt requested, on all of the required coverage provided to the Agency. All notices will name the Contractor/Subcontractor and identify the contract number.

Insurance coverage specified in the GENERAL CONDITIONS (AIA Document A 201, 1997 Edition) to be provided by the Contractor, and any other insurance described below shall be furnished with the following minimum limits:

**SUPPLEMENT I  
INSURANCE REQUIREMENTS**

**\*\*\* INSURANCE \*\*\***

- A. Workers' Compensation - Statutory - in compliance with the Compensation Law of the State. Exception: Employers liability to be \$1,000,000 when work is to be over water and involves maritime exposures.
- B. Commercial General Liability Insurance with a combined single limit per occurrence for bodily injury and property damage. This insurance shall include coverage for bodily injury and property damage, and include the following coverages:
1. Premises - Operations;
  2. Broad Form Contractual Liability;
  3. Products and Completed Operations;
  4. Use of Contractors and Subcontractors;
  5. Personal Injury;
  6. Broad Form Property Damage;
  7. Explosion, Collapse and Underground (XCU) Coverage.

**NOTE:** On the certificate of insurance, under the description of operations, the following wording is required: THE AGGREGATE LOSS LIMIT APPLIES TO EACH PROJECT, or a copy of ISO form CG 25-03 (current form approved for use in Louisiana) shall be submitted.

**COMBINED SINGLE LIMIT (CSL) - AMOUNT OF INSURANCE REQUIRED**

| Type of<br><u>Construction</u>                                                          | Projects under<br><u>\$100,000</u> | Projects \$100,001<br><u>up to \$1,000,000</u> | Projects over<br><u>\$1,000,000</u> |
|-----------------------------------------------------------------------------------------|------------------------------------|------------------------------------------------|-------------------------------------|
| <b>New Buildings:</b>                                                                   |                                    |                                                |                                     |
| Each Occurrence/<br>Minimum Limit                                                       | \$500,000                          | \$1,000,000                                    | \$3,000,000                         |
| Aggregate<br>(Applicable to this<br>contract ONLY)                                      | \$500,000                          | \$1,000,000                                    | \$3,000,000                         |
| <b>Renovations:</b> <u><b>The building(s) value for this project is : \$681,353</b></u> |                                    |                                                |                                     |
| Each Occurrence/<br>Minimum Limit                                                       | \$500,000**                        | \$1,000,000**                                  | \$3,000,000**                       |
| Aggregate<br>(Applicable to this<br>contract ONLY)                                      | \$500,000**                        | \$1,000,000**                                  | \$3,000,000**                       |

While the minimum combined single limit of \$500,000 is required for all renovations, the value of a building shall be multiplied by 10% and insurance requirements will be increased at \$1,000,000 intervals and rounded to the nearest \$1,000,000. Example: Renovation on \$33,000,000 building would require \$3,000,000 minimum combined single limit of coverage. Maximum limit required is \$5,000,000 regardless of building value.

- C. Business Automobile Liability Insurance with a combined single limit of \$1,000,000 per occurrence for bodily injury and property damage, unless otherwise indicated. This insurance shall include for bodily injury and property damage the following coverages:

**SUPPLEMENT I  
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**\*\*\* INSURANCE \*\*\***

1. Owned automobiles;
2. Hired automobiles;
3. Non-owned automobiles.

D. An Umbrella Policy may be used to meet minimum requirements.

IV. All property losses shall be made payable to and adjusted with the Agency.

V. All policies of insurance shall be approved by the contracting Agency prior to the inception of any work.

VI. Other insurance required is as follows:

Owner's Protective Liability (OPL) Insurance shall be furnished by the Contractor and naming the State of Louisiana as the Named Insured for projects over \$50,000.

|                               | Projects under<br><u>\$100,000</u> | Projects \$100,001<br><u>up to \$1,000,000</u> | Projects over<br><u>\$1,000,000</u> |
|-------------------------------|------------------------------------|------------------------------------------------|-------------------------------------|
| <b>CSL – Each Occurrence:</b> | \$500,000                          | \$1,000,000                                    | \$3,000,000                         |

VII. Property Insurance

The General Contractor shall purchase and maintain property insurance upon the entire work included in the contract for an amount equal to the greater of the full-completed value or the amount of the construction contract including any amendments thereto. The general contractor's policy shall provide "ALL RISK" Builder's Risk insurance (Extended to include the perils of wind, collapse, vandalism/malicious mischief, and theft, including theft of materials whether or not attached to any structure). The "All Risk" Builder's Risk insurance must also cover architect's and engineer's fees that may be necessary to provide plans and specifications and supervision of work for the repair and/or replacement of property damage caused by a covered peril not to exceed 10% of the cost of those repair and/or replacements

Flood coverage shall be provided by the Contractor on the first floor and below for projects North of the Interstate Corridor beginning at the Texas – Louisiana border at Interstate 10 east to the Baton Rouge junction of Interstate 12, East to Slidell junction with Interstate 10 to the Louisiana – Mississippi border. Flood sub-limit shall equal an amount no lower than 10% of the total contract cost per occurrence. Coverage for roofing projects shall not require flood coverage.

On projects south of this corridor, flood coverage shall be provided by the State of Louisiana, as the owner, through the National Flood Insurance Program (NFIP). The Contractor will be liable for the \$5,000 deductible on the NFIP policy from the Notice to Proceed date through the Notice of Final Acceptance date of the project.

A specialty contractor shall purchase and maintain property insurance upon the system to be installed for an amount equal to the greater of the full-completed value or the amount of the contract including any amendments thereto. The specialty contractor may provide an installation floater with the same coverage as the "ALL RISK" Builder's Risk insurance policy.

**SUPPLEMENT I**  
**INSURANCE REQUIREMENTS**

**\*\*\* INSURANCE \*\*\***

The policy must include the interest of the Owner, Contractor, and Subcontractors as their interest may appear. The contractor has the right to purchase coverage or self-insure any exposures not required by the bid specifications, but shall be held liable for all losses, deductibles, self-insurance for coverage not required.

Policies insuring projects involving additions, alterations or repairs to existing buildings or structures must include an endorsement providing the following:

In the event of a disagreement regarding a loss covered by this policy which may also be covered by the State of Louisiana, Policy of self-insurance or any commercial property insurance policy purchased by the State of Louisiana, Office of Risk Management (ORM) covering in excess of the State of Louisiana, policy of self-insurance, this company agrees to the following procedure to establish coverage and/or the amount of loss:

Any party to a loss may make a written demand for an appraisal of the matter in disagreement. Within 20 days of receipt of written demand, this company and either ORM or its commercial insurance company shall each select a competent and impartial appraiser and notify the other of the appraiser selected. The two appraisers will select a competent and impartial umpire. The appraisers will then identify the policy or policies under which the loss is insured and, if necessary, state separately the value of the property and the amount of loss that must be borne by each policy. If the appraisers fail to agree, they shall submit their differences to the umpire. A written decision by any two shall determine the policy or policies and the amount of loss. Each insurance company (or ORM) agree that the decision of the appraisers and the umpire, if involved, will be binding and final and that neither party will resort to litigation. Each of the two parties shall pay its chosen appraiser and bear the cost of the umpire equally.

- VIII. If, at any time, any of the said policies shall be or become unsatisfactory to the Agency, as to form or substance, or if a company issuing any such policy shall be or become unsatisfactory to the Agency, the Contractor/Subcontractor shall promptly obtain a new policy, submit the same to the Agency for approval and submit a certificate thereof as herein above provided.

Upon failure of the Contractor/Subcontractor to furnish, deliver and maintain such insurance as above provided, this contract, at the election of the Agency, may be forthwith declared suspended, discontinued or terminated. Failure of the Contractor/Subcontractor to take out and/or to maintain or the taking out and/or maintenance of any required insurance shall not relieve the Contractor/Subcontractor from any liability under the contract, nor shall the insurance requirements be construed to conflict with the obligations of the Contractor/Subcontractor concerning indemnification. The Agency reserves the right to require complete, certified copies of all required insurance policies at any time.

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**\*\*\* INSURANCE \*\*\***

**INFORMATION FOR BIDDERS**

**RISKS AND INDEMNIFICATIONS ASSUMED BY THE CONTRACTOR**

- A. Neither the acceptance of the completed work or payment therefore shall release the Contractor/Subcontractor from his obligations from the insurance requirements or indemnification agreement.
1. Additional insurance may be required on an individual basis for extra hazardous contracts and specific service agreements. If such additional insurance is required for a specific contract, that requirement will be described in the "Special Conditions" of the contract specifications.
  2. If any of the Property and Casualty insurance requirements are not complied with at their renewal dates, payments to the Contractor/Subcontractor will be withheld until those requirements have been met, or at the option of the Agency, the Agency may pay the Renewal Premium and withhold such payments from any monies due the Contractor/Subcontractor.
  3. All property losses shall be made payable to and adjusted with the Agency.
  4. All policies and certificates of insurance shall be approved by the contracting agency prior to the inception of any work.
  5. Other coverages may be required by the Agency based on specific needs. If such other coverages are required for this contract, those coverages will be described in the "Special Conditions" of the contract specifications.
  6. If at any time any of the foregoing policies shall be or become unsatisfactory to the Agency, as to form or substance, or if a company issuing any such policy shall be or become unsatisfactory to the Agency, the Contractor/Subcontractor shall, upon notice to that effect from the Agency, promptly obtain a new policy, submit the same to the Agency for approval and submit a certificate thereof as herein above provided. Upon failure of the Contractor/Subcontractor to furnish, deliver and maintain such insurance as above provided, this Contract, at the election of the Agency, may be forthwith declared suspended, discontinued or terminated. Failure of the Contractor/Subcontractor to take out and/or maintain or the taking out and/or maintenance of any required insurance, shall not relieve the Contractor/Subcontractor from any liability under the Contract, nor shall the insurance requirements be construed to conflict with or otherwise limit the obligations of the Contractor/Subcontractor concerning indemnification. The agency reserves the right to require complete, certified copies of all required insurance policies at any time.

**SUBCONTRACTORS**

Contractor shall include all subcontractors as insureds under its policies or shall furnish separate certificates for each subcontractor. All coverages for subcontractors shall be subject to all of the requirements stated herein.

**CERTIFICATES OF INSURANCE**

Contractor shall furnish the Agency with certificates of insurance affecting coverage required by this clause. The certificates for each insurance policy are to be signed by a person authorized by that

**SUPPLEMENT I**  
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insurer to bind coverage on its behalf. The certificates are to be received and approved by the Agency before work commences. The Agency reserves the right to require complete, certified copies of all required insurance policies at any time.

**INSURANCE REQUIREMENTS FOR CONTRACTORS**

Contractor shall procure and maintain for the duration of the contract insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work hereunder by the Contractor, his agents, representatives, employees or subcontractors. The cost of such insurance shall be included in the Contractor's bid.

**A. MINIMUM SCOPE OF INSURANCE**

Coverage shall be at least as broad as:

1. Insurance Services Office Commercial General Liability coverage "occurrence" form CG 00 01 (current form approved for use in Louisiana). "Claims Made" form is unacceptable.
2. Insurance Services Office form number CA 00 01 (current form approved for use in Louisiana) covering Automobile Liability. The policy shall provide coverage for owned, hired, and non-owned coverage. If an automobile is to be utilized in the execution of this contract, and the vendor/contractor does not own a vehicle, then proof of hired and non-owned coverage is sufficient.
3. Workers' Compensation insurance as required by the Labor Code of the State of Louisiana, including Employers Liability insurance.

**B. MINIMUM LIMITS OF INSURANCE**

Contractor shall maintain limits no less than:

1. Commercial General Liability: \$1,000,000 combined single limit per occurrence for bodily injury, personal injury and property damage (or higher limits depending on size of contract.)
2. Automobile Liability: \$1,000,000 combined single limit per accident, for bodily injury and property damage.
3. Workers Compensation and Employers Liability: Workers' Compensation limits as required by the Labor Code of the State of Louisiana and Employers Liability coverage. Exception: Employers liability limit is to be \$1,000,000 when work is to be over water and involves maritime exposure.

**C. DEDUCTIBLES AND SELF-INSURED RETENTIONS**

Any deductibles or self-insured retentions must be declared to and approved by the Agency. At the option of the Agency, either 1) the insurer shall reduce or eliminate such deductibles or self-insured retentions as respects the Agency, its officers, officials, employees and volunteers, or 2) the Contractor shall procure a bond guaranteeing payment of losses and related investigations, claim administration and defense expenses.

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**INSURANCE REQUIREMENTS**

**\*\*\* INSURANCE \*\*\***

**D. OTHER INSURANCE PROVISIONS**

The policies are to contain, or be endorsed to contain, the following provisions:

1. General Liability and Automobile Liability Coverages

- a. The Agency, its officers, officials, employees, Boards and Commissions and volunteers are to be added as "additional insured" as respects liability arising out of activities performed by or on behalf of the Contractor; products and completed operations of the Contractor, premises owned, occupied or used by the Contractor. The coverage shall contain no special limitations on the scope of protection afforded to the Agency, its officers, officials, employees or volunteers. It is understood that the business auto policy under "Who is an Insured" automatically provides liability coverage in favor of the State of Louisiana.
- b. Any failure to comply with reporting provisions of the policy shall not affect coverage provided to the Agency, its officers, officials, employees, Boards and Commissions or volunteers.
- c. The Contractor's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

2. Workers' Compensation and Employers' Liability Coverage

The insurer shall agree to waive all rights of subrogation against the Agency, its officers, officials, employees and volunteers for losses arising from work performed by the Contractor for the Agency.

3. All Coverages

Each insurance policy required by this clause shall be endorsed to state that coverage shall not be suspended, voided, canceled by either party, reduced in coverage or in limits except after thirty (30) days' prior written notice by certified mail, return receipt requested, has been given to the Agency.

**E. ACCEPTABILITY OF INSURERS**

Insurance is to be placed with insurers with an A.M. Best's rating of **A-:VI or higher**. This rating requirement may be waived for workers' compensation coverage only.

**F. VERIFICATION OF COVERAGE**

Contractor shall furnish the Agency with certificates of insurance effecting coverage required. The certificates for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf. The certificates are to be received and approved by the Agency before work commences. The Agency reserves the right to require complete, certified copies of all required insurance policies at any time.

**\*\*\* INSURANCE AND INDEMNIFICATION \*\*\***

**\*\* EXHIBIT A \*\***

**INDEMNIFICATION AGREEMENT**

The \_\_\_\_\_ agrees to protect, defend, indemnify, save, and hold harmless the  
{Contractor/Subcontractor/Lessee/Supplier}

State of Louisiana, all State Departments, Agencies, Boards and Commissions, its officers, agents, servants and employees, including volunteers, from and against any and all claims, demands, expenses and liability arising out of injury or death to any person or the damage, loss or destruction of any property which may occur or in any way grow out of any act or omission of \_\_\_\_\_, its agents, servants, and  
{Contractor/Subcontractor/Lessee/Supplier}

employees, or any and all costs, expenses and/or attorney fees incurred by

\_\_\_\_\_ as a result of any claims, demands, and/or causes of action except  
{Contractor/Subcontractor/Lessee/Supplier}

those claims, demands, and/or causes of action arising out of the negligence of the State of Louisiana, all State Departments, Agencies, Boards, Commissions, its agents, representatives, and/or employees.

\_\_\_\_\_ agrees to investigate, handle, respond to, provide defense for and  
{Contractor/Subcontractor/Lessee/Supplier}

defend any such claims, demands, or suits at its sole expense and agrees to bear all other costs and expenses related thereto, even if they (claims, etc.) are groundless, false or fraudulent.

Accepted by \_\_\_\_\_  
Company Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

Date Accepted \_\_\_\_\_

Is Certificate of Insurance Attached? \_\_\_\_\_ Yes \_\_\_\_\_ No

Contract No. \_\_\_\_\_ for \_\_\_\_\_  
State Agency Number and Name

PURPOSE OF CONTRACT: \_\_\_\_\_

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

BID BOND

FOR

LSU NEW ORLEANS PROJECT

\_\_\_\_\_  
(Date)

KNOW ALL MEN BY THESE PRESENTS:

That \_\_\_\_\_ of

\_\_\_\_\_, as Principal, and

\_\_\_\_\_, as Surety, are held and firmly bound unto the State of Louisiana, and LSU New Orleans, in the full and just sum of five (5%) percent of the total amount of this proposal, including all alternates, lawful money of the United States, for payment of which sum, well and truly be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally firmly by these presents.

Surety represents that it is listed on the current U.S. Department of the Treasury Financial Management Service list of approved bonding companies as approved for an amount equal to or greater than the amount for which it obligates itself in this instrument or that it is a Louisiana-domiciled insurance company with at least an A- rating in the latest printing of the A.M. Best's Key Rating Guide. If surety qualifies by virtue of its Best's listing, the Bond amount may not exceed ten percent of policyholders' surplus as shown in the latest A.M. Best's Key Rating Guide.

The Surety further represents that it is licensed to do business in the State of Louisiana and that this Bond is signed by surety's agent or attorney-in-fact. This Bid Bond is accompanied by appropriate power of attorney.

THE CONDITION OF THIS OBLIGATION IS SUCH that, whereas said Principal is herewith submitting its proposal to the obligee on a Contract for:

\_\_\_\_\_  
\_\_\_\_\_  
NOW, THEREFORE, if the said Contract be awarded to the Principal and the Principal shall, within such time as may be specified, enter into the Contract in writing and give a good and sufficient bond to secure the performance of the terms and conditions of the Contract with surety acceptable to the obligee, then this obligation shall be void; otherwise this obligation shall become due and payable.

\_\_\_\_\_  
PRINCIPAL (BIDDER)

\_\_\_\_\_  
SURETY

BY \_\_\_\_\_ BY \_\_\_\_\_

AUTHORIZED OFFICER-OWNER-PARTNER

AGENT OR ATTORNEY-IN-FACT

(SEAL)

## CONTRACT BETWEEN UNIVERSITY AND CONTRACTOR

This agreement made and entered into at New Orleans, Louisiana, this \_\_\_\_ day of \_\_\_\_\_, 200\_, by and between The LSU New Orleans, herein represented by Troy A. Bacino, Assistant Director of Purchasing, LSU New Orleans, party of the first part and hereinafter sometimes called the

University; and \_\_\_\_\_  
(Contractor)

herein represented by \_\_\_\_\_  
(Name and title)

Party of the second part and hereinafter sometimes called the Contractor:

WITNESSETH, THAT the University and the Contractor, for the considerations hereinafter named, agree as follows, that:

1. The Advertisement for Bids (if advertised)
2. The Bid Proposal
3. The General Conditions and Instructions
4. Bonds
5. The Specifications
6. The Following Enumerated Plans:
7. The Following Enumerated Addenda:

are all hereby made a part of this Contract to the same extent as if incorporated here in full.

## CONTRACT BETWEEN UNIVERSITY AND CONTRACTOR

The Contractor agrees to furnish all materials, labor, tools, equipment and other facilities necessary and to perform all work required for:

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

In accordance with this Contract and their proposal dated \_\_\_\_\_ all in strict accord with the requirements of the Contract.

The work to be performed under this contract shall be commenced immediately after award is made to the successful bidder and notification by the University that the work shall start, and shall be fully completed within the time stated in the Instructions to Bidders, subject to pertinent provisions of the General Conditions of the Contract Documents.

The amount to be paid to the Contractor by the University, subject to modification on account of changes as herein provided and/or as may be agreed to in writing by both parties to this contract is \_\_\_\_\_

(figures)

\_\_\_\_\_  
(in words)

The University shall make payments on account of the Contract as provided in the Instructions and Specifications.

**Performance and Payment Bond:** To these presents personally came and intervened, herein acting for \_\_\_\_\_, a corporation organized and existing under the laws of the State of \_\_\_\_\_, and duly authorized to transact business in the state of Louisiana, as surety, who declared that having taken cognizance of this Contract and of the Construction Documents mentioned herein, he hereby in his capacity as its Attorney in Fact obligates his said company, as surety for the said Contractor, unto the said University, up to the sum of \_\_\_\_\_. The condition of this Performance and Payment Bond shall be that should the Contractor herein not perform the contract in accordance with the terms and conditions hereof, or should said Contractor not fully indemnify and save harmless the University, from all cost and damages which he may suffer by said Contractor's nonperformance or should said Contractor not pay all persons who have and fulfill obligations to perform labor and/or furnish materials in the prosecution of the work provided for herein, including by way of example workmen, laborers, mechanics, and furnishers of materials, machinery, equipment and fixtures, then said Surety agrees and is bound to so perform the Contract upon demand by the University and make said payments in accordance with law.

Provided, that any alterations which may be made in the terms, of the Contract or in the work to be done under it, or the giving by the University of any extensions of time for the performance of the Contract, or any other forbearance on the part of either the University or the Contractor to the other shall not in any way release the Contractor or the Surety from their liability hereunder, notice to the Surety of any such alterations, extensions or other forbearance being hereby waived.

In Witness whereof, the parties hereto on the day and year first above written have executed this agreement in \_\_\_\_\_ counterparts, each of which shall, without proof or accountancy for the other counterparts, be deemed an original thereof.

This Performance and Payment Bond is accompanied by appropriate Power of Attorney.

WITNESSES:

\_\_\_\_\_  
(CONTRACTOR)

\_\_\_\_\_  
BY: \_\_\_\_\_  
(TITLE)

LSU NEW ORLEANS

\_\_\_\_\_  
BY: \_\_\_\_\_  
(TITLE)

\_\_\_\_\_  
(SURETY)

\_\_\_\_\_  
(ATTORNEY-IN-FACT)

STATE OF LOUISIANA  
PARISH OF \_\_\_\_\_

AFFIDAVIT ATTESTING THAT PUBLIC CONTRACT  
WAS NOT, NOR WILL NOT BE SECURED  
THROUGH EMPLOYMENT OR PAYMENT OF SOLICITOR

KNOW ALL MEN BY THESE PRESENT, that a public contract is  
contemplated between the LSU NEW ORLEANS and:

\_\_\_\_\_  
(contractor)

represented by \_\_\_\_\_,  
(title)

who attests that he is empowered and authorized to execute said  
documents.

FURTHER, \_\_\_\_\_, who being duly sworn, does depose and attest that:

(1) Affiant employed no person, corporation, firm, association, or other organization,  
either directly or indirectly, to secure the public contract under which he received payment, other  
than persons regularly employed by the affiant whose services in connection with the  
construction of the public building or project or in securing the public contract were in the regular  
course of their duties for affiant; and

(2) No part of the contract price received by affiant was paid or will be paid to any person,  
corporation, firm, association, or other organization for soliciting the contract, other than the  
payment of their normal compensation to persons regularly employed by the affiant whose  
services in connection with the construction of the public building or project were in the regular  
course of their duties for affiant.

WITNESSES:

\_\_\_\_\_

BEFORE ME, the undersigned authority, personally appeared, who being duly sworn,  
deposes the states that the above is true and correct in all respects recited.

\_\_\_\_\_

SWORN TO AND SUBSCRIBED before me this \_\_ day of \_\_, 20\_\_

\_\_\_\_\_  
NOTARY PUBLIC

STATE OF \_\_\_\_\_

PARISH OF \_\_\_\_\_

**ATTESTATIONS AFFIDAVIT**

**Before me**, the undersigned notary public, duly commissioned and qualified in and for the parish and state aforesaid, personally came and appeared Affiant, who after being duly sworn, attested as follows:

**LA. R.S. 38:2227 PAST CRIMINAL CONVICTIONS OF BIDDERS**

A. No sole proprietor or individual partner, incorporator, director, manager, officer, organizer, or member who has a minimum of a ten percent (10%) ownership in the bidding entity named below has been convicted of, or has entered a plea of guilty or nolo contendere to any of the following state crimes or equivalent federal crimes:

- |                                       |                                    |
|---------------------------------------|------------------------------------|
| (a) Public bribery (R.S. 14:118)      | (c) Extortion (R.S. 14:66)         |
| (b) Corrupt influencing (R.S. 14:120) | (d) Money laundering (R.S. 14:230) |

B. Within the past five years from the project bid date, no sole proprietor or individual partner, incorporator, director, manager, officer, organizer, or member who has a minimum of a ten percent (10%) ownership in the bidding entity named below has been convicted of, or has entered a plea of guilty or nolo contendere to any of the following state crimes or equivalent federal crimes, during the solicitation or execution of a contract or bid awarded pursuant to the provisions of Chapter 10 of Title 38 of the Louisiana Revised Statutes:

- |                                                  |                                                              |
|--------------------------------------------------|--------------------------------------------------------------|
| (a) Theft (R.S. 14:67)                           | (f) Bank fraud (R.S. 14:71.1)                                |
| (b) Identity Theft (R.S. 14:67.16)               | (g) Forgery (R.S. 14:72)                                     |
| (c) Theft of a business record<br>(R.S.14:67.20) | (h) Contractors; misapplication of<br>payments (R.S. 14:202) |
| (d) False accounting (R.S. 14:70)                | (i) Malfeasance in office (R.S. 14:134)                      |
| (e) Issuing worthless checks<br>(R.S. 14:71)     |                                                              |

**LA. R.S. 38:2212.10 Verification of Employees**

- A. At the time of bidding, Appearer is registered and participates in a status verification system to verify that all new hires in the state of Louisiana are legal citizens of the United States or are legal aliens.
- B. If awarded the contract, Appearer shall continue, during the term of the contract, to utilize a status verification system to verify the legal status of all new employees in the state of Louisiana.
- C. If awarded the contract, Appearer shall require all subcontractors to submit to it a sworn affidavit verifying compliance with Paragraphs (A) and (B) of this Subsection.

**LA. R.S. 23:1726(B) Certification Regarding Unpaid Workers Compensation Insurance**

- A. R.S. 23:1726 prohibits any entity against whom an assessment under Part X of Chapter 11 of Title 23 of the Louisiana Revised Statutes of 1950 (Alternative Collection Procedures & Assessments) is in effect, and whose right to appeal that assessment is exhausted, from submitting a bid or proposal for or obtaining any contract pursuant to Chapter 10 of Title 38 of the Louisiana Revised Statutes of 1950 and Chapters 16 and 17 of Title 39 of the Louisiana Revised Statutes of 1950.
- B. By signing this bid /proposal, Affiant certifies that no such assessment is in effect against the bidding / proposing entity.

\_\_\_\_\_  
NAME OF BIDDER

\_\_\_\_\_  
NAME OF AUTHORIZED SIGNATORY OF BIDDER

\_\_\_\_\_  
DATE

\_\_\_\_\_  
TITLE OF AUTHORIZED SIGNATORY OF BIDDER

\_\_\_\_\_  
SIGNATURE OF AUTHORIZED  
SIGNATORY OF BIDDER/AFFIANT

Sworn to and subscribed before me by Affiant on the \_\_\_\_ day of \_\_\_\_\_, 20\_\_.

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

# LOUISIANA UNIFORM PUBLIC WORK BID FORM

TO: LSU NEW ORLEANS  
Purchasing Office  
Administration Annex, Room 1004G  
New Orleans, Louisiana 70148  
*(Owner to provide name and address of owner)*

BID FOR: Replacement of Boiler and Chiller  
Net Charter School (The Athletic Center)  
SP5331 BTB2933  
*(Owner to provide name of project and other identifying information)*

The undersigned bidder hereby declares and represents that she/he: a) has carefully examined and understands the Bidding Documents, b) has not received, relied on, or based his bid on any verbal instructions contrary to the Bidding Documents or any addenda, c) has personally inspected and is familiar with the project site, and hereby proposes to provide all labor, materials, tools, appliances and facilities as required to perform, in a workmanlike manner, all work and services for the construction and completion of the referenced project, all in strict accordance with the Bidding Documents prepared by: Crumb Engineering, LLC dated 01-23-2025.  
*(Owner to provide name of entity preparing bidding documents.)*

Bidders must acknowledge all addenda. The Bidder acknowledges receipt of the following **ADDENDA:** (Enter the number the Designer has assigned to each of the addenda that the Bidder is acknowledging) \_\_\_\_\_ .

**TOTAL BASE BID:** For all work required by the Bidding Documents (including any and all unit prices designated "Base Bid" \* but not alternates) the sum of:

\_\_\_\_\_ Dollars (\$ \_\_\_\_\_)

**ALTERNATES:** For any and all work required by the Bidding Documents for Alternates including any and all unit prices designated as alternates in the unit price description.

**Alternate No. 1** *Replacement of (2) chilled water pumps and VFD's and Replacement of (2) heating water pumps and VFD's* for the lump sum of:

\_\_\_\_\_ Dollars (\$ \_\_\_\_\_)

**Alternate No. 2** *(Owner to provide description of alternate and state whether add or deduct)* for the lump sum of:

N/A \_\_\_\_\_ Dollars (\$ \_\_\_\_\_ N/A \_\_\_\_\_)

**Alternate No. 3** *(Owner to provide description of alternate and state whether add or deduct)* for the lump sum of:

N/A \_\_\_\_\_ Dollars (\$ \_\_\_\_\_ N/A \_\_\_\_\_)

**NAME OF BIDDER:** \_\_\_\_\_

**ADDRESS OF BIDDER:** \_\_\_\_\_

**LOUISIANA CONTRACTOR'S LICENSE NUMBER:** \_\_\_\_\_

**NAME OF AUTHORIZED SIGNATORY OF BIDDER:** \_\_\_\_\_

**TITLE OF AUTHORIZED SIGNATORY OF BIDDER:** \_\_\_\_\_

**SIGNATURE OF AUTHORIZED SIGNATORY OF BIDDER \*\*:** \_\_\_\_\_

**DATE:** \_\_\_\_\_

## **THE FOLLOWING ITEMS ARE TO BE INCLUDED WITH THE SUBMISSION OF THIS LOUISIANA UNIFORM PUBLIC WORK BID FORM:**

\* The Unit Price Form shall be used if the contract includes unit prices. Otherwise it is not required and need not be included with the form. The number of unit prices that may be included is not limited and additional sheets may be included if needed.

\*\* **A CORPORATE RESOLUTION OR WRITTEN EVIDENCE** of the authority of the person signing the bid for the public work as prescribed by LA R.S. 38:2212(B)(5).

**BID SECURITY** in the form of a bid bond, certified check or cashier's check as prescribed by LA R.S. 38:2218(A) attached to and made a part of this bid.

# LOUISIANA UNIFORM PUBLIC WORK BID FORM

## UNIT PRICE FORM

TO: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(Owner to provide name and address of owner)

BID FOR: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(Owner to provide name of project and other identifying information)

**UNIT PRICES:** This form shall be used for any and all work required by the Bidding Documents and described as unit prices. Amounts shall be stated in figures and only in figures.

|              |                                                                          |                  |            |                                                           |
|--------------|--------------------------------------------------------------------------|------------------|------------|-----------------------------------------------------------|
| DESCRIPTION: | <input type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.# ____ |                  |            |                                                           |
| REF. NO.     | QUANTITY:                                                                | UNIT OF MEASURE: | UNIT PRICE | UNIT PRICE EXTENSION ( <i>Quantity times Unit Price</i> ) |
|              |                                                                          |                  |            |                                                           |

|              |                                                                          |                  |            |                                                           |
|--------------|--------------------------------------------------------------------------|------------------|------------|-----------------------------------------------------------|
| DESCRIPTION: | <input type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.# ____ |                  |            |                                                           |
| REF. NO.     | QUANTITY:                                                                | UNIT OF MEASURE: | UNIT PRICE | UNIT PRICE EXTENSION ( <i>Quantity times Unit Price</i> ) |
|              |                                                                          |                  |            |                                                           |

|              |                                                                          |                  |            |                                                           |
|--------------|--------------------------------------------------------------------------|------------------|------------|-----------------------------------------------------------|
| DESCRIPTION: | <input type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.# ____ |                  |            |                                                           |
| REF. NO.     | QUANTITY:                                                                | UNIT OF MEASURE: | UNIT PRICE | UNIT PRICE EXTENSION ( <i>Quantity times Unit Price</i> ) |
|              |                                                                          |                  |            |                                                           |

|              |                                                                          |                  |            |                                                           |
|--------------|--------------------------------------------------------------------------|------------------|------------|-----------------------------------------------------------|
| DESCRIPTION: | <input type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.# ____ |                  |            |                                                           |
| REF. NO.     | QUANTITY:                                                                | UNIT OF MEASURE: | UNIT PRICE | UNIT PRICE EXTENSION ( <i>Quantity times Unit Price</i> ) |
|              |                                                                          |                  |            |                                                           |

|              |                                                                          |                  |            |                                                           |
|--------------|--------------------------------------------------------------------------|------------------|------------|-----------------------------------------------------------|
| DESCRIPTION: | <input type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.# ____ |                  |            |                                                           |
| REF. NO.     | QUANTITY:                                                                | UNIT OF MEASURE: | UNIT PRICE | UNIT PRICE EXTENSION ( <i>Quantity times Unit Price</i> ) |
|              |                                                                          |                  |            |                                                           |

|              |                                                                          |                  |            |                                                           |
|--------------|--------------------------------------------------------------------------|------------------|------------|-----------------------------------------------------------|
| DESCRIPTION: | <input type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.# ____ |                  |            |                                                           |
| REF. NO.     | QUANTITY:                                                                | UNIT OF MEASURE: | UNIT PRICE | UNIT PRICE EXTENSION ( <i>Quantity times Unit Price</i> ) |
|              |                                                                          |                  |            |                                                           |

|              |                                                                          |                  |            |                                                           |
|--------------|--------------------------------------------------------------------------|------------------|------------|-----------------------------------------------------------|
| DESCRIPTION: | <input type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.# ____ |                  |            |                                                           |
| REF. NO.     | QUANTITY:                                                                | UNIT OF MEASURE: | UNIT PRICE | UNIT PRICE EXTENSION ( <i>Quantity times Unit Price</i> ) |
|              |                                                                          |                  |            |                                                           |

|              |                                                                          |                  |            |                                                           |
|--------------|--------------------------------------------------------------------------|------------------|------------|-----------------------------------------------------------|
| DESCRIPTION: | <input type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.# ____ |                  |            |                                                           |
| REF. NO.     | QUANTITY:                                                                | UNIT OF MEASURE: | UNIT PRICE | UNIT PRICE EXTENSION ( <i>Quantity times Unit Price</i> ) |
|              |                                                                          |                  |            |                                                           |

Wording for “DESCRIPTION” is to be provided by the Owner.

All quantities are estimated. The contractor will be paid based upon actual quantities as verified by the Owner.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |           |  |            |  |                                                                            |  |  |  |                                  |  |  |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----------|--|------------|--|----------------------------------------------------------------------------|--|--|--|----------------------------------|--|--|--|
| LSU NEW ORLEANS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |           |  |            |  | PAYMENT REQUEST # _____                                                    |  |  |  | Page ____ of ____<br>Date: _____ |  |  |  |
| Project:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |           |  |            |  | Contractor:<br>Mailing Address:                                            |  |  |  |                                  |  |  |  |
| SP# _____ SB# _____                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |      |           |  |            |  |                                                                            |  |  |  |                                  |  |  |  |
| <b>CHANGE ORDER SUMMARY</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |           |  |            |  |                                                                            |  |  |  |                                  |  |  |  |
| Change Order History                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      | ADDITIONS |  | DEDUCTIONS |  | ORIGINAL CONTRACT SUM..... \$ _____                                        |  |  |  |                                  |  |  |  |
| Number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Date |           |  |            |  | Net change by Change Orders..... \$ _____                                  |  |  |  |                                  |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |           |  |            |  | CONTRACT SUM TO DATE..... \$ _____                                         |  |  |  |                                  |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |           |  |            |  | TOTAL COMPLETED & STORED TO DATE..... \$ _____<br>(See Schedule of Values) |  |  |  |                                  |  |  |  |
| TOTALS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |           |  |            |  | RETAINAGE _____ %..... \$ _____                                            |  |  |  |                                  |  |  |  |
| Net Change by Change Orders                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |           |  |            |  | TOTAL EARNED LESS RETAINAGE..... \$ _____                                  |  |  |  |                                  |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |           |  |            |  | LESS PREVIOUS PAYMENTS/APPLICATIONS..... \$ _____                          |  |  |  |                                  |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |           |  |            |  | PAYMENT DUE THIS REQUEST..... \$ _____                                     |  |  |  |                                  |  |  |  |
| <div style="display: flex;"><div style="writing-mode: vertical-rl; transform: rotate(180deg); font-weight: bold;">UNOFFICIAL PURCHASING ONLY</div><div>I CERTIFY THAT THE GOODS OR SERVICES REFERENCED ON THIS INVOICE HAVE BEEN RENDERED AND PAYMENT OF THESE CHARGES IS ACCEPTABLE AS INDICATED BELOW.<br/><br/>DATE RECEIVED: _____<br/>DEPARTMENT CHAIRMAN/<br/>AUTHORIZED REPRESENTATIVE: _____<br/><br/>____ APPROVED WITHOUT EXCEPTION<br/><br/>____ APPROVED WITH EXCEPTION(S) AS NOTED</div></div> |      |           |  |            |  | CONTRACTOR:                                                                |  |  |  | DATE:                            |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |           |  |            |  | ARCHITECT:                                                                 |  |  |  | DATE:                            |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |           |  |            |  | FS:                                                                        |  |  |  | DATE:                            |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |           |  |            |  | APPROVALS                                                                  |  |  |  |                                  |  |  |  |



# **AIA**® Document A201™ – 2017

## **General Conditions of the Contract for Construction**

for the following PROJECT:  
(Name and location or address)

**THE OWNER:**  
(Name, legal status and address)

Owner

Owner

Owner

**THE ARCHITECT:**  
(Name, legal status and address)

Crumb Engineering, LLC

4609 Fairfield St

Metairie, LA 70006

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This document has important legal consequences.

Consultation with an attorney is encouraged with respect to its completion or modification.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.

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## **ARTICLE 1 GENERAL PROVISIONS**

### **§ 1.1 Basic Definitions**

#### **§ 1.1.1 The Contract Documents**

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.

#### **§ 1.1.2 The Contract**

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

#### **§ 1.1.3 The Work**

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

#### **§ 1.1.4 The Project**

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

#### **§ 1.1.5 The Drawings**

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

#### **§ 1.1.6 The Specifications**

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

#### **§ 1.1.7 Instruments of Service**

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

#### **§ 1.1.8 Initial Decision Maker**

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

### **§ 1.2 Correlation and Intent of the Contract Documents**

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

**§ 1.2.1.1** The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

**§ 1.2.2** Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

**§ 1.2.3** Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

### **§ 1.3 Capitalization**

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

### **§ 1.4 Interpretation**

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

### **§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service**

**§ 1.5.1** The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

**§ 1.5.2** The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

### **§ 1.6 Notice**

**§ 1.6.1** Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

**§ 1.6.2** Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

### **§ 1.7 Digital Data Use and Transmission**

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

### **§ 1.8 Building Information Models Use and Reliance**

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk

and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

## **ARTICLE 2 OWNER**

### **§ 2.1 General**

**§ 2.1.1** The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

**§ 2.1.2** The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

### **§ 2.2 Evidence of the Owner's Financial Arrangements**

**§ 2.2.1** Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

**§ 2.2.2** Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

**§ 2.2.3** After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

**§ 2.2.4** Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

### **§ 2.3 Information and Services Required of the Owner**

**§ 2.3.1** Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

**§ 2.3.2** The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

**§ 2.3.3** If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

**§ 2.3.4** The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

**§ 2.3.5** The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

**§ 2.3.6** Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

#### **§ 2.4 Owner's Right to Stop the Work**

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

#### **§ 2.5 Owner's Right to Carry Out the Work**

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

### **ARTICLE 3 CONTRACTOR**

#### **§ 3.1 General**

**§ 3.1.1** The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

**§ 3.1.2** The Contractor shall perform the Work in accordance with the Contract Documents.

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

#### **§ 3.2 Review of Contract Documents and Field Conditions by Contractor**

**§ 3.2.1** Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

**§ 3.2.2** Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in

such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

**§ 3.2.3** The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

**§ 3.2.4** If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

### **§ 3.3 Supervision and Construction Procedures**

**§ 3.3.1** The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

**§ 3.3.2** The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

**§ 3.3.3** The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

### **§ 3.4 Labor and Materials**

**§ 3.4.1** Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

**§ 3.4.2** Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

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

### **§ 3.5 Warranty**

**§ 3.5.1** The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or

equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

**§ 3.5.2** All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

### **§ 3.6 Taxes**

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

### **§ 3.7 Permits, Fees, Notices and Compliance with Laws**

**§ 3.7.1** Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

**§ 3.7.2** The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

**§ 3.7.3** If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

### **§ 3.7.4 Concealed or Unknown Conditions**

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

**§ 3.7.5** If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

### **§ 3.8 Allowances**

**§ 3.8.1** The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

**§ 3.8.2** Unless otherwise provided in the Contract Documents,

- .1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- .3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

**§ 3.8.3** Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

### **§ 3.9 Superintendent**

**§ 3.9.1** The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

**§ 3.9.2** The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

**§ 3.9.3** The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

### **§ 3.10 Contractor's Construction and Submittal Schedules**

**§ 3.10.1** The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

**§ 3.10.2** The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

**§ 3.10.3** The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

### **§ 3.11 Documents and Samples at the Site**

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

### **§ 3.12 Shop Drawings, Product Data and Samples**

**§ 3.12.1** Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

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

**§ 3.12.3** Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

**§ 3.12.4** Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

**§ 3.12.5** The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

**§ 3.12.6** By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

**§ 3.12.7** The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

**§ 3.12.8** The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

**§ 3.12.9** The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

**§ 3.12.10** The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

**§ 3.12.10.1** If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

**§ 3.12.10.2** If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

### **§ 3.13 Use of Site**

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

### **§ 3.14 Cutting and Patching**

**§ 3.14.1** The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

**§ 3.14.2** The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

### **§ 3.15 Cleaning Up**

**§ 3.15.1** The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

**§ 3.15.2** If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

### **§ 3.16 Access to Work**

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

### **§ 3.17 Royalties, Patents and Copyrights**

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

### **§ 3.18 Indemnification**

**§ 3.18.1** To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

**§ 3.18.2** In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages,

compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

## **ARTICLE 4 ARCHITECT**

### **§ 4.1 General**

**§ 4.1.1** The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

**§ 4.1.2** Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

### **§ 4.2 Administration of the Contract**

**§ 4.2.1** The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

**§ 4.2.2** The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

**§ 4.2.3** On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

### **§ 4.2.4 Communications**

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

**§ 4.2.5** Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

**§ 4.2.6** The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

**§ 4.2.7** The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of

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other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

**§ 4.2.8** The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

**§ 4.2.9** The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

**§ 4.2.10** If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

**§ 4.2.11** The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

**§ 4.2.12** Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

**§ 4.2.13** The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

**§ 4.2.14** The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

## **ARTICLE 5 SUBCONTRACTORS**

### **§ 5.1 Definitions**

**§ 5.1.1** A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

**§ 5.1.2** A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

### **§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work**

**§ 5.2.1** Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

**§ 5.2.2** The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

**§ 5.2.3** If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

**§ 5.2.4** The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

### **§ 5.3 Subcontractual Relations**

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

### **§ 5.4 Contingent Assignment of Subcontracts**

**§ 5.4.1** Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

**§ 5.4.2** Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

**§ 5.4.3** Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

## **ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS**

### **§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts**

**§ 6.1.1** The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

**§ 6.1.2** When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term “Contractor” in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

**§ 6.1.3** The Owner shall provide for coordination of the activities of the Owner’s own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

**§ 6.1.4** Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner’s own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

## **§ 6.2 Mutual Responsibility**

**§ 6.2.1** The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor’s construction and operations with theirs as required by the Contract Documents.

**§ 6.2.2** If part of the Contractor’s Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor’s Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner’s or Separate Contractor’s completed or partially completed construction is fit and proper to receive the Contractor’s Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

**§ 6.2.3** The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor’s delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor’s delays, improperly timed activities, damage to the Work or defective construction.

**§ 6.2.4** The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

**§ 6.2.5** The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

## **§ 6.3 Owner's Right to Clean Up**

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

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

### **§ 7.1 General**

**§ 7.1.1** Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

**§ 7.1.2** A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

## § 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

- .1 The change in the Work;
- .2 The amount of the adjustment, if any, in the Contract Sum; and
- .3 The extent of the adjustment, if any, in the Contract Time.

## § 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

- .1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
- .2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
- .5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

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

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

**§ 7.3.8** The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

**§ 7.3.9** Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

**§ 7.3.10** When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

#### **§ 7.4 Minor Changes in the Work**

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

### **ARTICLE 8 TIME**

#### **§ 8.1 Definitions**

**§ 8.1.1** Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

**§ 8.1.2** The date of commencement of the Work is the date established in the Agreement.

**§ 8.1.3** The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

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

#### **§ 8.2 Progress and Completion**

**§ 8.2.1** Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

**§ 8.2.2** The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

**§ 8.2.3** The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

#### **§ 8.3 Delays and Extensions of Time**

**§ 8.3.1** If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

**§ 8.3.2** Claims relating to time shall be made in accordance with applicable provisions of Article 15.

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§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

## **ARTICLE 9 PAYMENTS AND COMPLETION**

### **§ 9.1 Contract Sum**

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

### **§ 9.2 Schedule of Values**

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

### **§ 9.3 Applications for Payment**

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

### **§ 9.4 Certificates for Payment**

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or

(3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

**§ 9.4.2** The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

### **§ 9.5 Decisions to Withhold Certification**

**§ 9.5.1** The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a Separate Contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

**§ 9.5.2** When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

**§ 9.5.3** When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

**§ 9.5.4** If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

### **§ 9.6 Progress Payments**

**§ 9.6.1** After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

**§ 9.6.2** The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

**§ 9.6.3** The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

**§ 9.6.4** The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

**§ 9.6.5** The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

**§ 9.6.6** A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

**§ 9.6.7** Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

**§ 9.6.8** Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

## **§ 9.7 Failure of Payment**

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

## **§ 9.8 Substantial Completion**

**§ 9.8.1** Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

**§ 9.8.2** When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

**§ 9.8.3** Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

**§ 9.8.4** When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

**§ 9.8.5** The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

### **§ 9.9 Partial Occupancy or Use**

**§ 9.9.1** The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

**§ 9.9.2** Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

**§ 9.9.3** Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

### **§ 9.10 Final Completion and Final Payment**

**§ 9.10.1** Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

**§ 9.10.2** Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

**§ 9.10.3** If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

**§ 9.10.4** The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- .1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents;
- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

**§ 9.10.5** Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

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

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

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

### **§ 10.2 Safety of Persons and Property**

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

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

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

**§ 10.2.3** The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

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

**§ 10.2.5** The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.1.8.

**§ 10.2.6** The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

**§ 10.2.7** The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

**§ 10.2.8 Injury or Damage to Person or Property**

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

**§ 10.3 Hazardous Materials and Substances**

**§ 10.3.1** The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

**§ 10.3.2** Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

**§ 10.3.3** To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

**§ 10.3.4** The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

**§ 10.3.5** The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

**§ 10.3.6** If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

#### **§ 10.4 Emergencies**

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

### **ARTICLE 11 INSURANCE AND BONDS**

#### **§ 11.1 Contractor's Insurance and Bonds**

**§ 11.1.1** The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

**§ 11.1.2** The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

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

**§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance.** Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

#### **§ 11.2 Owner's Insurance**

**§ 11.2.1** The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

**§ 11.2.2 Failure to Purchase Required Property Insurance.** If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

**§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance.** Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by

an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

### **§ 11.3 Waivers of Subrogation**

**§ 11.3.1** The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

**§ 11.3.2** If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

### **§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance**

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

### **§ 11.5 Adjustment and Settlement of Insured Loss**

**§ 11.5.1** A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

**§ 11.5.2** Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

## **ARTICLE 12 UNCOVERING AND CORRECTION OF WORK**

### **§ 12.1 Uncovering of Work**

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

**§ 12.1.2** If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract

Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

## **§ 12.2 Correction of Work**

### **§ 12.2.1 Before Substantial Completion**

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

### **§ 12.2.2 After Substantial Completion**

**§ 12.2.2.1** In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

**§ 12.2.2.2** The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

**§ 12.2.2.3** The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

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

**§ 12.2.4** The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

**§ 12.2.5** Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

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

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

## **ARTICLE 13 MISCELLANEOUS PROVISIONS**

### **§ 13.1 Governing Law**

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

### **§ 13.2 Successors and Assigns**

**§ 13.2.1** The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in

Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

**§ 13.2.2** The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

### **§ 13.3 Rights and Remedies**

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

**§ 13.3.2** No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

### **§ 13.4 Tests and Inspections**

**§ 13.4.1** Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

**§ 13.4.2** If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

**§ 13.4.3** If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

**§ 13.4.4** Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

**§ 13.4.5** If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

**§ 13.4.6** Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

### **§ 13.5 Interest**

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

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

### **§ 14.1 Termination by the Contractor**

**§ 14.1.1** The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

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- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- .2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- .4 The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

**§ 14.1.2** The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

**§ 14.1.3** If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

**§ 14.1.4** If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

## **§ 14.2 Termination by the Owner for Cause**

**§ 14.2.1** The Owner may terminate the Contract if the Contractor

- .1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or Suppliers;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

**§ 14.2.2** When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

**§ 14.2.3** When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

**§ 14.2.4** If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

## **§ 14.3 Suspension by the Owner for Convenience**

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

**§ 14.3.2** The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

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

**§ 14.4 Termination by the Owner for Convenience**

**§ 14.4.1** The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

**§ 14.4.2** Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

**§ 14.4.3** In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

**ARTICLE 15 CLAIMS AND DISPUTES**

**§ 15.1 Claims**

**§ 15.1.1 Definition**

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

**§ 15.1.2 Time Limits on Claims**

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

**§ 15.1.3 Notice of Claims**

**§ 15.1.3.1** Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

**§ 15.1.3.2** Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

**§ 15.1.4 Continuing Contract Performance**

**§ 15.1.4.1** Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

**§ 15.1.4.2** The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

#### **§ 15.1.5 Claims for Additional Cost**

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

#### **§ 15.1.6 Claims for Additional Time**

**§ 15.1.6.1** If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

**§ 15.1.6.2** If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

#### **§ 15.1.7 Waiver of Claims for Consequential Damages**

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- .1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

#### **§ 15.2 Initial Decision**

**§ 15.2.1** Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

**§ 15.2.2** The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

**§ 15.2.3** In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

**§ 15.2.4** If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

**§ 15.2.5** The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

**§ 15.2.6** Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

**§ 15.2.6.1** Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

**§ 15.2.7** In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

**§ 15.2.8** If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

### **§ 15.3 Mediation**

**§ 15.3.1** Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

**§ 15.3.2** The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

**§ 15.3.3** Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

**§ 15.3.4** The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

### **§ 15.4 Arbitration**

**§ 15.4.1** If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

**§ 15.4.1.1** A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand

for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

**§ 15.4.2** The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

**§ 15.4.3** The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

**§ 15.4.4 Consolidation or Joinder**

**§ 15.4.4.1** Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

**§ 15.4.4.2** Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

**§ 15.4.4.3** The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

## **SECTION 01000**

### **GENERAL CONDITIONS**

The general conditions of these Technical Specifications, including amendments and additions thereto, apply to each and every heading included in these Technical Specifications with the same force as though repeated in full under each heading respectively.

#### **1.01 SCOPE**

##### **BASE BID:**

Provide the materials, labor, equipment and supervision necessary for the completion of all work associated with Replacement of Boiler and Chiller, NET Charter School (The Athletic Center) LSU New Orleans East Campus in accordance with this Project Manual dated 6-19-26.

##### **ALTERNATE #1:**

Provide the materials, labor, equipment and supervision necessary for the completion of all work associated with Replacement of Boiler and Chiller, NET Charter School (The Athletic Center) LSU New Orleans East Campus – Alternate #1 (replacement of (4) pumps and associated piping, valves, VFD's, electrical and controls) in accordance with this Project Manual dated 6-19-26.

Opportunity for the site visit and inspection is provided under Article 8 of the "INSTRUCTIONS."

#### **1.03 REVIEW OF QUOTING DOCUMENTS**

The Contractor shall carefully study and compare the field conditions, Drawings and Technical Specifications and shall at once report to the University Representative errors, inconsistencies or omissions discovered.

Maintain one (1) complete set of Bid Documents and Change Orders at the site during the work.

#### **1.04 PROJECT MEETINGS**

If called by the University Representative, a Pre-Construction Conference between the Contractor, his on-site representative and the University Representative will be held in order to clarify and direct University policy and specific items of concern as pertain to the Contract. Present copies of the project Schedule of Values, List of Subcontractors and Construction Schedule to the University Representative. University standard forms for this information are available through the University Representative.

Progress meetings will be scheduled at the discretion of the University Representative depending on the progress of the work.

#### **1.05 COORDINATION**

Coordinate installation schedule with the University Representative so as not to interfere with the ongoing operation of the University. If for any reason, shut down of utilities is required on this project, it is imperative that the University Representative be consulted.

#### **1.06 SUPERVISION**

The Contractor shall provide consistent, capable supervision at all times during the work. Provide telephone service at the Project site. Service may be cellular or hard-wired, at the Contractor's option. Telephone service shall not be discontinued until after final acceptance of the

project.

#### 1.07 SUBSTITUTIONS

Substitutions to specified materials require approval of the University Representative prior to the opening of quotes (Article 3.3 of the "INSTRUCTIONS"). Substitutions not approved prior to opening of quotes are subject to rejection and replacement with the specified materials.

#### 1.08 SUBMITTALS

Submit all required shop drawings, brochures and samples for review by the University Representative prior to ordering and/or installing materials. Equipment or material ordered and/or installed without review by the University Representative is subject to rejection. Reproduction and edit of the Quoting Documents for use as shop drawings is not permitted.

Shop Drawings: Submit one (1) electronic copy. The electronic copy will be returned with mark ups.

Brochures, Cut Sheets, and Technical Data: Submit one (1) electronic copy. The electronic copy will be returned with mark ups.

Samples: Submit one (1) each to be retained by the University and any additional if these need to be returned.

#### 1.09 QUALITY ASSURANCE

Use new materials of quality acceptable to the University Representative and meeting all applicable regulations as pertain to this project. Remove and replace all material delivered to site which, in the opinion of the Representative, does not meet specifications and quality.

The University expects quality workmanship and only those who are qualified to perform the tasks in their respective trades are acceptable. The term qualified above is understood to mean "Journeymen" skilled in their respective trades. Correct, at no expense to the University, any work performed which, in the opinion of the University Representative, is found unacceptable or not according to code.

#### 1.10 TRAFFIC CONTROL

Coordinate the schedule of delivery vehicles which will interfere with normal campus traffic. When deliveries are made from the street curb, provide sufficient properly attired and equipped flagmen to safely control and maintain the flow of traffic.

It is the policy of the LSU New Orleans to provide full access to all disabled individuals in all areas possible. Because of this commitment, contractors, vendors or servicing agencies are cautioned to ensure that their staff is made aware of this commitment. When parking on the campus of this University, it shall be the responsibility of the contractor, vendor or servicing agency to ensure that no sidewalks or access ways are blocked at any time. If temporary blocking is required, the Contractor, shall assume the responsibility for the safe transit of all disabled persons.

Park only in authorized areas; comply with all traffic and parking regulations of the University. The University will furnish the Contractor, at no charge, permits for all vehicles which will be parked in the designated parking areas.

#### 1.11 PROJECT CONDITIONS

- A. Conduct building demolition so University's operations will not be disrupted.
  - 1. Provide not less than 48 hours' notice to the University Representative of activities that will affect University's operations.
  - 2. Maintain access to existing exits and other adjacent occupied or used facilities.
    - a. Do not close exits or other occupied or used facilities without written permission from authorities having jurisdiction.
- B. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
  - 1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify the University Representative. Hazardous materials will be removed by University under a separate contract.
- C. Storage or sale of removed items or materials on-site is not permitted.

#### 1.12 PROTECTION

Protect adjacent buildings and building elements from damage during the work. Protect the site, including trees, shrubs, vegetation and lawn areas; where damage does occur, restore to original condition replacing damaged vegetation and lawn with equal size and species.

Store construction materials with care; distribute the weight to not endanger the building structure.

Contractor shall verify the exact locations of underground utilities. Damage to existing utilities shall be immediately repaired by the Contractor at his own expense to restore the interrupted service. Work at night and/or on weekends if deemed necessary by the University Representative. Restoration may involve repair and/or replacement of damaged section with new, without credit for condition or useable life of the damaged utility.

#### 1.13 ROUGH-IN INSPECTION

At the completion of the rough-in work, before any closing of wall, ceiling, or floor; schedule a rough-in inspection for the University Representative's approval. Give the University Representative a 48-hour notice.

#### 1.14 CLEANUP

Daily, as it accumulates, remove from the work site, all rubbish, debris and unsalvageable material resulting from the work. Do not permit trash to accumulate. Do not use individual building dumpsters for trash disposal.

#### 1.15 SAFETY

Provide sufficient continuous barricades to identify the work site and restrict entry. Where necessary, equip barricades with warning lights for night use.

Provide measures necessary to ensure and maintain security at the work site; protect from theft, vandalism, personal injury, and property damage. Erect and maintain temporary enclosures and barriers to prevent unauthorized access to the site.

Provide fire protection equipment during the construction period, including not less than two (2)

ten (10) pound capacity multi-purpose A-B-C dry chemical extinguishers (10A:40BC).

If indicated on the Drawings, provide a temporary fence to isolate the construction site and restrict unauthorized entry. Use chain link fence material, 6'-0 minimum height, on steel or wood posts spaced a 6'-0 maximum and embedded 2'-6 minimum below existing grade; include personnel

and/or equipment access gates. Coordinate fence installation with underground utilities - see 1.11; before installation, confirm fence location and layout with the University Representative.

#### 1.16 WARRANTY

Warranty all workmanship and material for a period of one year from date of acceptance or per warranty required per individual specifications. Provide copies of all warranties to University at close of project. During this period, the University will notify the Contractor of any discrepancy for prompt correction at no expense to the University.

At the discretion and initiation of the University Representative, a one-year warranty review meeting with the Contractor will be held to review warranty items which remain incomplete.

#### 1.17 CHANGES TO THE WORK

When required, changes to the work will be documented and the contract price adjusted by written change order issued by the University to the Contractor. Time extensions will be handled by change order.

Itemize material and labor costs. Include quantities and unit costs. Submit a separate breakdown for each Subcontractor. Document all cost.

Compute overhead and profit as follows:

1. When all of the work is General Contractor work: 15% of the cost the work.
2. When the work is all Subcontract work: 15% of the cost of the work for Subcontractor's overhead and profit plus 5% of the cost of the work for General Contractor's overhead and profit.
3. When the work is a combination of General Contractor work and Subcontract work: 15% of the cost of the subcontract work for Subcontractor's overhead and profit plus 5% of the cost of the Subcontractor's work for General Contractor's overhead and profit plus 15% of the cost of general contract work for General Contractor's overhead and profit.

Cost of the work: all costs necessarily incurred in performance of the work and paid by the contractor.

This includes:

1. Wages paid.
2. Cost of all materials and supplies.
3. Rental of necessary machinery and equipment.
4. Applicable taxes, insurance, fringe benefits, unemployment compensation, social security, old age and bond premiums.
5. Any other documented costs.

#### 1.18 ACCEPTANCE

When, in the mutual opinions of the Contractor and the University Representative, the work is

judged substantially complete, a meeting at the site will be held to inspect the work and to identify and list those items which are incomplete and/or not in compliance with the Quoting Documents, Contract and all Change Orders. Consultants to the University may be in attendance at the

meeting as well the subcontractors invited by the Contractor. The list developed forms the "Punch List" for the project.

A value equal to the material, labor, equipment and supervision cost incidental to the completion and/or correction of each item on the Punch List will be assessed by the University Representative and Consultants. The total value of all items on the Punch List is designated "Special Retainage" and will be withheld from the Contractor's final payment until all items on the Punch List have been completed and/or corrected.

The project will be accepted at the discretion of the University Representative based on the extent of the Punch List. The Acceptance Certificate will be subsequently issued to the Contractor by the University.

Unless otherwise required by the University Representative and agreed to by the Contractor, all punch list items will be corrected and/or completed within thirty (30) calendar days of the acceptance date.

#### 1.19 TEMPORARY UTILITIES

The Contractor may use reasonable amounts of the utility services available to the site at no charge from the University. The University will not provide utility service beyond that existing. Coordinate tie-in and disconnect to the existing utilities with the University Representative. Any costs associated with tie-in should be borne by the Contractor.

Locate temporary facilities so as not to interfere with the University's use of the Project site and/or surrounding areas. Relocate non-complying facilities at no expense to the University.

#### 1.20 AS-BUILT DOCUMENTS

Maintain one set of Quoting Documents and Change Orders on the job site for recording changes to the work and as-built conditions as they occur. Upon completion of the work (at the acceptance inspection) present the record set to the University Representative. Provide an electronic copy in pdf format also to the University Representative.

#### 1.21 CLOSE OUT DOCUMENTS

Contractor shall provide all close-out documents to owner at Substantial Completion including list of all subcontractors and manufacturers, labor and material warranties, as-builts, keys, tools, attic stock material, and owner & maintenance manuals for each specification section and/or material/equipment. Provide one hard copy and electronic copy of each to University representative.

#### 1.22 TEMPORARY SANITARY FACILITIES

Existing facilities in the building may be used by construction personnel during work on this project.

#### 1.23 MISCELLANEOUS

Only the General Contractor may erect a job sign: 24" by 36" maximum at a location approved by the University Representative before installation.

**END**

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## SECTION 01040 - CUTTING AND PATCHING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

The General Provisions of the Contract, including General and Supplementary Conditions, and General Requirements apply to the work specified in this Section.

#### 1.2 DESCRIPTION OF WORK

- A. Furnish all labor, materials, tools, and equipment, and perform all operations necessary for cutting and patching work indicated or specified.
- B. Definition: "Cutting-and-Patching" is hereby defined to include but is not necessarily limited to the cutting and patching of nominally completed and previously existing work, in order to accommodate the coordination of the work, or to uncover other work for access or inspection, or to obtain samples for testing, or for similar purposes; and is defined to exclude integral cutting-and-patching during the manufacturing, fabricating, erecting and installing process for individual units of work. Drilling the work to install fasteners and similar operations are excluded from the definition of cutting-and-patching.

#### 1.3 QUALITY ASSURANCE

- A. Requirements for Structural Work

General: Do not cut-and-patch work in a manner resulting in a reduction of load-carrying capacity or load/deflection ratio. Do not cut or core existing concrete joists or beams.

- B. Visual Requirements

General: Do not cut-and-patch work which is exposed on the exterior or exposed in occupied spaces of the building, in a manner resulting in a reduction of visual qualities or resulting in substantial evidence of the cut-and-patch work, both as judged solely by the University Representative. Remove and replace work judged by the University Representative to be cut-and-patched in a visually unsatisfactory manner. All concrete shall be saw cut and removed back to nearest expansion joint.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

General: Except as otherwise indicated or approved by the University Representative, provide materials for cutting-and-patching which will result in equal-or-better work than the work being cut-and-patched, in terms of performance characteristics and including visual effect where applicable. Comply with the original materials where feasible and where recognized that satisfactory results can be produced thereby. Provide matching ceiling tile where existing tile is damaged.

### PART 3 - EXECUTION

#### CUTTING AND PATCHING

June 19, 2026

### 3.1 PREPARATION

- A. Temporary Support: Provide adequate temporary support for work to be cut, to prevent failure. Do not endanger other work.
- B. Protection: Provide adequate protection of other work during cutting-and-patching, to prevent damage; and provide protection of the work from adverse weather exposure.

### 3.2 CUTTING AND PATCHING

- A. Employ skilled tradesmen to perform cutting and patching. Except as otherwise indicated or approved by the University Representative, proceed with cutting-and-patching at the earliest feasible time, in each instance, and perform the work promptly.
- B. Cut work by methods least likely to damage work to be retained and work adjoining.
- C. Patch with seams that are durable and as invisible as possible. Comply with specified tolerances for the work.
- D. Restore exposed finishes of patched areas; and, where necessary extend finish restoration onto retained work adjoining, in a manner which will eliminate evidence of patching.
- E. Where patch occurs in a smooth painted surface, extend final paint coat over the entire unbroken surface containing the patch, after patched area has received prime and base coats.

END OF SECTION - 01040

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. This Section includes demolition and removal of the following:
  - 1. Selective Demolition: To allow for installation of new work as indicated on drawings.

**1.02 DEFINITIONS**

- A. Remove: Detach items from existing construction and legally dispose of any material away from University Property unless indicated to be re-installed, removed and salvaged or recycled. Items to be reinstalled shall be properly stored.

**1.03 SUBMITTALS**

- A. Schedule of Building Demolition Activities: Indicate detailed sequence of demolition and removal work.
- B. Predemolition Photographs: Show existing conditions of adjoining construction that might be misconstrued as damage caused by building demolition operations. Submit before Work begins.

**1.04 PROJECT CONDITIONS**

- A. Conduct building demolition so the University's operations will not be disrupted.
  - 1. Provide not less than 72 hours' notice to the University Representative of activities that will affect the University's operations.
  - 2. Maintain access to existing exits and other adjacent occupied or used facilities.
    - a. Do not close exits or other occupied or used facilities without written permission from authorities having jurisdiction.
- B. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
  - 1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify the University Representative. Hazardous materials will be removed by the University under a separate contract.
- C. Storage or sale of removed items or materials on-site is not permitted.

**1.05 COORDINATION**

- A. Arrange demolition schedule so as not to interfere with University's on-site operations.

**BUILDING DEMOLITION**

June 19, 2026

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Survey existing conditions and correlate with requirements indicated to determine extent of building demolition required.
- B. If required, request and review Project Record Documents of existing construction provided by the University. The University does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Inventory and record the condition of items to be removed and salvaged.
- D. When unanticipated mechanical, electrical, or structural elements are encountered, investigate and measure the nature and extent of the element. Promptly submit a written report to the University Representative.

#### **3.02 PREPARATION**

- A. Removed and Salvaged Items: Comply with the following:
  - 1. University Representative shall indicate items to be salvaged.
  - 2. Clean salvaged items of dirt and demolition debris.
  - 3. Store items in secure area until delivery to University.

#### **3.03 REPAIRS**

- A. General: Promptly repair damage to adjacent construction caused by building demolition operations.
- B. Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.
- C. Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.

END OF SECTION 02221

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements apply to the work specified in this Section.

**1.2 DESCRIPTION OF WORK**

- A. The work to be done under this heading includes the furnishing of labor, materials, equipment, and service necessary for and reasonably incidental to the proper completion of all mechanical work as shown on the drawings and herein specified.
- B. Visit and examine the job site, and with all authorities concerned in order to become familiar with all existing conditions pertinent to the work to be performed thereon. No additional compensation will be allowed for failure to be so informed. Pay all costs and fees for utility connections.
- C. Materials and equipment shall be new, except where otherwise indicated, of the best quality, with same brand of manufacturer for all similar material.
- D. All work shall be performed in a neat and workmanlike manner, and in accordance with all codes, standards, and requirements of the industry.
- E. In general, provide the installation of piping, fittings, equipment, etc. as required for the boiler and chiller replacement under base bid and the (4) pumps and VFD's under Alternate #1.
- F. Regardless of titles and subdivisions herein employed, consider these specifications as one complete document with General Section applying to all other sections. All bidders are cautioned to read entire specifications and to thoroughly familiarize themselves with all requirements thereof.
- G. Check all specifications and all drawings and bring to attention any conflicts or variations as shown as noted.
- H. Specifications and accompanying drawings apply to all contracts or sub-contracts entered into for supplying material or labor for construction of work specified herein and shown on drawings.
- I. Protect University and University Representatives from any and all damages and expense arising from fulfillment of contract and at completion of work repair all damages done.
- J. For any points which are not clear, or for items and/or details which the Contractor feels are in need of clarification, consult the University Representative before submission of a proposal.
- K. The drawings and the specifications are complementary and what is shown and/or called for on one shall be furnished and installed the same as if shown and/or called for in the other.

**GENERAL MECHANICAL**

- L. In case of discrepancies and/or ambiguities in the drawings and/or in the specifications, the University Representative shall be consulted prior to submission of a proposal. Failure to do so on the part of the successful bidder shall be construed as explicit agreement on his part to abide by the University Representative's decision in such matters.
- M. The word "provide" as used in these Specifications and on the Drawings shall be termed to mean "furnish and install".
- N. If the Contractor notices during the bidding any items of the contract documents which will violate any applicable code, these items shall be brought to the attention of the University Representative before the bid date. Failure to bring these items to the attention of the University Representative shall be construed as explicit agreement that the Contractor has included in his bid price any and all modifications necessary to complete the project in accordance with all applicable codes.

**1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS**

- A. Power wiring for all equipment shall be done under ELECTRICAL SECTION 16010.
- C. Piping penetrations through fire rated partitions/floors shall be fire sealed in accordance with the UL fire resistance directory. The integrity of the fire rating, as indicated on the architectural drawings, shall be maintained.

**1.4 QUALITY ASSURANCE**

- A. The Contractor bidding on this portion of the work must be fully experienced in installations of equal size, complexity, and quality, and must be licensed as a mechanical contractor to perform such work as required by the Louisiana State Legislature, R.S.37:2152-2163.
- B. In bidding he acknowledges that he fully understands the scope of work and design, and has the ability for the contract price to assemble and install the equipment, piping and ductwork shown or specified, so as to mold same into a satisfactory workable system and arrangement.
- C. Contractor shall recognize that a fault or error in his work remains his responsibility regardless of whether such difficulty was discovered after the work had progressed, and shall make corrections at no cost to the Owner.
- D. Adequate and competent constant supervision shall be provided by Contractor to assure that work is done in accordance with good standard practice and workmanship and with intent of drawings and specifications. Contractor shall recognize that amount of information and detail could be provided to contract documents is limitless and could extend into every minute detail and sequence of operations, to a point where only workmen would be required, without drawing on ability, experience and ingenuity of the Contractor.
- E. All work shall be installed in strict accordance, with all existing local and state codes and ordinances, with National Board of Fire Underwriters
- F. This Contractor shall secure all permits and inspections and shall pay all fees and taxes and shall provide University with certificates of approval from agencies having jurisdiction over various phases of work.

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- G. Contractor shall maintain and service all equipment until time of acceptance by University. Contractor shall include all required service access in the installation as required by the manufacturer and governing codes.
- H. Prior to starting any work, the Contractor shall submit a quality assurance plan for approval by the University Representative. In the quality assurance plan, the Contractor shall provide the following information:
  - 1. List of all sub-contractors and equipment suppliers.
  - 2. List of all foreman and job superintendents including job experience for all trades.
  - 3. Construction time schedule demonstrating coordination with other trades and showing detailed time lines for test and balance and commissioning being completed prior to final punch list inspection.

#### 1.5 SUBMITTALS

##### A. Shop Drawings and Submittal Data required:

- 1. Submit to the University Representative for review, complete descriptive information and dimensional data on all items of equipment, materials and accessories, including duct, equipment and sprinkler layouts. Piecemeal submissions shall not be approved. Written approval thereof must be obtained before ordering or installation. The following shall be submitted:

Insulation  
Boiler  
Pumps  
Valves and Fittings

Temperature Controls  
Air Cooled Chiller  
VFD's

- 2. Shop drawings and submittal data shall be considered to be instruments of service only and submitted for the sole purpose of convenience to the Contractor to assist him in the performance of the contract. The University Representative's review of the shop drawings and submittal data shall not supersede these specifications, the accompanying drawings, or the contract terms, unless specifically covered by a properly executed change order, and then only to the extent specifically and explicitly stipulated therein.

- 2. Submit in accordance with requirements of Section 01000.

- B. After completion of project Contractor shall turn over to the University Representative complete operating and maintenance instructions including listing of supply and repair items and locations of places to purchase same.

##### C. Substitutions:

- 1. All material, equipment, methods, and accessories entering into the work under this section of contract are subject to approval or disapproval of the University. Approval of any manufacturer, material, or product shall not constitute a waiver of University's right to demand full compliance with contract requirements, including shape, size, quality and performance.

2. Equality of materials is that established by opinion of University. Decision of University is final.
3. Whenever a material or article of equipment is specified by use of a proprietary name, or by naming the manufacturer or vendor, any material or article which will perform adequately the duties imposed by the design will be considered for substitution, providing it is of equal substance, and function, meets specifications, and is aesthetically acceptable to the University. Refer to Division 1 Sections for approval procedures.
4. Literature, technical data, etc., includes complete data and samples if necessary, with submissions for substitutions. Burden of proof that material offered for substitution is equal, or superior, in construction and efficiency to that named, rests on Contractor, and unless proof is satisfactory to University Representative, substitution will not be approved.

D. See Specifications for "As-Built" requirements.

#### 1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

Take necessary precautions to protect all material, equipment, apparatus and work from damage. Failure to do so to the satisfaction of the University Representative will be sufficient cause for the rejection of the material, equipment or work in question. Contractor is responsible for the safety and good condition of the materials installed until final acceptance by the University.

#### 1.7 JOB CONDITIONS

- A. Accompanying drawings, including plans, details, diagrams, notes, etc., are shown to limit and explain structural conditions, construction requirements, sizes, capacities and method of installation and erection. Structural and other conditions may require certain modifications and adjustments from conditions shown. Such deviations are permissible; however, specific sizes capacities and requirements affecting the satisfactory performance and operation of the installation shall remain unchanged. Make allowance for normal job conditions and interferences.
- B. Whenever it becomes necessary to shift ducts or pipes or to change shape of ducts, such changes shall be referred to University Representative for approval.
- C. Ask for details whenever uncertain about method of installation. Lack of details not requested shall not excuse improper installation and correction shall be responsibility of Contractor.
- D. Schedule and perform all mechanical work to avoid delays to the Contractor and other trades.
- E. In addition to the basic work covered under this contract, the Contractor shall plan and schedule the work to permit continuous operation of essential services of existing facilities. Planning shall also include scheduling necessary interruptions of service on water lines, drain lines, etc., to existing building at times when such interruptions will cause minimum interference with existing routine and services. All such interruptions shall be made only after consultation with the University. This is extremely important since included in the work is a relocation and rerouting of and connecting to existing facilities, piping, etc. No additional compensation will be allowed for failure to be so informed.

#### **GENERAL MECHANICAL**

- F. It is essential that all adjacent areas of the school be kept in operation at all times, except when specific permission is given to contrary. Before any lines or equipment are shut down for disconnecting, tie-ins, or rearranging of services, make arrangements with Architect to do this work at night, or Sunday, or at special time of day or year with length of shutdown agreed upon before work is begun. Contractor to bear any overtime or work costs in the connection.
- G. All piping, cleanouts and covers, and other mechanical items in way of construction or remodeling, shall be rerouted, relocated or otherwise adjusted to work out with such construction or changes shown or specified in any or all of various sections of specifications. Unknown piping that is encountered will be referred immediately to University Representative for method of disposition before continuation of work.

**1.8 GUARANTEE AND SERVICE**

- A. Guarantee all equipment, materials, and workmanship for a period of one (1) year following date of acceptance.
- B. During the period of guarantee any defects in equipment, materials, or workmanship shall be promptly corrected without cost to the University.
- C. Guarantee includes equipment capacity and performance ratings specified without excessive noise levels. Any deficiencies in equipment capacity specified shall be promptly corrected.
- D. Guarantee does not include maintenance items.

**PART 2 - PRODUCTS**

**2.1 TOOLS AND SCAFFOLDING**

Furnish all tools, equipment, scaffolding and other facilities required to properly and expeditiously perform the work.

**2.2 SIPHON PREVENTORS**

Furnish and install on all equipment and fixtures requiring same, backflow preventors or vacuum breakers of a type approved by the Louisiana Health and Human Resources. Water connections to fixtures and equipment shall be made in such a way as to prevent back siphonage when the water supply is out or the pressure drops. Provide reduced pressure type back flow preventors where indicated on drawings or required by Code. They shall be Watts series 900 or Febco Series 825, size as indicated on drawings.

**2.3 SLEEVES AND THIMBLES**

- A. Pipe sleeves - wrought iron or cast iron of sufficient size for piping and installation to be installed in floors, walls below grade, and grade beams where piping passes through.
- B. Thimbles above grade - heavy galvanized steel of proper size to allow freedom of piping and insulation, set in floor or roof slab as work progresses, also to be installed in wall and partitions where piping passes through.

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- C. Thimbles below grade - same as pipe sleeves above.
- D. Sleeves through floors extend 1/4" above finished floor. Caulk around and seal all piping in chases and piping passing through floor slab.
- E. Provide sleeve seals and shields for all pipe penetrations of ground floor slab.
- F. Provide fire-stopping in all pipe penetrations of rated floors and walls.

## 2.4 BUCKS, GROUNDS AND CHASES

- A. Be responsible for proper location and sizes or for any errors or omission in placing same.
- B. Failure to inform the General Contractor promptly of such requirements shall not relieve the Mechanical installer of the responsibility for providing a complete mechanical system.

## 2.5 HANGERS

- A. Horizontal piping above grade without hubs shall be rigidly supported. Distance between pipe supports:
  - 1. 1/2" pipe 6'-0" maximum
  - 2. 3/4" pipe 7'-0" maximum
  - 3. 1" pipe 8'-0" maximum
  - 4. 1 1/4" pipe 9'-0" maximum
  - 5. 1 1/2" pipe and over 10'-0" maximum
- B. Hangers shall be similar to "Split Ring" type.
- C. Metal strap or wire will not be acceptable.
- D. For two or more systems of piping run parallel and with same grade trapeze hangers may be used.
- E. Use #22 gauge galvanized sheet steel saddles between the pipe covering and each pipe hanger on all insulated lines. Saddles shall extend along pipe runs and at least half way up piping on each side.
- F. Rods supporting pipe hangers shall have the following dimensions:

|                   |          |
|-------------------|----------|
| 1/2" to 2" pipe   | 3/8" rod |
| 2-1/2" to 3" pipe | 1/2" rod |
| 4" to 5" pipe     | 5/8" rod |
| 6" pipe           | 3/4" rod |
| 8" through 12"    | 7/8" rod |

Rods for trapeze hangers shall be a minimum of 3/8" and shall have the equivalent cross section, listed above, per pipe supported.

## 2.6 PAINTING AND IDENTIFICATION

### GENERAL MECHANICAL

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- A. Equipment, including pumps, motors, and similar factory fabricated and assembled units shall be furnished with factory applied protective prime coat paint of finished baked enamel. Equipment surfaces damaged during course of construction or shipment shall be refinished by the Contractor.
- B. Uncoated black ferrous piping and fittings shall be cleaned under this section and painted with one coat of enamel paint under PAINTING SECTION 09900. Color of piping shall be selected by University Representative. Hangers and supports shall be coated by dipping or brush painting with one coat of asphalt varnish. Steel frame equipment supports shall be cleaned and painted with one coat of aluminum paint.
- C. Detached motor controllers, disconnects, etc., shall be identified with metal or plastic plates with etched letters to completely identify service of electrical equipment.
- D. Major control and sectionalizing valves shall be identified by means of etched brass plates bracketed to valve handle. Contractor shall prepare schedule of such identifying plates for University Representative's approval.

### **PART 3 - EXECUTION**

#### **3.1 FLASHING AND COUNTERFLASHING**

All pipes and ducts that pass through roof and walls shall run so as not to interfere with the structural system and to permit proper application of base and counterflashing.

#### **3.2 CLEANING, STERILIZING AND PIPING**

- A. When all work has been finally tested, Contractor shall clean all pipes and exposed work.
- B. All pipes shall be free from all obstructions.
- C. All plated and other finished products shall be thoroughly cleaned and polished.
- D. All piping shall be installed so that it may expand and contract freely without damages to equipment, other work, or injury to piping system. All necessary swing joints, expansion joints, or offsets to protect piping, etc., shall be installed whether indicated or not. Piping shall be graded to allow for system drainage.
- E. All piping shall be installed and sized as indicated on plans and be of equivalent materials to piping as hereinafter specified.
- F. All piping shall be installed with runs arranged parallels or perpendicular to walls and ceilings with symmetrical and equal spacings between parallel pipes. Offsets shall be made using factory fittings, bending of piping shall not be accepted.
- G. Notify University Representative a minimum 72 hours prior to enclosing piping in concealed spaces so that piping may be inspected.

#### **3.3 TESTING AND INSTRUCTION**

### **GENERAL MECHANICAL**

- A. Piping shall be tested to pressure hereinafter specified. Where pressures are not mentioned, it shall be understood that testing to 1-1/2 times service conditions, before insulation is applied, will be acceptable. All tests shall be held for a minimum of 24 hours before inspection.
- B. Furnish all necessary gauges, pumps, test plugs, and temporary connections and shall test sections of the building as work progresses.
- C. All new chilled water piping shall be tested to 150 PSI for a period of four hours.
- D. All tests shall be made in the presence of the University Representative or his representative. Where pipes or connections in new piping are found to leak, they shall be made tight and the tests repeated.
- E. Thoroughly check the operation of each item of equipment and controls while testing, without waiting first for the Owner or Architect to complain about their operation. Verify that same are wired correctly and completely, notifying the proper parties for necessary corrections. Thoroughly instruct the Owner's representative in the operation and care of controls, individual equipment, and entire system. Provide training for each equipment item to include recommended maintenance procedures, control adjustments and system installation specifics. The following is the minimum training period for each item of equipment:
  - Chillers – 4 hours
  - Boilers – 4 hours
  - BAS System – 4 hours
  - Pumps – 4 hours
- F. Coordinate with owner provided test and balance Contractor. Provide necessary belts, sheaves, insulation repairs, gauge ports, etc. as required for Owner testing. Mechanical Contractor shall be complete all work 2 weeks prior to substantial completion so that test and balance can be performed prior to substantial completion.

### 3.4 CUTTING AND PATCHING

Cooperate to the fullest extent with all other trades to reduce to a minimum the amount of cutting and patching of other work necessary for this installation. Do not cut or patch the work of other trades but arrange to provide cutting templates in time, or otherwise pay the respective other contractors for changing theirs, to accommodate this work. No cutting into any structural units likely to impair the strength shall be done without the approval of the University Representative.

### 3.5 CLEAN UP

Remove debris, surplus and waste materials, oil, grease or stains resulting from the work performed and leave the premises in a broom clean condition AT THE END OF EACH WORKING DAY. All debris, surplus and waste material shall be removed completely from the job site.

### 3.6 COMMISSIONING

## GENERAL MECHANICAL

- A. Contractor shall install all items of equipment as identified in this specification in strict accordance with manufacturer's requirements (whether identified in this specification or not), shop drawings and contract documents. Start-up of all equipment shall be by manufacturer authorized representative, unless specific equipment is allowed in writing, by the University Representative, to be started up by the installing Contractor. Start-up services shall be provided for as long a period of time as is necessary to insure proper operation of the equipment items. The start-up technician shall conduct all operating tests as required to insure the equipment is operating in accordance with design parameters. Complete testing of all safety and emergency control devices shall be made. The start-up technician shall submit a written report to the University Representative (prior to final punch list inspection) containing all test data recorded as required above and a letter certifying that the equipment is operating properly.
- B. Other specific items of commissioning shall be as follows:
1. Visually inspect insulation system to verify that insulation is continuous and vapor barrier is complete. Verify there is no condensation or hot spots, correct as required.
  2. Thoroughly test all piping systems to insure no leaks are present. Adjust valves, pressure reducing valves, etc., as required by operating characteristics of the system. Set pressures of domestic water systems.
  3. Vibration isolation shall be tested by running equipment and checking deflection of spring isolators. Make adjustments as required. No isolator shall be fully compressed.
  4. Piping shall be checked to insure direction of flow.
  5. Coordinate with section 15950 Contractor to insure mechanical systems operate in accordance with plans and specifications. Heating and cooling modes shall be tested.
  6. Ductwork and hydronic piping test and balancing. See Section 15850.
  7. Provide written reports for all startup and commissioning tests for University Representative review prior to final punch list inspection.

### **3.7 WELDING**

- A. Codes and Standards
1. American Society of Mechanical Engineers (ASME) B31.1
  2. ASME Boiler and Pressure Vessel Code – Section V and IX
  3. American Welding Society (AWS) D10
- B. Qualifications for Welding Work: The fabricator and/or installer shall qualify each welder or welding operator for the welding processes to be used during production and field welding. The performance qualification shall be in accordance with a qualified Welding Procedure Specification (WPS). The WPS shall be governed by the essential variables listed in ASME Section IX and AWS D10.9 as may be applicable for the welding processes for which the welder is being qualified. Provide certification that the welders performing work on this project are qualified in accordance with the WPS, as well as the parameters used in the qualification.

- C. Welds shall be in accordance with ASME and AWS standards as qualified under ASME Section IX. Owner shall employ a testing agency to perform a visual inspection of 5% of the welds in accordance with ASME Section V. The following visual examination indications shall be deemed unacceptable and shall be corrected at Contractor's expense:

1. Cracks on external surfaces
2. Surface undercut greater than 1/32 inch deep.
3. Weld reinforcement greater than specified in ASME Table 127.4.2
4. Lack of fusion on surface
5. Incomplete penetration

Future inspections for failed welds shall be tested at Contractor's expense.

END OF SECTION 15050

**PART 1 GENERAL**

**1.1 WORK SPECIFIED HEREIN**

- A. Furnish all labor, materials, equipment and services necessary for the installation of all insulation as herein described and as indicated on the drawings. The insulation shall be applied by a licensed Insulation Contractor in strict accordance with the best practices of the trade. All insulation material, coverings, adhesive, vapor barriers and tapes shall have a flame spread classification not to exceed 25 and a smoke development not to exceed 50.

**PART 2 PRODUCTS**

**2.1 MANUFACTURERS**

- A. Certain items in this specification are listed by manufacturer and/or manufacturer's model number to establish general style, type, character, and quality of the product desired. Similar items manufactured by other than those listed will be considered, providing submittals are made according to Pre-Bid Approval requirements of Instructions to Proposers Article 3.3.
- B. Where no manufacturer or model number is given, any product meeting performance or design criteria, or referenced trade association standard may be used and Pre-Bid Approval is not required.

**2.2 CHILLED WATER PIPING INSULATION**

- C. All chilled water piping and fittings, including field insulation of chilled water packaged pumping system, shall be insulated with 100% rigid cellular glass molded pipe insulation. Insulation shall have an average density of 8 lb./cu.ft. and shall have a thermal conductivity of 0.31 BTU-in/hr.sq.degrees F. at 50 degrees F. The insulation shall comply with ASTM C 552, Type II furnished in half sections of 24" long. At Contractor's option insulate with 2" thick elastomeric closed cell foam pipe insulation. The R-value shall be 5.7 minimum. Coat the exterior with one coat of vapor retarder mastic suitable for use with elastomeric foam insulation.
- D. Insulation shall be installed with all seams and joints sealed with water proof sealant as recommended by the manufacturer. After sealant is applied insulation shall be secured with 1/2" wide by 0.010" thick stainless steel bands with matching seals. Sealants shall be applied full depth of all joints and shall not be used to fill voids or cracks.
- E. Cover all new insulation with an all purpose jacketing of kraft paper/aluminum foil/vinyl coating construction.
- F. Insulate fittings, flanges and valves with same material and thickness as adjacent piping. Cover insulation with same jacket as adjacent piping.
- G. Insulation shall have the following thickness:

| Pipe Size    | Insulation Thickness |
|--------------|----------------------|
| Up to 1"     | 2"                   |
| 1-1/4" to 4" | 2-1/2"               |
| 5" to 12"    | 3"                   |

- H. Provide one or two layer expansion/contraction joints in accordance with manufacturer's recommendations.

## 2.3 PUMPS

Insulate chilled water pumps with elastomeric closed cell insulation, 1-1/2 inch thick. Seal joints with vapor barrier adhesive. Vapor seal and finish with vapor barrier mastic reinforced with white glass fabric. Insulate the chilled and heating water packaged pump system piping per the chilled and heating water requirements of this section. This includes expansion tanks, air separators, chemical treatment pots and all interconnecting piping.

## 2.4 HEATING WATER PIPING

- A. Insulate heating water piping with glass fiber pipe insulation with factory applied white all service jacket, with self-sealing lap (ASJ-SSL).
- B. Insulate fittings, flanges and valves with performed insulation with PVC premolded one-piece fitting covers, with fiberglass insert. Premolded or shop fabricated glass fiber cover may be used in lieu of above at the Contractor's option. Optional covers to be given a smoothing coat of finishing cement in exposed areas and finished in all areas with Insulation Coating, reinforced with white glass fabric.
- C. Insulation thickness to be as follows:

|                      |    | PIPE SIZES |             |         |
|----------------------|----|------------|-------------|---------|
|                      |    | Up to 2"   | 2-1/2 to 4" | Over 4" |
| Insulation Thickness | 1" | 1-1/2"     | 2"          |         |

- D. Adhere longitudinal laps and butt strips of jacket with factory applied pressure sensitive tape system or stapled on 2-inch centers with monel staples.
- E. Provide inserts of calcium silicate pipe insulation, at each pipe saddle and finish to match adjoining pipe insulation.

## 2.5 EXTERIOR ABOVE GROUND CHILLED WATER PIPING

Insulate exterior chilled water piping, valves and fittings with 2" thick elastomeric closed cell foam pipe insulation. The R-value shall be 5.7 minimum. Coat the exterior with one coat of vapor retarder mastic suitable for use with elastomeric foam insulation. Provide aluminum jacket as described below.

## PART 3 EXECUTION

### 3.1 WORKMANSHIP AND INSTALLATION

- A. All insulation shall be applied per manufacturer's specifications and installation requirements.

- B. Insulation shall be applied over clean dry surfaces after all test have been performed and approved.
- C. Methods of application and other details not specified herein shall be in accordance with manufacturer's recommendations, which shall constitute minimum standards.
- D. Sheet Metal Saddles - 10" long shall be provided on all hangers supporting insulated lines. They shall be fabricated to conform with the outside diameter of the pipe covering and shall be fabricated from 22 gauge sheet iron for pipe through 2-1/2" 20 gauge sheet iron for pipes through 8" and 16 gauge for all pipes over 8".
- E. A rigid insulation material shall be used at each pipe hanger as an insert and the pipe covering shall pass full thickness through the hangers.
- F. On all outdoor piping insulation above ground provide aluminum jacket 0.016 inch thick with longitudinal z-joint secured with preformed 2" wide butt strips, as manufactured by KNAUF, MANVILLE or approved equal. Provide preformed aluminum fitting cover on all fittings.

END OF SECTION 15250

## **PART 1 GENERAL**

### **1.1 RELATED DOCUMENTS**

- A. The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements apply to the work specified in this Section.

### **1.2 DESCRIPTION OF WORK**

- A. The work to be done under this Section includes the furnishing of all labor, tools, materials, equipment and services necessary for and reasonable incidental to the removal and installation of complete mechanical equipment and piping as shown on plans and herein specified, excepting only work and/or materials indicated as being done and/or furnished under other sections.
- B. Contractor shall refer to other Sections of the Specifications which may be applicable to, or associated with this Section.
- C. Contractor shall disconnect and remove the Mechanical equipment (Boiler, Chiller, Pumps, VFD's, etc.) as shown on the drawings.
- D. Contractor shall provide complete installation of piping, equipment and installation of all field mounted accessories.
- E. Miscellaneous piping.

### **1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS**

- A. Provide and install structural supports for equipment. These supports must be checked and coordinated by this Section so that they suit the equipment which is to be supported.
- B. Provide all platforms slabs, lintels and curbs, as directed by this Section, to accommodate the mechanical equipment.

### **1.4 QUALITY ASSURANCE**

These specifications with accompanying drawings, require complete apparatus, fully erected and in successful operating condition. Perform all work in best, most substantial manner.

### **1.5 SUBMITTALS**

- A. Contractor, before beginning work, shall submit dimensional shop drawings for approval of the installation of all piping systems and equipment layouts.
- B. Where the piping installed is of a different configuration and/or routing than that shown on the drawings, Contractor shall assume all responsibility to conform with the intent of the contract documents. The University Representative shall be advised of any changes and deviations for his

approval. The same shall be true for any field modification required because of "on job" construction conditions.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Certain items in this specification are listed by manufacturer and/or manufacturer's model number to establish general style, type, character, and quality of the product desired. Similar items manufactured by other than those listed will be considered, providing submittals are made according to Pre-Bid Approval requirements of Instructions to Bidders.
- B. Where no manufacturer or model number is given, any product meeting performance or design criteria, or referenced trade association standard may be used and Pre-Bid Approval is not required.

### **2.2 PIPING AND FITTINGS**

- A. Furnish and install all piping related to air conditioning systems including chilled water, heating water, and other miscellaneous piping.
- B. All piping shall be installed parallel and square with building lines and shall be sloped to permit drainage, with suitable provision for drainage at all low points.
- C. Piping shall be arranged to maintain headroom and keep passageways clear and where necessary shall be offset to maintain the required clearance and conform with the structural features of the building. Contractor shall determine in advance of construction locations for all piping sleeves, hangers, etc. No allowance will be made for extra due to inaccurate location of sleeves, piping or equipment.
- D. All piping shall have provisions for expansion and contraction with anchorage at each point shown on the plans and/or as required.
- E. Full length pipe shall be used where possible, short lengths and couplings will not be permitted. After cutting, all pipes shall be reamed out to full bore and before erection, all cutting and foreign matter shall be removed from the inside of pipes. Screwed joints shall be made tight without caulking or the use of lead or paint and no lubricant shall be used except flake granite and cylinder oil paste, or approved pipe compound applied to make threaded pipe.
- F. Pipe sleeves shall be provided for the passage of all pipe through walls, floors and partitions.
- G. Welding fittings shall be Tube Turn, Midwest, or approved equal. Use welding elbows at all turns in welded piping, except where bent runs are indicated and except that turns and off-setting to a maximum of 15 degrees mitered. At branch connections, either use welding tees or weld the branches directly into the mains. Use extra heavy couplings in all cases where female threaded openings are required, in welding piping.
- H. Above slab, chilled water, and heating water and 2-1/2" and larger shall be installed using ASTM A53 Grade B Schedule 40 black steel pipe with malleable iron fittings. At Contractor's option size three (3") inches and larger may be flanged or welded. Welded elbows shall be factory made long radius. Provide bronze unions at connections to copper coils. Also, at Contractor's option

## **MECHANICAL SYSTEMS AND PIPING**

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all water piping, above ground, may be installed using grooved mechanical pipe coupling and fittings, with grade "E" gaskets. Piping 2" and smaller shall be ASTM B88 type "L" hard drawn copper with wrought copper sweat fittings.

- I. Install control valves, sensor wells, sockets, flow meters and DP sensors required by Section 15950.
- J. See Section 15900 for valves, fittings, unions, gaskets, bolts and nuts.
- K. See Section 15050 for hangers.
- L. All control, sensor and gauge piping shall be brass or 304 s.s. tubing.
- M. Provide drains at all low piping points and automatic and manual air vents at all high points.

## 2.3 PIPING AND PIPING IDENTIFICATION

All piping at each piece of equipment shall be stencil to show the service and direction of flow. Stencils shall be black on a white background with letters one (1") inch high spaced at approximately forty-eight (48") inches apart by equipment or 10 foot intervals along piping runs.. Pressure-sensitive pipe markers ANSI Standard A 13.1 may be used in lieu of stenciling.

## 2.4 VIBRATION ISOLATION SYSTEMS

- A. Work shall include furnishing, installing and testing all material required and hereinafter called for complete execution of the vibration isolation system. Isolation materials shall not be limited to compressors, convertors, air units, pumps, piping, duct work, fans, etc. All motor-connected equipment shall be considered a source of vibration and shall be isolated to prevent vibration and sound transmission. Isolation equipment, as manufactured by Kinetics, Mason Industries or prior approval equal, shall be used. Specific reference to isolation under equipment headings is to provide additional information by which proper selection of the required isolation may be made. Equipment specification data showing physical size, bearing points, weights per point, rotating speeds and sound power levels generated shall be furnished by the respective equipment supplier to the vibration isolation supplier after equipment submittals have been approved.
- B. All mechanical and sound isolation materials specified herein or shown on drawings shall be provided by a single manufacturer to assure singular responsibility for proper selection, application, installation and performance. Substitution for isolation material specified incorporating non-permanent materials, such as cork, rubber, wood pulp, or thermal fiberglass will not be acceptable. Should no specific material be called out for particular use, all mechanical vibration isolation shall be based upon Chapter 46, A.S.H.R.A.E. Guide-Table 45, "Guide for Selection of Vibration Isolators". Bases, mounts and hangers furnished shall have a nominal deflection equal to the minimum deflection as shown in this guide and shall be furnished on all motor driven equipment requiring isolation as well as piping and duct connected to same.
- C. To assure stability, the spring element to be a large diameter laterally stable spring with load plate and have a lateral stiffness greater than 0.8 times the rated vertical stiffness and be designed to provide up to 50% overload capacity. Each base mount spring shall have a 1" isolation sound pad of elastomeric material.

- D. Isolation shall be stable during starting and stopping of equipment without any transverse or eccentric movement that could damage or adversely affect the equipment or attachments. Isolation systems for floor or ceiling-mounted equipment shall have a maximum lateral motion under start up and shut down of 3/8". Motion in excess shall be corrected by restrained spring-type mounts. Isolators shall be selected for the lowest operating speed of the equipment isolated and shall be located to produce uniform loading and deflection even when equipment weight is not evenly distributed. Static deflection on grade up to 3/8" shall use nominal 1" deflection springs on isolation pads. Static deflection above grade shall use spring isolators with spring deflection based upon ASHRAE Guide Deflection data. The static deflection of the isolation system shall be selected to avoid being in resonance with the disturbing frequency. All spring isolators shall have neoprene sound damping pads separating isolator from structure.
- E. Submittals shall contain a complete schedule of all equipment to be isolated along with the type of isolator, loading per isolator, static deflection, spring diameters and maximum deflection. Should isolation installed fail to perform satisfactorily in preventing the transmission of vibration, the isolation shall be replaced without cost to owner and properly selected isolators shall be installed.
- F. Water pump bases shall consist of a concrete slab cast into a prefabricated inertia base frame assembly designed and supplied by the isolation materials supplier such as CPF inertia base. Frames shall be welded steel channels with a depth greater than 8% of the longest span between isolators, a minimum of 6" thick or as indicated on the drawings, and shall include 1/2" steel reinforcing rods on maximum 8" centers each way. Prelocated equipment anchor bolts shall be included. Spring isolator support brackets shall be welded at the corners of the perimeter channel frame with 1/2" reinforcing rods welded 1-1/2" above bottom of bracket running continuously in two directions between all isolator brackets. Inertia bases used to support horizontally split case pumps shall be wide enough to support pipe elbows and may be rectangular or "T" shaped at manufacturers option.
- G. All piping over 1" in diameter and connected to motor-driven equipment shall be spring hung for a minimum of 3 hangers in each direction. The spring deflection for the hanger shall be the same as the spring deflection for the equipment isolated. Mason Model 30N or Kinetics Model SFH.

## **2.5 VARIABLE FREQUENCY DRIVES**

- A. This specification is to cover a complete Adjustable ( Variable ) Frequency motor Drive (VFD) consisting of a pulse width modulated (PWM) inverter designed for use on a standard NEMA Design B induction motor. It is required that the drive manufacturer have an existing Sales representative exclusively for HVAC products, with expertise in HVAC systems and controls and an independent service organization. The drive manufacturer shall supply the drive and all necessary controls as herein specified. VFD's that are manufactured by a third party and "brand labeled" shall not be acceptable. Drives shall be small form factor type.
- B. The following Referenced Standards shall apply:
  - 1. Institute of Electrical and Electronic Engineers Standard 519-1992, IEEE Guide for Harmonic Content and Control.
  - 2. Underwriters laboratories UL508C.

3. National Electrical Manufacturer's Association (NEMA) ICS 7.0, AC Adjustable Speed Drives.
  4. IEC 16800 Parts 1 and 2.
  5. VFDs and options shall be UL listed as a complete assembly. VFD's that require the customer to supply external fuses for the VFD to be UL listed are not acceptable. The base VFD shall be UL.
- C. Submittals shall include the following information:
1. Outline dimensions, conduit entry locations and weight.
  2. Customer connection and power wiring diagrams.
  3. Complete technical product description include a complete list of options provided.
  4. Compliance to IEEE 519 – harmonic analysis for particular jobsite including total harmonic voltage distortion and total harmonic current distortion (TDD). The VFD manufacturer shall provide calculations; specific to this installation, showing total harmonic voltage distortion is less than 5%. Input line filters shall be sized and provided as required by the VFD manufacturer to ensure compliance with IEEE standard 519. All VFD's shall include a minimum of 5% impedance reactors, no exceptions.
- D. The VFD package as specified herein shall be enclosed in a UL Listed Type 12 enclosure, completely assembled and tested by the manufacturer in an ISO9001 facility. The VFD tolerated voltage window shall allow the VFD to operate from a line of +30% nominal, and -35% nominal voltage as a minimum.
- E. The VFD package as specified herein shall operate between 32 to 104°F continuous, and less than 95% humidity, non-condensing. VFD's that can operate at 104° F intermittently (during a 24 hour period) are not acceptable and must be oversized. Enclosure shall be rated UL type 12 and shall be UL listed as a plenum rated VFD. VFD's without these ratings are not acceptable.
- F. All VFDs shall have the following standard features:
1. All VFDs shall have the same customer interface, including digital display, and keypad, regardless of horsepower rating. The keypad shall be removable, capable of remote mounting and allow for uploading and downloading of parameter settings as an aid for start-up of multiple VFDs.
  2. The keypad shall include Hand-Off-Auto selections and manual speed control. The drive shall incorporate "bumpless transfer" of speed reference when switching between "Hand" and "Auto" modes. There shall be fault reset and "Help" buttons on the keypad. The Help button shall include "on-line" assistance for programming and troubleshooting.
  3. There shall be a built-in time clock in the VFD keypad. The clock shall have a battery back up with 10 years minimum life span. The clock shall be used to date and time stamp faults and record operating parameters at the time of fault. If the battery fails, the VFD shall automatically revert to hours of operation since initial power up. The clock shall also be programmable to control start/stop functions, constant speeds, PID

parameter sets and output relays. The VFD shall have a digital input that allows an override to the time clock (when in the off mode) for a programmable time frame. There shall be four (4) separate, independent timer functions that have both weekday and weekend settings.

4. The VFD's shall utilize pre-programmed application macro's specifically designed to facilitate start-up. The Application Macros shall provide one command to reprogram all parameters and customer interfaces for a particular application to reduce programming time. The VFD shall have two user macros to allow the end-user to create and save custom settings.
5. The VFD shall have cooling fans that are designed for easy replacement. The fans shall be designed for replacement without requiring removing the VFD from the wall or removal of circuit boards. The VFD cooling fans shall operate only when required. To extend the fan and bearing operating life, operating temperature will be monitored and used to cycle the fans on and off as required.
6. The VFD shall be capable of starting into a coasting load (forward or reverse) up to full speed and accelerate or decelerate to setpoint without safety tripping or component damage (flying start).
7. The VFD shall have the ability to automatically restart after an over-current, over-voltage, under-voltage, or loss of input signal protective trip. The number of restart attempts, trial time, and time between attempts shall be programmable.
8. The overload rating of the drive shall be 110% of its normal duty current rating for 1 minute every 10 minutes, 130% overload for 2 seconds. The minimum FLA rating shall meet or exceed the values in the NEC/UL table 430-150 for 4-pole motors.
9. The VFD shall have an integral 5% impedance line reactors to reduce the harmonics to the power line and to add protection from AC line transients. The 5% impedance may be from dual (positive and negative DC bus) reactors, or 5% AC line reactors. VFD's with only one DC reactor shall add AC line reactors.
10. The input current rating of the VFD shall be no more than 3% greater than the output current rating. VFD's with higher input current ratings require the upstream wiring, protection devices and source transformers to be oversized per NEC 430-2.
11. The VFD shall include a coordinated AC transient protection system consisting of 4-120 joule rated MOV's (phase to phase and phase to ground), a capacitor clamp, and 5% impedance reactors.
12. The VFD shall be capable of sensing a loss of load (broken belt / broken coupling) and signal the loss of load condition. The drive shall be programmable to signal this condition via a keypad warning, relay output and/or over the serial communications bus. Relay outputs shall include programmable time delays that will allow for drive acceleration from zero speed without signaling a false underload condition.
13. If the input reference (4-20mA or 2-10V) is lost, the VFD shall give the user the option of either (1) stopping and displaying a fault, (2) running at a programmable preset speed, (3) hold the VFD speed based on the last good reference received, or (4) cause a warning to be issued, as selected by the user. The drive shall be programmable to signal this

condition via a keypad warning, relay output and/or over the serial communication bus.

14. The VFD shall have programmable “Sleep” and “Wake up” functions to allow the drive to be started and stopped from the level of a process feedback signal.

G. All VFDs to have the following adjustments:

1. Three (3) programmable critical frequency lockout ranges to prevent the VFD from operating the load continuously at an unstable speed.
2. Two (2) PID Setpoint controllers shall be standard in the drive, allowing pressure or flow signals to be connected to the VFD, using the microprocessor in the VFD for the closed loop control. The VFD shall have 250 ma of 24 VDC auxiliary power and be capable of loop powering a transmitter supplied by others. The PID setpoint shall be adjustable from the VFD keypad, analog inputs, or over the communications bus. There shall be two parameter sets for the first PID that allow the sets to be switched via a digital input, serial communications or from the keypad for night setback, summer/winter setpoints, etc. There shall be an independent, second PID loop that can utilize the second analog input and modulate one of the analog outputs to maintain setpoint of an independent process (i.e. valves, dampers, etc.). All setpoints, process variables, etc. to be accessible from the serial communication network. The setpoints shall be set in Engineering units and not require a percentage of the transducer input.
3. Two (2) programmable analog inputs shall accept current or voltage signals.
4. Two (2) programmable analog outputs (0-20ma or 4-20 ma). The outputs may be programmed to output proportional to Frequency, Motor Speed, Output Voltage, Output Current, Motor Torque, Motor Power (kW), DC Bus voltage, Active Reference, and other data.
5. Six (6) programmable digital inputs for maximum flexibility in interfacing with external devices, typically programmed as here-in-after described. There shall be a run permissive circuit for damper or valve control. Regardless of the source of a run command (keypad, input contact closure, time-clock control, or serial communications) the VFD shall provide a dry contact closure that will signal the damper to open (VFD motor does not operate). When the damper is fully open, a normally open dry contact (end-switch) shall close. The closed end-switch is wired to an VFD digital input and allows VFD motor operation. Two separate safety interlock inputs shall be provided. When either safety is opened, the motor shall be commanded to coast to stop, and the damper shall be commanded to close. The keypad shall display “start enable 1 (or 2) missing”. The safety status shall also be transmitted over the serial communications bus. All digital inputs shall be programmable to initiate upon an application or removal of 24VDC.
6. Three (3) programmable digital Form-C relay outputs. The relays shall include programmable on and off delay times and adjustable hysteresis. Default settings shall be for run, not faulted (fail safe), and run permissive. The relays shall be rated for maximum switching current 8 amps at 24 VDC and 0.4 A at 250 VAC; Maximum voltage 300 VDC and 250 VAC; continuous current rating 2 amps RMS. Outputs shall be true form C type contacts; open collector outputs are not acceptable.
7. Seven (7) programmable preset speeds.

8. Two independently adjustable accel and decel ramps with 1 – 1800 seconds adjustable time ramps.
  9. The VFD shall include a motor flux optimization circuit that will automatically reduce applied motor voltage to the motor to optimize energy consumption and audible motor noise.
  10. The VFD shall include a carrier frequency control circuit that reduces the carrier frequency based on actual VFD temperature that allows the highest carrier frequency without derating the VFD or operating at high carrier frequency only at low speeds.
  11. The VFD shall include password protection against parameter changes.
- H. The Keypad shall include a backlit LCD display. The display shall be in complete English words for programming and fault diagnostics (alpha-numeric codes are not acceptable). The keypad shall utilize the following assistants:
1. Start-up assistants.
  2. Parameter assistants
  3. Maintenance assistant
  4. Troubleshooting assistant
- I. All applicable operating values shall be capable of being displayed in engineering (user) units. A minimum of three operating values from the list below shall be capable of being displayed at all times. The display shall be in complete English words (alpha-numeric codes are not acceptable):
1. Output Frequency
  2. Motor Speed (RPM, %, or Engineering units)
  3. Motor Current
  4. Calculated Motor Torque
  5. Calculated Motor Power (kW)
  6. DC Bus Voltage
  7. Output Voltage
- J. The VFD shall include a fireman's override input. Upon receipt of a contact closure from the fireman's control station, the VFD shall operate at an adjustable preset speed. The mode shall override all other inputs (analog/digital, serial communication, and all keypad commands) and force the motor to run at the adjustable, preset speed. "Override Mode" shall be displayed on the keypad. Upon removal of the override signal, the VFD shall resume normal operation.

K. Serial Communications

1. The VFD shall have an RS-485 port as standard. The standard protocols shall be Modbus, Johnson Controls N2 bus, and Siemens Building Technologies FLN. Optional protocols for LonWorks, BACnet, Profibus, Ethernet, and DeviceNet shall be available. Each individual drive shall have the protocol in the base VFD. The use of third party gateways and multiplexers is not acceptable. All protocols shall be “certified” by the governing authority. Use of non-certified protocols is not allowed.
2. The BACnet connection shall be an RS485, MSTP interface operating at 9.6, 19.2, 38.4, or 76.8 Kbps. The connection shall be tested by the BACnet Testing Labs (BTL) and be BTL Listed. The BACnet interface shall conform to the BACnet standard device type of an Applications Specific Controller (B-ASC). The interface shall support all BIBBs defined by the BACnet standard profile for a B-ASC including, but not limited to:
  - a. Data Sharing – Read Property – B.
  - b. Data Sharing – Write Property – B.
  - c. Device Management – Dynamic Device Binding (Who-Is; I-AM).
  - d. Device Management – Dynamic Object Binding (Who-Has; I-Have).
  - e. Device Management – Communication Control – B.

If additional hardware is required to obtain the BACnet interface, the VFD manufacturer shall supply one BACnet gateway per drive. Multiple VFDs sharing one gateway shall not be acceptable.

3. Serial communication capabilities shall include, but not be limited to; run-stop control, speed set adjustment, proportional/integral/derivative PID control adjustments, current limit, accel/decel time adjustments, and lock and unlock the keypad. The drive shall have the capability of allowing the DDC to monitor feedback such as process variable feedback, output speed / frequency, current (in amps), % torque, power (kW), kilowatt hours (resettable), operating hours (resettable), and drive temperature. The DDC shall also be capable of monitoring the VFD relay output status, digital input status, and all analog input and analog output values. All diagnostic warning and fault information shall be transmitted over the serial communications bus. Remote VFD fault reset shall be possible. The following additional status indications and settings shall be transmitted over the serial communications bus – keypad “Hand” or “Auto” selected, bypass selected, the ability to change the PID setpoint, and the ability to force the unit to bypass (if bypass is specified). The DDC system shall also be able to monitor if the motor is running in the VFD mode or bypass mode over serial communications. A minimum of 15 field parameters shall be capable of being monitored.
4. The VFD shall allow the DDC to control the drive’s digital and analog outputs via the serial interface. This control shall be independent of any VFD function. For example, the analog outputs may be used for modulating chilled water valves or cooling tower bypass valves. The drive’s digital (relay) outputs may be used to actuate a damper, open a valve or control any other device that requires a maintained contact for operation. In addition, all of the drive’s digital and analog inputs shall be capable of being monitored by the DDC system.
5. The VFD shall include an independent PID loop for customer use. The independent PID loop may be used for cooling tower bypass value control, chilled water value control, etc. Both the VFD control PID loop and the independent PID loop shall continue functioning

even if the serial communications connection is lost. The VFD shall keep the last good set-point command and last good DO & AO commands in memory in the event the serial communications connection is lost.

- L. All VFD's shall include EMI/RFI filters. The onboard filters shall allow the VFD assemble to be CE Marked and the VFD shall meet product standard EN 61800-3 for the First Environment restricted level.
- M. All VFD's through 50HP shall be protected from input and output power mis-wiring. The VFD shall sense this condition and display an alarm on the keypad.
- N. The following additional features shall be furnished and mounted by the drive manufacturer. All additional features shall be UL Listed by the drive manufacturer as a complete assembly and carry a UL508 label.
  - 1. A complete factory wired and tested bypass system consisting of an output contactor and bypass contactor. Overload protection and shall be provided in both drive and bypass modes.
  - 2. Door interlocked, padlockable circuit breaker that will disconnect all input power from the drive and all internally mounted options.
  - 3. Fused VFD only disconnect (service switch). Fast acting fuses exclusive to the VFD – fast acting fuses allow the VFD to disconnect from the line prior to clearing upstream branch circuit protection, maintaining bypass capability. Bypass designs, which have no such fuses, or that incorporate fuses common to both the VFD and the bypass will not be accepted. Three contactor bypass schemes are not acceptable.
  - 4. The drive / bypass shall provide single-phase motor protection in both the VFD and bypass modes.
  - 5. The following operators shall be provided:
    - a. Bypass Hand-Off-Auto
    - b. Drive mode selector
    - c. Bypass mode selector
    - d. Bypass fault reset
  - 6. The following indicating lights (LED type) shall be provided. A test mode or push to test feature shall be provided.
    - a. Power-on (Ready)
    - b. Run enable (safeties) open
    - c. Drive mode select damper opening
    - d. Bypass mode selected
    - e. Drive running
    - f. Bypass running
    - g. Drive fault
    - h. Bypass fault
    - i. Bypass H-O-A mode
    - j. Automatic transfer to bypass selected

- k. Safety open
  - l. Damper opening
  - m. Damper end-switch made
7. The following relay (form C) outputs from the bypass shall be provided:
- a. System started
  - b. System running
  - c. Bypass override enabled
  - d. Drive fault
  - e. Bypass fault (motor overload or underload (broken belt))
  - f. Bypass H-O-A position
8. The digital inputs for the system shall accept 24V or 115VAC (selectable). The bypass shall incorporate internally sourced power supply and not require an external control power source.
9. Customer Interlock Terminal Strip – provide a separate terminal strip for connection of freeze, fire, smoke contacts, and external start command. All external safety interlocks shall remain fully functional whether the system is in Hand, Auto, or Bypass modes (not functional in Fireman's Override 2). The remote start/stop contact shall operate in VFD and bypass modes.
10. Dedicated digital input that will transfer motor from VFD mode to bypass mode upon dry contact closure for fireman's override. Two modes of operation are required.
- a. One mode forces the motor to bypass operation and overrides both the VFD and bypass H-O-A switches and forces the motor to operate across the line (test mode). The system will only respond to the digital inputs and motor protections.
  - b. The second fireman's override mode remains as above, but will also defeat the overload and single-phase protection for bypass and ignore all keypad and digital inputs to the system (run until destruction).
11. The VFD shall include a "run permissive circuit" that will provide a normally open contact whenever a run command is provided (local or remote start command in VFD or bypass mode). The VFD system (VFD or bypass) shall not operate the motor until it receives a dry contact closure from a damper or valve end-switch. When the VFD system safety interlock (fire detector, freeze stat, high static pressure switch, etc) opens, the motor shall coast to a stop and the run permissive contact shall open, closing the damper or valve.
12. Class 20 or 30 (selectable) electronic motor overload protection shall be included.
13. There shall be an internal switch to select manual or automatic bypass.
14. There shall be an adjustable current sensing circuit for the bypass to provide loss of load indication (broken belt) when in the bypass mode.

O. Installation shall be the responsibility of the mechanical contractor. The contractor shall install the drive in accordance with the recommendations of the VFD manufacturer as outlined in the

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installation manual. Power wiring shall be completed by the electrical contractor. The contractor shall complete all wiring in accordance with the recommendations of the VFD manufacturer as outlined in the installation manual.

- P. Certified factory start-up shall be provided for each drive by a factory authorized service center. A certified start-up form shall be filled out for each drive with a copy provided to the owner, and a copy kept on file at the manufacturer.
- Q. Factory trained application engineering and service personnel that are thoroughly familiar with the VFD products offered shall be locally available. A 24/365 technical support line shall be available on a toll-free line. A computer based training CD or 8-hour professionally generated video (VCR format) shall be provided to the owner at the time of project closeout. The training shall include installation, programming and operation of the VFD, bypass and serial communication.

## **2.6 CLOSE COUPLED END SUCTION PUMPS**

### **General Description**

The Contractor shall supply materials, equipment and labor to furnish, install and test the pumping system complete with the pumps, motors, mounting bases, piping, valves and accessories, as indicated on the contract drawings and following the instructions specified by the manufacturer. The Contractor shall ensure that the pumps and motors are properly installed and checked in accordance with the standard of the Hydraulic Institute and there shall be no undue pipe strain transmitted to the pump casing.

### **Product**

The pump shall be a centrifugal horizontal close-coupled end suction pump, suitable for operation with a VFD, Pentair Aurora Model 3801 or pre-approved equal with following characteristics and materials of construction:

Pump volute shall be Ductile Iron (ASTM A536) with integrated foot to support the volute and allow back pullout feature. Pump shall include gauge tappings at the suction and discharge flanges and vent and drain tappings at top, bottom and side of the volute. Simple design with no center drop out spacer coupling needed to disassemble the rotating elements without disturbing the casing or suction, the discharge piping, and the electrical motor connections.

Impeller shall be of enclosed type Stainless Steel (ASTM A743 Type 316), finished all over, the exterior being turned and the interior being finished smooth and cleaned of all burrs, trimmings, and irregularities. Impeller shall be dynamically balanced to ANSI/HI 9.6.4 balance grade G6.#, keyed to the shaft, and fastened with a washer, gasket and cap screw.

Pump internal design shall include a self-flushing Mechanical seal with Stainless Steel (ASTM 303) metal parts, Buna-N elastomers parts, Ceramic seat and Carbon washer suitable for continuous operation at 225°F (107°C). Pump shall be equipped with a Steel (AISI C1045) shaft and fitted with a replaceable Stainless Steel 316 ASTM shaft sleeve to minimize shaft wear. The sleeve shall be sealed to the impeller hub by an O-ring, and shall be positively driven by a pin to the keyway. The use of adhesive compounds to fasten the sleeve to the shaft shall not be accepted.

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Pump seal plate and motor bracket shall be of a two piece design, and shall provide an adequate area for internal recirculation of the pumped fluid around the sealing medium.

Pumps shall be able to handle 175 PSI working pressure.

The pump and motor shall be able mount on a concrete foundation base using bolt or lag screws into threaded inserts to allow removal of the drive motor without disturbing the pump liquid end or the piping.

Motor(s) shall be a NEMA configuration in accordance with the latest NEMA Standards, premium efficient, and shall have a sufficient horsepower rating to operate the pump at any point within the manufacturer's recommended operating range on the pump's head-capacity curve without overloading the nameplate horsepower rating of the motor, regardless of service factor. The motor shall have a service factor of at least 1.15. The service factor is reserved for variations in voltage and frequency. The motor shall be inverter duty rated.

Each centrifugal pump furnished under these specifications shall be tested at the factory to Verify Individual Performance (VIP). Certified copies of all test reports shall be submitted to the Engineer for approval prior to shipment. Each unit shall be hydrostatically tested in accordance with the Hydraulic Institute Standards.

Pump manufacturer warranty shall be for a period of five (5) years from the date of installation or start-up, or for five (5) years after the date of shipment, whichever comes first.

Pump(s) shall be manufactured, assembled and tested in an ISO 9001 approved facility.

After January 27, 2020 all pumps must be compliant with the Department of Energy (DOE) New Standard (PEI of 1 or less) and include all new mandatory information on the nameplate.

Pumps shall be 3801 Series a manufactured by Pentair Aurora, Bell & Gossett, or equal.

The pump and motor shall be mounted on a groutable formed steel baseplate with integral drip channels incorporated on each side. Each channel shall include an NPT drain connection and plug. The base shall be sufficiently rigid to support the pump and the motor without the use of additional supports or members.

The pumping units shall be installed in accordance with the instructions of the manufacturer and as shown on the drawings by the Contractor.

Installation shall include furnishing the required oil and grease for initial operation. The grades of oil and grease shall be in accordance with the manufacturer's recommendations.

## **2.7 HEATING WATER BOILERS**

### **WARRANTY**

- A. The boiler shall come with the warranties stated below. Warranty period shall be one (1) year from date of substantial completion.
  - 1. Primary copper-fin tube heat exchanger: 5-year limited warranty, and a 20-year warranty against thermal shock.

2. Secondary 316L heat exchanger: 3-year limited warranty
3. Burner: 10-year limited warranty.
4. All other parts: 1-year limited warranty.

#### **ACCEPTABLE MANUFACTURERS**

- A. Aerco. Thermal Solutions. Refer to the Equipment Schedule in the Contract Drawings for the specific design and performance criteria.
- B. 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.

#### **GENERAL REQUIREMENTS**

- A. Boiler
  1. The boiler shall be a factory-packaged unit, complete with jacket, gas manifold, burner and controls mounted and wired, as specified in this Section. The boiler shall be factory assembled and fire tested. Boiler connections shall be limited to the water supply & return, relief valve and boiler drains, fuel input, electrical power, exhaust vent and air inlet (as specified/shown in contract documents).
  2. The boiler shall be constructed in conformance to ASME Section IV and UL 795. The boiler shall bear the ASME “H” stamp and be National Board Listed for 160 psi working pressure and 250°F. The gas train and safety controls shall conform to requirements of UL 795 and ASME CSD-1.
  3. The complete boiler shall be factory fire tested by the manufacturer and a copy of the fire-test report shall be supplied with the boiler.
  4. The boiler primary heat exchanger shall be constructed in accordance with Section IV of the ASME code with straight copper tubes having extruded, integral fins. Fin spacing shall be at least seven (7) fins per inch. Each copper tube shall have a minimum wall thickness of .072”. All tubes shall be rolled securely into cast iron headers (top and bottom). There shall be no bolts, gaskets or “O-Rings” used in the header construction. Removable access plugs shall be included in the design of the heat to allow for access (cleaning and inspection) and replacement of each individual tube. The heat exchanger shall encompass the entire burner and be enclosed in stainless steel inner shells.
  5. The secondary heat exchanger material shall be made of 316L stainless steel. All condensing in the boiler shall take place in a secondary heat exchanger. Proper condensate removal provisions shall be incorporated in the design to properly remove and drain all condensate emitted from the boiler.
  6. The boiler shall be contained in a minimum 16-gauge negative pressure steel jacket protected with a powder-coated finish. The boiler control panel shall be non-pressurized allowing boiler operation with any jacket panels removed.

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Hinge-less front and rear access panels shall be provided for easy access to the operating controls and eliminate electrical code “swing radius” clearance issues.

7. The operating sound level for the boiler shall not exceed 50 dBA.
8. Electrical input to the boiler shall be 208v/3ph. The manufacturer will mount the control transformer and fuses inside the boiler control panel. Single-point electrical hook-up for the boiler shall be provided. Separate power wiring and control wiring is not acceptable. A dedicated electrical disconnect shall be provided.

**B. Combustion System**

1. The burner shall be a radiant non-corroding ceramic burner, with no moving parts. Double-meshed screen, fiber-metal mats, aluminized or stainless steel construction of the burner will not be accepted. The burner shall fire in a full 360-degree pattern providing uniform heat transfer across the entire heat exchanger. A viewing port shall be provided for visual observation of burner performance. Burner shall require no maintenance, inspection or service.
2. Burner operation shall provide infinite Modulation with minimum 3:1 turn down utilizing a Variable Frequency Drive and air-fuel ratio control gas valve for dependable, repeatable modulation and precise combustion control. The boiler will be equipped with a non-sparking blower manufactured with a cast-aluminum housing. Dampers, linkages or a single-speed fan are not acceptable.
3. An interrupted-type mixed fuel/air pilot system with electric spark-to-pilot ignition shall be used. The pilot system shall use a UV scanner to prove pilot prior to energizing the main gas valves. Hot surface ignition systems and flame rods are not acceptable.
4. The entire ignition and firing control sequence shall be monitored by a UL approved commercial-type microprocessor based integrated flame safeguard burner control with first out fault annunciation and operating sequence and diagnostic indicator lights. The burner control shall incorporate both pre-purge and post-purge timing functions. In the event of ignition pilot and/or main flame failure a burner “lockout” will occur requiring a manual reset of the burner control.
5. The combustion air blower shall be equipped with a replaceable combustion air filter, 99% efficient to one micron to protect the burner from contamination. A delta-P type pressure switch shall be provided to alert the boiler operator of a dirty filter condition. Air inlet dampers and vacuum relief dampers are not required for proper operation. A combustion airflow switch shall be provided.

The gas train shall be UL/FM/CSD-1 compliant and capable of accepting up to 5 psi Natural Gas. Additional step-down regulators are not allowed. The gas train shall consist of a pilot gas pressure regulator, high and low gas pressure switches (each with manual reset), automatic main and redundant gas valve - leak test valves downstream of each gas valve, a manual shut off valve upstream of burner and downstream of last gas valve. The main gas valve shall perform the functions of safety shutoff, constant pressure regulation and air-fuel ratio control.

C. Operating Control

1. The boiler shall be equipped with an onboard microprocessor based Electronic Control Module (ECM) featuring a 2-line, 16-character LCD display and user-friendly menu selections. All safety, operating and ignition controls shall be integrated in the ECM. The ECM shall include a diagnostic menu that provides an alarm history of the last ten (10) alarm messages and a low boiler inlet water temperature alarm history. The ECM shall have a user-friendly menu that allows easy selection of desired operating temperature, upper and lower temperature set-point limits, burner on/off thresholds PID control loop characteristics and local or remote operating modes. The ECM shall have an outdoor temperature reset function to allow the boiler operating temperature to vary based on outdoor air temperature. The ECM shall be capable of accepting a 0-10 vdc remote signal for changing temperature set-points and/or remote modulation control. Operating variables such as boiler inlet & outlet water temp, remote system temp, outdoor air temp, firing rate set-point, modulating percent and mixing valve demand percent are accessible on the display. The display shall also automatically present boiler sequence messages, alarms, and hold and lockout messages. Design features of the ECM shall include multi-level password security, outdoor temperature reset and DHW prioritization. The ECM shall provide for control of a dedicated boiler pump, up to two system pumps and a mixing valve to insure proper inlet water temperature to the boiler. The EMC shall be capable of providing peer-to-peer communication and lead/lag sequencing control (with auto rotation) of up to eight (8) boilers using standard RJ11 phone cables. The ECM shall also be capable of communicating with a BAS/BMS, use TSCG for BACnet communication protocol.

D. Water Trim

1. Water trim devices including an ASME rated pressure relief valve set at 150 psig combination water pressure and temperature gage (furnish graduated pressure gauge scale from 1-1/2 to 3 times of pressure relief valve setting) and water flow switch to prevent burner operation during low water flow conditions shall be provided in the boiler outlet piping. An adjustable high limit temperature controller with manual reset to prevent water temperature from exceeding a safe system temperature and an Auxiliary Low Water Cutoff to provide redundant low water protection shall both be provided.

E. Vent & Intake Air Connections

1. The boiler shall be designed to accommodate sealed, direct, or conventional venting options. The flue duct shall be AL 29-4C, positive pressure type vent material. Single wall vent is acceptable where allowed by local code.
2. Barometric dampers are to be used only on multiple boiler installations where the individual vents are combined into a common vent.

3. When used for sealed combustion, air intake piping can be PVC or galvanized smoke pipe that is sealed and pressure tight. Pipe must be at least the same size as the inlet air connection on the boiler.
4. Intake dampers and vacuum relief dampers are not required for sealed combustion/direct venting. Vacuum relief dampers can violate the intent of sealed combustion/direct vent applications.

#### **PERFORMANCE**

- A. Boiler efficiency shall be as stated in the Equipment Schedule of the Contract Documents.
- B. The burner shall emit no more than 9 ppm NOx and 50 ppm CO (corrected to 3% O<sub>2</sub>) 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.

#### **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. 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.

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- 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.

## 2.9 Air Cooler Chiller

### Scope

- A. Provide Microprocessor controlled, multiple scroll compressor, air-cooled, liquid chiller of the scheduled capacities as shown and indicated on the Drawings, including but not limited to:
  - 1. Chiller Package
  - 2. Charge of refrigerant and oil
  - 3. Electrical power and control connections
  - 4. Chilled liquid connections
  - 5. Manufacture start-up

### Quality Assurance

- A. Products shall be Designed, Tested, Rated and Certified in accordance with, and Installed in compliance with applicable sections of the following Standards and Codes:
  - 1. AHRI 550/590 – Water Chilling Packages Using the Vapor Compression Cycle
  - 2. AHRI 370 – Sound Rating of Large Outdoor Refrigerating and Air-Conditioning Equipment
  - 3. ANSI/ASHRAE 15 – Safety Code for Mechanical Refrigeration
  - 4. ANSI/ASHRAE 34 – Number Designation and Safety Classification of Refrigerants
  - 5. ASHRAE 90.1 – Energy Standard for Buildings Except Low-Rise Residential Buildings
  - 6. ANSI/NFPA 70 – National Electrical Code (N.E.C.)
  - 7. ASME Boiler and Pressure Vessel Code, Section VIII, Division 1
  - 8. OSHA – Occupational Safety and Health Act
  - 9. Manufactured in facility registered to ISO 9001
  - 10. Conform to Intertek Testing Services for construction of chillers and provide ETL/cETL Listed Mark

- B. Factory Run Test: Chiller shall be pressure-tested, evacuated and fully charged with refrigerant and oil, and shall be factory operational run tested with water flowing through the vessel.
- C. Chiller manufacturer shall have a factory trained and supported service organization.
- D. Warranty: Manufacturer shall Warrant all equipment and material of its manufacture against defects in workmanship and material for a period of eighteen (18) months from date of shipment or twelve (12) months from date of start-up, whichever occurs first. Chiller shall have 5-year parts, labor and refrigerant warranty on entire unit

#### **DELIVERY AND HANDLING**

- A. Unit shall be delivered to job site fully assembled with all interconnecting refrigerant piping and internal wiring ready for field installation and charged with refrigerant and oil by the Manufacturer.
- B. Provide protective covering over vulnerable components for unit protection during shipment. Fit nozzles and open ends with plastic or fabric enclosures.
- C. Unit shall be stored and handled per Manufacturer's instructions.

#### **CHILLER MATERIALS AND COMPONENTS**

- A. General: Install and commission, as shown on the schedules and plans, factory assembled, charged, and tested air cooled scroll compressor chiller(s) as specified herein. Chiller shall be designed, selected, and constructed using a refrigerant with Flammability rating of "1", as defined by ANSI/ASHRAE STANDARD 34 Number Designation and Safety Classification of Refrigerants. Chiller shall include not less than two refrigerant circuits above 50 tons (200kW), scroll compressors, direct-expansion type evaporator, air-cooled condenser, refrigerant, lubrication system, interconnecting wiring, safety and operating controls including capacity controller, control center, motor starting components and special features as specified herein or required for safe, automatic operation.
- B. Cabinet: External structural members shall be constructed of heavy guage, galvanized steel coated with baked on powder paint which, when subject to ASTM B117, 1000 hour, 5% salt spray test, yields minimum ASTM 1654 rating of "6".
- C. Operating Characteristics: Provide low and high ambient temperature control options as required to ensure unit is capable of operation from 30°F to 115°F (-1°C to 46°C) ambient temperature. [Optional: -10°F to 125°F (-23°C to 52°C) ambient.]
- D. Service Isolation valves: Discharge (ball type) isolation valves factory installed per refrigerant circuit. Includes a system high-pressure relief valve in compliance with ASHRAE15.
- E. Pressure Transducers and Readeout Capability

1. Discharge Pressure Transducers: Permits unit to sense and display discharge pressure.
2. Suction Pressure Transducers: Permits unit to sense and display suction pressure.
3. High Ambient Control: Allows units to operate when the ambient temperature is above 115°F (46°C). Includes discharge pressure transducers

## **COMPRESSORS**

A. Compressors: Shall be hermetic, scroll-type, including:

1. Compliant design for axial and radial sealing.
2. Refrigerant flow through the compressor with 100% suction cooled motor.
3. Large suction side free volume and oil sump to provide liquid handling capability.
4. Compressor crankcase heaters to provide extra liquid migration protection.
5. Annular discharge check valve and reverse vent assembly to provide low-pressure drop, silent shutdown and reverse rotation protection.
6. Initial oil charge.
7. Oil level sight glass.
8. Vibration isolator mounts for compressors.
9. Brazed-type connections for fully hermetic refrigerant circuits.
10. Compressor Motor overloads capable of monitoring compressor motor current. Provides extra protection against compressor reverse rotation, phase-loss and phase-imbalance.

## **REFRIGERANT CIRCUIT COMPONENTS**

- A. Each refrigerant circuit shall include: a discharge service ball type isolation valve, high side pressure relief, liquid line shutoff valve with charging port, low side pressure relief device, filter-drier, solenoid valve, sight glass with moisture indicator, thermostatic expansion valves, and flexible, closed-cell foam insulated suction line and suction pressure transducer and hot gas bypass.

## HEAT EXCHANGERS

### A. Evaporator:

1. Evaporator shall be brazed-plate stainless steel construction capable of refrigerant working pressure of 650 psig (3103 kPa) and liquid side pressure of 150 psig (1034 kPa) [Option for 300 psig (2068 kPa) available].
2. Brazed plate heat exchangers shall be UL listed.
3. Exterior surfaces shall be covered with 3/4" (19mm), flexible, closed cell insulation, thermal conductivity of 0.26k ([BTU/HR-Ft<sup>2</sup> - °F]/in.) maximum.
4. Water nozzles shall be provided with grooves for field provided ANSI/AWWA C-606 mechanical couplings.
5. Evaporator shall include vent and drain fittings and thermostatically controlled heaters to protect to -20°F (-29°C) ambient in off-cycle.
6. A serviceable wye-strainer and mechanical couplings shall be provided for field installation on evaporator inlet prior to startup.
7. Evaporator shall be provided with piping extension kit and mechanical couplings to extend liquid connection from evaporator to edge of unit. Thermal dispersion type flow switch shall be factory installed in the evaporator outlet pipe extension and wired to the unit control panel. Insulation and heat trace on piping shall be responsibility of installing contractor. Extension kit nozzle connections shall be ANSI/AWWA C-606 (grooved).

### B. Air-cooled Condenser:

1. Coils: Condenser coils shall be constructed of a single material to avoid galvanic corrosion due to dissimilar metals. Coils and headers are brazed as one piece and coated with a post coated Environmental Guard. Integral sub cooling is included. Coils shall be designed for a design working pressure of 650 PSIG (45 bar). Condenser coil shall be washable with potable water under 100 psi (7 bar) pressure.
2. Low Sound Fans: Shall be dynamically and statically balanced, direct drive, corrosion resistant glass fiber reinforced composite blades molded into a low noise, full-airfoil cross section, providing vertical air discharge and low sound. Each fan shall be provided in an individual compartment to prevent crossflow during fan cycling. Guards of heavy gauge, PVC (poly- vinylchloride) coated or galvanized steel shall be factory installed.
3. Fan Motors: High efficiency, direct drive, 6 pole, 3 phase, insulation class "F", current protected, Totally Enclosed Air-Over (TEAO) , rigid mounted, with double sealed, permanently lubricated, ball bearings.

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4. Low Sound Fans with Variable Speed Drives. All fans shall be powered by VSDs. Fans shall provide vertical air discharge from extended orifices. Fans shall be composed of corrosion resistant aluminum hub and glass-fiber-reinforced polypropylene composite blades molded into a low-noise airfoil section. Fan impeller shall be dynamically balanced for vibration-free operation. Fan guards of heavy gauge, PVC (polyvinyl chloride) coated or galvanized steel.

## CONTROLS

- A. General: Automatic start, stop, operating, and protection sequences across the range of scheduled conditions and transients.
- B. Power/Control Enclosure: Rain and dust tight NEMA 3R powder painted steel cabinet with hinged, latched, and gasket sealed door.
- C. Microprocessor Control Center:
  - 1. Automatic control of compressor start/stop, anti-coincidence and anti-recycle timers, automatic pumpdown at system shutdown, condenser fans, evaporator pump, evaporator heater, unit alarm contacts, and chiller operation from -10°F to 125°F (-23°C to 52°C) ambient. Automatic reset to normal chiller operation after power failure.
  - 2. Software stored in non-volatile memory, with programmed setpoints retained in lithium battery backed real-time-clock (RTC) memory for minimum 5 years.
  - 3. Forty character liquid crystal display, descriptions in English (or Spanish, French, Italian, or German), numeric data in English (or Metric) units. Sealed keypad with sections for Setpoints, Display/Print, Entry, Unit Options & clock, and On/Off Switch.
  - 4. Programmable Setpoints (within Manufacturer limits): display language; chilled liquid temperature setpoint and range, remote reset temperature range, daily schedule/holiday for start/stop, manual override for servicing, low and high ambient cutouts, low liquid temperature cutout, low suction pressure cutout, high discharge pressure cutout, anti-recycle timer (compressor start cycle time), and anti-coincident timer (delay compressor starts).
  - 5. Display Data: Return and leaving liquid temperatures, low leaving liquid temperature cutout setting, low ambient temperature cutout setting, outdoor air temperature, English or metric data, suction pressure cutout setting, each system suction pressure, liquid temperature reset via a 4-20milliamp or 0-10 VDC input, anti-recycle timer status for each compressor, anti-coincident system start timer condition, compressor run status, no cooling load condition, day, date and time, daily start/stop times, holiday status, automatic or manual system lead/lag control, lead system definition, compressor starts/operating hours (each), status of hot gas valves, evaporator heater and fan operation, run permissive status, number of compressors running, liquid solenoid valve status, load & unload timer status, water pump status.

6. System Safeties: Shall cause individual compressor systems to perform auto shut down; manual reset required after the third trip in 90 minutes. System Safeties include: high discharge pressure, low suction pressure, high pressure switch, and motor protector. Compressor motor protector shall protect against damage due to high input current or thermal overload of windings.
  7. Unit Safeties: Shall be automatic reset and cause compressors to shut down if low ambient, low leaving chilled liquid temperature, under voltage, and flow switch operation.
  8. Alarm Contacts: Low ambient, low leaving chilled liquid temperature, low voltage, low battery, and (per compressor circuit): high discharge pressure, and low suction pressure.
  9. BAS Communications: YORKTalk 2, BACnet MS/TP, Modbus and N2 communication capabilities are standard.
- D. Manufacturer shall provide any controls not listed above, necessary for automatic chiller operation. Mechanical Contractor shall provide field control wiring necessary to interface sensors to the chiller control system.

#### **POWER CONNECTION AND DISTRIBUTION**

**A. Power Panels:**

1. NEMA 3R/12 rain/dust tight, powder painted steel cabinets with hinged, latched, and gasket sealed outer doors. Provide main power connection(s), control power connections, compressor and fan motor start contactors, current overloads, and factory wiring. Shall have 65KA short circuit rating.
2. Power supply shall enter unit at a single location, be 3 phase of scheduled voltage, and connect to individual terminal blocks per compressor. Separate disconnecting means and/or external branch circuit protection (by Contractor) required per applicable local or national codes.

Compressor, control and fan motor power wiring shall be located in an enclosed panel or routed through liquid tight conduit.

#### **ACCESSORIES AND OPTIONS**

- A. Microprocessor controlled, Factory installed Across-the-Line type compressor motor starters as standard.
1. High Ambient Control: Permits unit operation above 115°F ambient.

- B. Control Power Transformer: Converts unit power voltage to 120-1-60 (500 VA capacity).  
Factory-mounting includes primary and secondary wiring between the transformer and the control panel.
- C. Protective Chiller Panels (Factory or Field Mounted)
  - 1. Louvered Panels (condenser coils only): Painted steel as per remainder of unit cabinet, over external condenser coil faces.
- D. Thermal Dispersion Flow Switch (Factory installed and wired in piping extension kit): Normally open, 30bar pressure rating, stainless steel 316L construction, IP67, -4°F to 158°F ambient rating.
- E. Hot Gas By-Pass: Permits continuous, stable operation at capacities below the minimum step of unloading to as low as 5% capacity (depending on both the unit & operating conditions) by introducing an artificial load on the evaporator. Hot gas by-pass is installed on only one refrigerant circuit.
- F. Condenser Coil Protection: Condenser coils coated with an electro-deposited and baked flexible epoxy coating that is finished with a polyurethane UV resistant top coat.

## **INSTALLATION**

- A. General: Rig and Install in full accordance with Manufacturer's requirements, Project drawings, and Contract documents.
- B. Location: Locate chiller as indicated on drawings, including cleaning and service maintenance clearance per Manufacturer instructions. Adjust and level chiller on support structure.
- C. Components: Installing Contractor shall provide and install all auxiliary devices and accessories for fully operational chiller.
- D. Electrical: Coordinate electrical requirements and connections for all power feeds with Electrical Contractor (Division 16).
- E. Controls: Coordinate all control requirements and connections with Controls Contractor.
- F. Finish: Installing Contractor shall paint damaged and abraded factory finish with touch-up paint matching factory finish.

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

- A. All equipment and controls shall be installed in accordance with manufacturer's recommendations. Installation, adjustments and starting shall be done under supervision of manufacturer's representative.
- B. All ductwork and equipment shall be installed in a neat and workmanlike manner in accordance with the guidelines of NFPA 90-A, SMACNA and the best practice of the trade.
- D. For requirements of the temperature control system SEE SECTION 15950. This Contractor shall furnish and install any and all mechanical items which are required to complete the temperature controls which are to be provided under other sections of the specifications. Read SECTION 15950 for requirements.
- E. All piping as specified under this section shall be tested to the following pressures:

Chilled Water, Heating Water - 150 psi

The method of application of tests and duration shall be as described in SECTION 15050. Maximum of 5% pressure loss during the duration will be acceptable.

- F. Upon completion of the installation of all work and equipment the Contractor shall start all equipment and make all necessary tests and adjustments to place entire heating, ventilating and air conditioning systems in a satisfactory condition for continuous safe operation of facilities.

END OF SECTION 15800

**SECTION 15850 – TESTING AND BALANCING OF WATER SYSTEMS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. The Contractor shall furnish all labor, equipment and services necessary for and incidental to Water Systems Testing and Balancing.
- B. The Contractor shall procure the services of an independent testing and balancing agency. The Testing and Balancing Agency (TBA) specializes in testing and balancing of heating, ventilating, air-moving equipment, air-conditioning system and Hydronic systems. The Contractor shall award the test and balance contract to the above agency as soon as possible after receipt of contract.
- C. Testing and Balancing shall not begin until the systems have been completed and are in full working order.
- D. Shop drawings must be provided to the TAB firm no later than 30 days after the final, approved shop drawings have been returned by the University Representative.
- E. The final and complete Test and Balance Report shall be submitted, for approval, not less than two weeks before a final inspection of the Project is requested by the General Contractor. Failure to provide the Report shall be cause to delay the final inspection until the Report is Approved .
- F. Contractor is cautioned that test and Balance Report shall include both Grille counts, and Supply, Return, Outside Air and Exhaust Duct Traverses so that duct leakage can be calculated.

**1.2 REFERENCES**

- A. AABC – National Standards for Total System Balance.
- B. NEBB – Procedural Standards for Testing, Adjusting, and Balancing.

**1.3 SUBMITTALS**

- A. Field Reports: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
- B. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for University Representative and for inclusion in operating and maintenance manuals.

**TESTING AND BALANCING OF WATER SYSTEMS**

- C. Provide reports in soft cover, letter size, binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating, thermostat locations.

#### **1.4 QUALITY ASSURANCE**

Perform total system balance in accordance with AABC National Standards for Field Measurement and Instrumentation, Total System Balance or NEBB Standards – Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems or Testing Adjusting and Balancing Bureau (TABB)-National Standards for Environmental Systems Balance.

#### **1.5 QUALIFICATIONS**

TBA shall be a Company specializing in the testing, adjusting, and balancing of systems specified in this Section with minimum three years experience.

### **PART 2 - PRODUCTS**

#### **2.1 ADJUSTMENT DEVICES**

Replacement of adjustable pulleys, additional balancing dampers, additional fan belts, pressure taps and fitting, hydronic balancing valves and any other devices or equipment required to effect proper testing, adjusting and balancing shall be provided by the Contractor at no additional cost to the University.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
  - 1. Systems are started and operating in a safe and normal condition.
  - 2. Temperature control systems are installed complete and operable.
  - 3. Proper thermal overload protection is in place for electrical equipment.
  - 4. Hydronic systems are flushed, filled, and vented.
  - 5. Pumps are rotating correctly.
  - 6. Proper strainer baskets are clean and in place.
  - 7. Service and balance valves are open.

- B. Beginning of work means acceptance of existing HVAC conditions.

### **3.2 INSTALLATION TOLERANCES**

- A. Hydronic Systems: Adjust to within plus or minus 5 percent of design.

### **3.3 ADJUSTING – GENERAL**

- A. Ensure recorded data represents actual measured or observed conditions.
- B. Permanently mark setting of valves, dampers, and other adjustment devices allowing setting to be restored. Set and lock memory stops.
- C. After adjustment, take measurement to verify balance has not been disrupted or that such disruption has been rectified.
- D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- E. At the time of final inspection the TAB agency may be required to recheck, in the presence of the University's Representative, specific and random selections of data, air quantities, and air motion recorded in the certified report. Points and areas for recheck shall be selected by the University Representative. Measurements and test procedures shall be the same as approved for the initial work for the certified report. Selections for recheck, specific plus random, shall not exceed 10% of the total number tabulated in the report.

### **3.4 WATER SYSTEM PROCEDURE (MINIMUM REQUIREMENTS)**

- A. Prepare itemized equipment schedules, listing all heating and/or cooling elements and equipment in the systems to be balanced. List in order on equipment schedules, by pump or zone according to the design, all heating or cooling elements all zone balancing valves circuit pump and ending with the last items of equipment or transfer element in the respective zone or circuit. Include on schedule sheet column titles listing the location, type of element or apparatus, design conditions and measured conditions. Prepare individual pump report sheets for each zone or circuit.
- B. Adjust water systems (new and existing as indicated on drawings) to provide required or design quantities.
- C. Use calibrated Venturi tubes, orifices, or other metered fitting and pressure gages to determine flow rates for system balance. Where flow-metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.
- D. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.
- E. Effect system balance with automatic control valves fully open to heat transfer elements.

### **TESTING AND BALANCING OF WATER SYSTEMS**

- F. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.
- G. Test pumps and adjust flow. Record the following on pumps report sheets: (a) suction and discharge pressure, (b) running amps and brake horsepower of pump motor under full flow and no flow conditions, (c) pressure drop across pump in feet of water and total GMP pump is handling under full flow conditions.
- H. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.

### **3.5 REQUIRED REPORTS TO BE SUBMITTED**

The following reports shall be submitted, as a minimum, with a complete Title Page, Summary, and Instrument List. All data and nomenclature shall be provided, as required by AABC and/or NEBB Procedure manuals, for each device tested and balanced.

- 1. Electric Motors.
- 2. VFD Drives.
- 3. Pump Data.
- 4. Chiller data.
- 5. Boiler data.

### **3.7 COMMISSIONING**

- A. Balancing Agency shall coordinate with the Contractor the Commissioning requirements as here-in-before specified.
- B. Contractor is cautioned that the University, thru the University Representative, reserves the right to check and verify any and all points and readings of the Test and Balance report. If 15% or more of the points do not agree with the report, then the Contractor shall re-test and re-balance the entire project and submit a complete new Report. If 15% or more of this new Data is independently verified and still does not agree with the Contractor's new Report, then the Owner has the right to hire an Independent Test and Balance Contractor and the Original Contractor shall be held responsible to pay these costs.
- C. All TAB deficiencies shall be corrected when found. Any deficiencies that are (for whatever reason) not corrected immediately shall be shown in the TAB report and listed on a summary sheet in the front of the TAB report. The TAB report must be completed and accepted by the University Representative before the project is accepted and all items on the summary sheet shall become punch list items with dollar values assigned to them.

END OF SECTION 15850

**SECTION 15900 – VALVES AND FITTINGS**

**PART 1 – GENERAL**

**1.1 SUMMARY**

The work under this heading includes the furnishing and installing of all required appurtenances incidental to the piping systems as indicated on the drawings. Refer to GENERAL MECHANICAL REQUIREMENTS Section 15050 which shall apply to all work in this Section.

**PART 2 - PRODUCTS**

**2.1 GENERAL**

- A. Provide factory-fabricated valves for use in service indicated. Provide valves of types and pressure ratings indicated; provide proper selection to comply with installation requirements. Provide sizes as indicated, and connections, which properly mate with pipe, tube, and equipment connections. Where more than one type is indicated, selection is installer's option. Valves shall be of same make for all these services.
- B. Valves shall comply with the following:
  - Gate - cast iron - MSS SP-70
  - Gate - bronze - MSS SP-80
  - Globe - cast iron -MSS SP-85
  - Globe - bronze - MSS SP-80
  - Ball - MSS SP-110
  - Butterfly - MSS SP-67
  - Check - cast iron - MSS SP-71
  - Check - bronze - MSS SP-80
- C. Gate valves shall be equipped with packing suitable for intended service. (Under no circumstances is asbestos acceptable.) Valves shall be designed so back seating protects packing and stem threads from media when valve is fully opened, and equipped with gland follower. Guides for disc on rising stem valves shall be machined for accurate fit.
- D. Globe valves shall be equipped with packing suitable for intended service. (Under no circumstances is asbestos acceptable.) Globe valves shall be designed so back seating protects packing and stem threads from media when valve is fully opened, and equipped with gland follower.
- E. Ball valves shall have FULL port opening blow out proof stem: hard chrome plated forged brass ball, rated not less than 600# W.O.G.
- F. Provide gear operators on butterfly valves 8" and larger. Valve bodies shall have extended necks to provide for 2-1/4" insulation.
- G. Provide valves with features indicated and where not otherwise indicated, provide proper valve features as outlined in this specification. Comply with ANSI B31.1.

**VALVES AND FITTINGS**

- H. Valve flanges shall comply to ANSI B16.1 (cast iron), ANSI B16.5(steel), ANSI B16.24 (bronze).
- I. Threaded valve ends shall comply with ANSI B2.1.
- J. Butt-Weld valve ends shall comply with ANSI B16.25.
- K. Solder Joint valve ends shall comply with ANSI B16.18.
- L. Flangeless valve bodies shall be manufactured to fit between flanges and shall comply with ANSI B16.1 (cast iron), ANSI B16.5 (steel), or ANSI B16.24 (bronze).
- M. Fabricate pressure-containing components of valves, including stems and seats from brass or bronze materials, of standard alloy recognized in valve manufacturing that resist de-zincification.
- N. Design seat of valve with removable disc, and assemble valve so disc can be replaced when worn.
- O. Butterfly valves shall be designed for flow regulation, and manufactured to be tight in closed position. Test pressures in accordance with MSS SP-67 as follows: Seat 2-12" 220psi. No leakage shall be permitted under test.

## **2.2 BALL VALVES**

- A. Threaded Ends 3" and Smaller: 600# W.O.G., forged brass two piece body, hard chrome plated forged brass ball, blow-out proof stem.
- B. Soldered Ends 2" and Smaller: 600# W.O.G., forged brass two piece body, hard chrome plated forged brass ball, true adjustable packing nut ("O"-ring only type stem seal not acceptable), blow-out proof stem..
- C. Flanged Ends 2-1/2" and larger: Class 150, flanged ends, carbon steel body with 316 s.s. trim, uni-body design, full port, blowout proof s.s. stem and ball, telfon seat.

## **2.3 BUTTERFLY VALVES**

- A. For chilled/hot water system provide lug type with rated working pressure of 200 psi on sizes 2" thru 12". Valve shall be cast iron, drilled and tapped bug body, lever operated, 10 position throttling handle, memory plate, type 410 stainless steel stem with EPDM seat.

## **2.4 SWING CHECK VALVES IN STEEL PIPING**

- A. Threaded Ends 2" and Smaller: Class 125, bronze body, screwed cap, "Y" pattern swing, Teflon disc.
- B. Flanged Ends 2-1/2" and Larger: Class 125, iron, bronze mounted, horizontal swing, cast-iron disc.

## **2.5 UNIONS IN COPPER LINES**

### **VALVES AND FITTINGS**

Cast Bronze Unions.

**2.6 UNIONS IN BLACK STEEL, WROUGHT IRON OR GALVANIZED STEEL PIPING**

Ground joint malleable iron galvanized Class 300 for 2" nominal pipe sizes or below. For pipe sizes 2-1/2" and larger use forged steel welding flanges (Galvanized for galvanized piping).

**2.7 UNIONS IN CONNECTION BETWEEN COPPER AND STEEL OR IRON PIPING**

Provide bronze valves or dielectric waterways.

**2.8 STRAINERS**

Through 2-1/2" Metraflex Style S - Screwed; Zurn Model YSBR 20 mesh monel screen through 2"; .045 stainless steel on 2-1/2"; Strainers on 3" and above Metraflex Style M1 - flanged; Zurn Model FS 3" to have .045 mesh, ss screws; 3-1/2" and above .125 mesh, ss screws.

**2.9 GAGE COCK**

Crane No. 744, or Weiss TC-14, all bronze.

**2.10 AIR VENT**

Automatic air vents where indicated on drawings shall be Bell & Gossett No. 7, or Taco 417, with copper discharge line piped to closet floor drain.

**2.11 MANUAL AIR VENTS**

Where installed shall be Crane No. 744, or Weiss TC-14, with 1/4" tap into line to be vented.

**2.12 GAUGES**

Furnish and install where shown on the plans or where good practice required, pressure gauges with 4-1/2 glass dial face, corrosion resistant stainless steel case and ring, balanced adjustable black pointer guaranteed accurate to 1% of range, easy read dial - white background with bold black numerals and graduations, 270 degree ARG, 1/4" N.P.T. bottom connection.

**2.13 THERMOMETERS**

Shall be Adjustable Angle type with 9" case, lens front reading mercury tube, with angle satin finish aluminum scales, bold black numerals, bold scale graduations, thick glass windows, and die cast aluminum case with baked bronze finish. Thermometer shall rotate 180 degrees and stem swivels 180 degrees in 10 degree increments separable wells to suit insulation. For chilled water 20 degrees to 120 degrees. For hot water 30 degrees to 240 degrees.

**2.14 T.A.P. PLUGS**

Furnish where shown on plans or where good practice requires 1/2" IPS plug. The Contractor shall leave with the University one kit consisting of (1) 1/8" thermometer, (1) pressure gauge and (1) gauge adaptor, 1/8" diameter with stainless steel probe, 1/4" FPT gauge connection.

**VALVES AND FITTINGS**

## 2.15 BALANCING VALVES

Valves ½" to 2" pipe size (NPT or Sweat) to be of dezincification brass or bronze construction. Valves 2-1/2" to 12" pipe size shall be cast iron for flanged models or ductile iron for grooved models. Valves shall be globe type rated 175 psi for iron and 240 psi for brass/bronze at 250 degrees F. Valves to have concealed memory stop feature and visual position readout. Each valve shall have two metering/test ports with internal check valves and protective caps. Valves to be leak-tight at full rated working pressure. All valves to be provided with molded insulation to permit access for balance and read-out. Nibco model T or S1710 (1/2" to 2"), F or G737 (2-1/2" to 12"), DeZurik series 12.30-1 or approved equal.

## 2.16 GASKETS

Material shall be of compressed sheet suitable for the operating conditions. Group 1a or 1b as listed in ASTM B16.5.

## 2.17 BOLTS AND NUTS

Bolts shall conform to ASTM A193/A193M Rev B, Grade B7, nuts shall conform to ASTM A194/A194M Rev A, Grade 2H.

# PART 3 EXECUTION

## 3.1 WORKMANSHIP AND INCIDENTAL ITEMS

- A. All valves shall be installed so as to be easily accessible for cleaning, inspection, maintenance, and operation.
- B. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward for horizontal plane unless unavoidable. Provide chain operators on all valves over 6' above floor in mechanical rooms.
- C. Except as otherwise indicated, install valves with the following ends or types of pipe/tube connections:
  - Tube Size 2" and smaller - Soldered-joint valves
  - Pipe Size 2" and smaller - Threaded valves
  - Pipe Size 2-1/2" and larger - Butt-weld end valves or  
Flanged end valves
- D. Install swing check valves in horizontal position, unless otherwise shown on drawings, with hinge pin horizontally perpendicular to centerline of pipe. Install for proper direction of flow.
- E. Provide access panels at all concealed valves.
- F. Major control and sectionalizing valves throughout building shall be identified by means of a brass valve tag bracketed to valve handle. Contractor shall prepare schedule of such identifying plates and frame under glass for installation in main equipment room.
- G. All welded piping to be welded by certified welders skilled in the work to be done.

## VALVES AND FITTINGS

- H. No piping of dissimilar metals placed in contact or in close proximity with each other. Provide dielectric waterways wherever piping of dissimilar metals is joined.
- I. Run all piping concealed unless specifically noted otherwise, making all necessary offsets, turns, etc., necessary to conceal piping from view.
- J. Provide all necessary steel frame supports, anchor bolts, sleeves, etc., required for safe support of equipment and piping installed under this contract. The Contractor shall be completely responsible for the accurate position and dimensions of all foundations and support items.

END OF SECTION 15900

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## SECTION 15950 – TEMPERATURE CONTROLS

### PART 1: GENERAL

#### 1.1 Products Not Furnished or Installed but integrated with the Work of this Section

##### A. General:

1. Coordination Meeting: The Installer furnishing the DDC network shall meet with the Installer(s) furnishing each of the following products to coordinate details of the interface between these products and the DDC network. The University representative shall be present at this meeting. Each Installer shall provide the University representative and all other Installers with details of the proposed interface including PICS for BACnet equipment, hardware and software identifiers for the interface points, network identifiers, wiring requirements, communication speeds, and required network accessories. The purpose of this meeting shall be to insure there are no unresolved issues regarding the integration of these products into the DDC network. Submittals for these products shall not be approved prior to the completion of this meeting.

##### B. Section 15800 - Static power equipment:

1. Variable frequency drives: The variable frequency drive (VFD) vendor shall furnish VFDs with an interface to the control and monitoring points specified in Section 15800. These specified points shall be the minimum acceptable interface to the VFD. The connection to these points shall be by one of the following methods: (a) Hardwired connection such as relay, 0-10VDC, or 4-20mA. (b) BACnet/IP network connection. (c) BACnet over ARCNET network connection. (d) BACnet MS/TP network connection.

##### C. Communications with Third Party Equipment:

1. Any additional integral control systems included with the products integrated with the work of this section shall be furnished with a BACnet interface for integration into the Direct Digital Control System described in this section.

#### 1.2 Related Sections

- A. The General Conditions of the Contract, Supplementary Conditions, and General Requirements are part of this specification and shall be used in conjunction with this section as part of the contract documents.

#### 1.3 Description

- A. General: The existing control system consists of a JCI high-speed, peer-to-peer network of DDC controllers and a web-based operator interface. Depict new boiler, chiller, and pump; by a point-and-click graphic. Update graphic interface as required for new points.
- B. The system shall directly control HVAC equipment as specified in Section 15950, (Sequences of Operation). Each zone controller shall provide occupied and unoccupied modes of operation by individual zone. Furnish energy conservation features such as optimal start and stop, night setback, request-based logic, and demand level adjustment of setpoints as specified.
- C. System shall use the native BACnet protocol for communication to the operator workstation or web server and for communication between control modules. Schedules, setpoints, trends, and alarms specified in Section 15950, (Sequences of Operation) shall be BACnet objects. BACnet MSTP will be the communication protocol.

#### 1.4 Approved Control Systems

- A. Use control system hardware and software that meet the requirements of this specification. Control system hardware is to be connected to and 100% compatible with Johnson Controls Facility Explorer supervisory system.

#### 1.5 Quality Assurance

- A. Installer and Manufacturer Qualifications
  - 1. Installer shall have an established working relationship with Control System Manufacturer.
  - 2. Installer shall have successfully completed Control System Manufacturer's control system training. Upon request, Installer shall present record of completed training including course outlines.

#### 1.6 Codes and Standards

- A. Work, materials, and equipment shall comply with the most restrictive of local, state, and federal authorities' codes and ordinances or these plans and specifications. As a minimum, the installation shall comply with current editions in effect 30 days prior to receipt of bids of the following codes:
  - 1. National Electric Code (NEC)
  - 2. International Building Code (IBC)
    - a. Chapter 28 Mechanical
  - 3. International Mechanical Code (IMC)

4. ANSI/ASHRAE 135-2004: Data Communication Protocol for Building Automation and Control Systems (BACNET)

#### 1.7 System Performance

- A. Performance Standards. System shall conform to the following minimum standards over network connections. Systems shall be tested using manufacturer's recommended hardware and software for operator workstation (server and browser for web-based systems).
  1. Graphic Display. A graphic with 20 dynamic points shall display with current data within 10 sec.
  2. Graphic Refresh. A graphic with 20 dynamic points shall update with current data within 8 sec. and shall automatically refresh every 15 sec.
  3. Configuration and Tuning Screens. Screens used for configuring, calibrating, or tuning points, PID loops, and similar control logic shall automatically refresh within 6 sec.
  4. Object Command. Devices shall react to command of a binary object within 2 sec. Devices shall begin reacting to command of an analog object within 2 sec.
  5. Alarm Response Time. An object that goes into alarm shall be annunciated at the workstation within 15 sec.
  6. Program Execution Frequency. Custom and standard applications shall be capable of running as often as once every 5 sec. Select execution times consistent with the mechanical process under control.
  7. Performance. Programmable controllers shall be able to completely execute DDC PID control loops at a frequency adjustable down to once per sec. Select execution times consistent with the mechanical process under control.
  8. Multiple Alarm Annunciation. Each workstation on the network shall receive alarms within 5 sec of other workstations.
  9. Reporting Accuracy. System shall report values with minimum end-to-end accuracy listed in Table 1.
  10. Control Stability and Accuracy. Control loops shall maintain measured variable at setpoint within tolerances listed in Table 2.

Table 1

#### Reporting Accuracy

| Measured Variable | Reported Accuracy |
|-------------------|-------------------|
|-------------------|-------------------|

|                                    |                                 |
|------------------------------------|---------------------------------|
| Space Temperature                  | ±0.5°C (±1°F)                   |
| Ducted Air                         | ±0.5°C (±1°F)                   |
| Outside Air                        | ±1.0°C (±2°F)                   |
| Dew Point                          | ±1.5°C (±3°F)                   |
| Water Temperature                  | ±0.5°C (±1°F)                   |
| Delta-T                            | ±0.15°C (±0.25°F)               |
| Relative Humidity                  | ±5% RH                          |
| Water Flow                         | ±2% of full scale               |
| Airflow (terminal)                 | ±10% of full scale (see Note 1) |
| Airflow (measuring stations)       | ±5% of full scale               |
| Airflow (pressurized spaces)       | ±3% of full scale               |
| Air Pressure (ducts)               | ±25 Pa (±0.1 in. w.g.)          |
| Air Pressure (space)               | ±3 Pa (±0.01 in. w.g.)          |
| Water Pressure                     | ±2% of full scale (see Note 2)  |
| Electrical (A, V, W, Power Factor) | ±1% of reading (see Note 3)     |
| Carbon Monoxide (CO)               | ±5% of reading                  |
| Carbon Dioxide (CO <sub>2</sub> )  | ±50 ppm                         |

Note 1: Accuracy applies to 10% - 100% of scale

Note 2: For both absolute and differential pressure

Note 3: Not including utility-supplied meters

Table 2

Control Stability and Accuracy

| Controlled Variable | Control Accuracy       | Range of Medium                     |
|---------------------|------------------------|-------------------------------------|
| Air Pressure        | ±50 Pa (±0.2 in. w.g.) | 0-1.5 kPa (0-6 in. w.g.)            |
|                     | ±3 Pa (±0.01 in. w.g.) | -25 to 25 Pa (-0.1 to 0.1 in. w.g.) |
| Airflow             | ±10% of full scale     |                                     |
| Space Temperature   | ±1.0°C (±2.0°F)        |                                     |
| Duct Temperature    | ±1.5°C (±3°F)          |                                     |

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|                |                                               |                                                            |
|----------------|-----------------------------------------------|------------------------------------------------------------|
| Humidity       | ±5% RH                                        |                                                            |
| Fluid Pressure | ±10 kPa (±1.5 psi)<br>±250 Pa (±1.0 in. w.g.) | MPa (1-150 psi)<br>0-12.5 kPa (0-50 in. w.g.) differential |

## 1.8 Submittals

- A. Product Submittal Requirements: Meet requirements on Shop Drawings, Product Data, and Samples. Provide six copies of shop drawings and other submittals on hardware, software, and equipment to be installed or furnished. Begin no work until submittals have been approved for conformity with design intent. Provide drawings as AutoCAD 2006 (or newer) compatible files on magnetic or optical disk (file format: .DWG, .DXF, .VSD, or comparable) and 3 prints of each drawing on 11" x 17" paper. When manufacturer's cutsheets apply to a product series rather than a specific product, clearly indicate applicable data by highlighting or by other means. Clearly reference covered specification and drawing on each submittal. General catalogs shall not be accepted as cutsheets to fulfill submittal requirements. Select and show submittal quantities appropriate to scope of work. Submittal approval does not relieve Contractor of responsibility to supply sufficient quantities to complete work. Provide submittals within 12 weeks of contract award on the following:

### 1. Direct Digital Control System Hardware

- a. Complete bill of materials indicating quantity, manufacturer, model number, and relevant technical data of equipment to be used.
- b. Manufacturer's description and technical data such as performance curves, product specifications, and installation and maintenance instructions for items listed below and for relevant items not listed below:
  - i. Direct digital controllers (controller panels)
  - ii. Transducers and transmitters
  - iii. Sensors (include accuracy data)
  - iv. Actuators
  - v. Valves
  - vi. Relays and switches
  - vii. Control panels
  - viii. Power supplies
  - ix. Batteries
  - x. Operator interface equipment

- 
- xi. Wiring
    - c. Wiring diagrams and layouts for each control panel. Show termination numbers.
    - d. Floor plan schematic diagrams indicating field sensor and controller locations.
    - e. Riser diagrams showing control network layout, communication protocol, and wire types.
  - 2. Central System Hardware and Software
    - a. Complete bill of material indicating quantity, manufacturer, model number, and relevant technical data of equipment used.
    - b. Manufacturer's description and technical data such as product specifications and installation and maintenance instructions for items listed below and for relevant items furnished under this contract not listed below:
      - i. Central Processing Unit (CPU) or web server
      - ii. Monitors
      - iii. Keyboards
      - iv. Power supplies
      - v. Battery backups
      - vi. Interface equipment between CPU or server and control panels
      - vii. Operating System software
      - viii. Operator interface software
      - ix. Color graphic software
      - x. Third-party software
    - c. Schematic diagrams of control, communication, and power wiring for central system installation. Show interface wiring to control system.
    - d. Network riser diagrams of wiring between central control unit and control panels.
  - 3. Controlled Systems
    - a. Riser diagrams showing control network layout, communication protocol, and wire types.
    - b. Schematic diagram of each controlled system. Label control points with point names. Graphically show locations of control elements.
    - c. Schematic wiring diagram of each controlled system. Label control elements and terminals. Where a control element is also shown on control system schematic, use the same name.

- 
- d. Instrumentation list (Bill of Materials) for each controlled system. List each control system element in a table. Show element name, type of device, manufacturer, model number, and product data sheet number.
      - e. Complete description of control system operation including sequences of operation. Include and reference schematic diagram of controlled system. List I/O points and software points specified in Section 15950, (Sequence of Operations). Indicate alarmed and trended points.
    4. Description of process, report formats, and checklists to be used in Section 15950 Article 3.16 (Control System Demonstration and Acceptance).
    5. BACnet Protocol Implementation Conformance Statement (PICS) for each submitted type of controller and operator interface.
  - B. Schedules
    1. Schedule of work provided within one month of contract award, indicating:
      - a. Intended sequence of work items
      - b. Start date of each work item
      - c. Duration of each work item
      - d. Planned delivery dates for ordered material and equipment and expected lead times
      - e. Milestones indicating possible restraints on work by other trades or situations
    2. Monthly written status reports indicating work completed and revisions to expected delivery dates. Include updated schedule of work.
  - C. Project Record Documents. Submit three copies of record (as-built) documents upon completion of installation for approval prior to final completion. Submittal shall consist of:
    1. Project Record Drawings. As-built versions of submittal shop drawings provided as AutoCAD 2006 (or newer) compatible files on magnetic or optical disk (file format: .DWG, .DXF, .VSD, or comparable) and 6 prints of each drawing on 11" x 17" paper.
    2. Testing and Commissioning Reports and Checklists. Completed versions of reports, checklists, and trend logs used to meet requirements of Section 15950 Article 3.16 (Control System Demonstration and Acceptance).
    3. Operation and Maintenance (O&M) Manual. Printed, electronic, or online help documentation of the following:
      - a. As-built versions of submittal product data.
      - b. Names, addresses, and telephone numbers of installing contractors and service representatives for equipment and control systems.

- c. Operator's manual with procedures for operating control systems: logging on and off, handling alarms, producing point reports, trending data, overriding computer control, and changing setpoints and variables.
  - d. Programming manual or set of manuals with description of programming language and syntax, of statements for algorithms and calculations used, of point database creation and modification, of program creation and modification, and of editor use.
  - e. Engineering, installation, and maintenance manual or set of manuals that explains how to design and install new points, panels, and other hardware; how to perform preventive maintenance and calibration; how to debug hardware problems; and how to repair or replace hardware.
  - f. Documentation of programs created using custom programming language including setpoints, tuning parameters, and object database. Electronic copies of programs shall meet this requirement if control logic, setpoints, tuning parameters, and objects can be viewed using furnished programming tools.
  - g. Graphic files, programs, and database on magnetic or optical media.
  - h. List of recommended spare parts with part numbers and suppliers.
  - i. Complete original-issue documentation, installation, and maintenance information for furnished third-party hardware including computer equipment and sensors.
  - j. Complete original-issue copies of furnished software, including operating systems, custom programming language, operator workstation or web server software, and graphics software.
  - k. Licenses, guarantees, and warranty documents for equipment and systems.
  - l. Recommended preventive maintenance procedures for system components, including schedule of tasks such as inspection, cleaning, and calibration; time between tasks; and task descriptions.
- D. Training Materials: Provide course outline and materials for each class at least six weeks before first class. Training shall be furnished via instructor-led sessions, computer-based training, or web-based training. Engineer will modify course outlines and materials if necessary to meet University's needs. Engineer will review and approve course outlines and materials at least three weeks before first class.

#### 1.9 Warranty

- A. Warrant work as follows:

1. Warrant labor and materials for specified control system free from defects for a period of 12 months after final acceptance. Control system failures during warranty period shall be adjusted, repaired, or replaced at no additional cost or reduction in service to University. Respond during normal business hours within 24 hours of University's warranty service request.
2. Work shall have a single warranty date, even if University receives beneficial use due to early system start-up. If specified work is split into multiple contracts or a multi-phase contract, each contract or phase shall have a separate warranty start date and period.
3. If Engineer determines that equipment and systems operate satisfactorily at the end of final start-up, testing, and commissioning phase, Engineer will certify in writing that control system operation has been tested and accepted in accordance with the terms of this specification. Date of acceptance shall begin warranty period.
4. Provide updates to operator workstation or web server software, project-specific software, graphic software, database software, and firmware that resolve Contractor-identified software deficiencies at no charge during warranty period. If available, University can purchase in-warranty service agreement to receive upgrades for functional enhancements associated with above-mentioned items. Do not install updates or upgrades without University's written authorization.
5. Exception: Contractor shall not be required to warrant reused devices except those that have been rebuilt or repaired. Installation labor and materials shall be warranted. Demonstrate operable condition of reused devices at time of Engineer's acceptance.

#### 1.10 Ownership of Proprietary Material

- A. Project-specific software and documentation shall become University's property. This includes, but is not limited to:
  1. Graphics
  2. Record drawings
  3. Database
  4. Application programming code
  5. Documentation

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## PART 2: PRODUCTS

### 2.1 Materials

- A. Use new products the manufacturer is currently manufacturing and selling for use in new installations. Do not use this installation as a product test site unless explicitly approved in writing by University. Spare parts shall be available for at least five years after completion of this contract.

### 2.2 Communication

- A. Control products, communication media, connectors, repeaters, hubs, and routers shall comprise a BACnet internetwork. Controller and operator interface communication shall conform to ANSI/ASHRAE Standard 135-2004, BACnet.
- B. Install new wiring and network devices as required to provide a complete and workable control network. Use existing Ethernet backbone for network segments marked "existing" on project drawings.
- C. Each controller shall have a communication port for temporary connection to a laptop computer or other operator interface. Connection shall support memory downloads and other commissioning and troubleshooting operations.
- D. Internetwork operator interface and value passing shall be transparent to internetwork architecture.
  - 1. An operator interface connected to a controller shall allow the operator to interface with each internetwork controller as if directly connected. Controller information such as data, status, and control algorithms shall be viewable and editable from each internetwork controller.
  - 2. Inputs, outputs, and control variables used to integrate control strategies across multiple controllers shall be readable by each controller on the internetwork. Program and test all cross-controller links required to execute control strategies specified in Section 233000, Article 3.19 (Sequence of Operations). An authorized operator shall be able to edit cross-controller links by typing a standard object address or by using a point-and-click interface.
- E. Controllers with real-time clocks shall use the BACnet Time Synchronization service. System shall automatically synchronize system clocks daily from an operator-designated controller via the internetwork. If applicable, system shall automatically adjust for daylight saving and standard time.
- F. System shall be expandable to at least twice the required input and output objects with additional controllers, associated devices, and wiring.

### 2.3 Operator Interface (Existing)

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## 2.4 Controller Software

- A. Building and energy management application software shall reside and operate in system controllers. Applications shall be editable through operator workstation, web browser interface, or engineering workstation.
- B. System Security. See Paragraph 2.3.F.5 (Security) and Paragraph 2.3.F.15.c (Operator Activity).
- C. Scheduling. See Paragraph 2.3.D.4 (View and Adjust Operating Schedules). System shall provide the following schedule options as a minimum:
  - 1. Weekly. Provide separate schedules for each day of the week. Each schedule shall be able to include up to 5 occupied periods (5 start-stop pairs or 10 events).
  - 2. Exception. Operator shall be able to designate an exception schedule for each of the next 365 days. After an exception schedule has executed, system shall discard and replace exception schedule with standard schedule for that day of the week.
  - 3. Holiday. Operator shall be able to define 24 special or holiday schedules of varying length on a scheduling calendar that repeats each year.
- D. System Coordination. Operator shall be able to group related equipment based on function and location and to use these groups for scheduling and other applications.
- E. Binary and Analog Alarms. See Paragraph 2.3.F.7 (Alarm Processing).
- F. Alarm Reporting. See Paragraph 2.3.F.9 (Alarm Reactions).
- G. Remote Communication. System shall automatically contact operator workstation or server on receipt of critical alarms. If no network connection is available, system shall use a modem connection.
- H. Demand Limiting.
  - 1. System shall monitor building power consumption from building power meter pulse generator signals or from building feeder line watt transducer or current transformer.
  - 2. When power consumption exceeds adjustable levels, system shall automatically adjust setpoints, de-energize low-priority equipment, and take other programmatic actions to reduce demand as specified in Section 15950, (Sequences of Operation). When demand drops below adjustable levels, system shall restore loads as specified.
- I. Maintenance Management. System shall generate maintenance alarms when equipment exceeds adjustable runtime, equipment starts, or performance limits. Configure and enable maintenance alarms as specified in Section 15950, (Sequences of Operation).

- J. Sequencing. Application software shall sequence chillers, boilers, and pumps as specified in Section 15950, (Sequences of Operation).
- K. PID Control. System shall provide direct- and reverse-acting PID (proportional-integral-derivative) algorithms. Each algorithm shall have anti-windup and selectable controlled variable, setpoint, and PID gains. Each algorithm shall calculate a time-varying analog value that can be used to position an output or to stage a series of outputs.
- L. Staggered Start. System shall stagger controlled equipment restart after power outage. Operator shall be able to adjust equipment restart order and time delay between equipment restarts.
- M. Energy Calculations.
  - 1. System shall accumulate and convert instantaneous power (kW) or flow rates (L/s [gpm]) to energy usage data.
  - 2. System shall calculate a sliding-window average (rolling average). Operator shall be able to adjust window interval to 15 minutes, 30 minutes, or 60 minutes.
- N. Anti-Short Cycling. Binary output objects shall be protected from short cycling by means of adjustable minimum on-time and off-time settings.
- O. On and Off Control with Differential. System shall provide direct- and reverse-acting on and off algorithms with adjustable differential to cycle a binary output based on a controlled variable and setpoint.
- P. Runtime Totalization. System shall provide an algorithm that can totalize runtime for each binary input and output. Operator shall be able to enable runtime alarm based on exceeded adjustable runtime limit. Configure and enable runtime totalization and alarms as specified in Section 15950, Article 3.19 (Sequence of Operations).

## 2.5 Controllers

- A. General. Provide Building Controllers (BC), Advanced Application Controllers (AAC), Application Specific Controllers (ASC), Smart Actuators (SA), and Smart Sensors (SS) as required to achieve performance specified in Section 15950 Article 1.9 (System Performance). Every device in the system which executes control logic and directly controls HVAC equipment must conform to a standard BACnet Device profile as specified in ANSI/ASHRAE 135-2004, BACnet Annex L. Unless otherwise specified, hardwired actuators and sensors may be used in lieu of BACnet Smart Actuators and Smart Sensors.
- B. BACnet.

1. Building Controllers (BCs). Each BC shall conform to BACnet Building Controller (B-BC) device profile as specified in ANSI/ASHRAE 135-2004, BACnet Annex L and shall be listed as a certified B-BC in the BACnet Testing Laboratories (BTL) Product Listing.
2. Advanced Application Controllers (AACs). Each AAC shall conform to BACnet Advanced Application Controller (B-AAC) device profile as specified in ANSI/ASHRAE 135-2004, BACnet Annex L and shall be listed as a certified B-AAC in the BACnet Testing Laboratories (BTL) Product Listing.
3. Application Specific Controllers (ASCs). Each ASC shall conform to BACnet Application Specific Controller (B-ASC) device profile as specified in ANSI/ASHRAE 135-2004, BACnet Annex L and shall be listed as a certified B-ASC in the BACnet Testing Laboratories (BTL) Product Listing.
4. Smart Actuators (SAs). Each SA shall conform to BACnet Smart Actuator (B-SA) device profile as specified in ANSI/ASHRAE 135-2004, BACnet Annex L and shall be listed as a certified B-SA in the BACnet Testing Laboratories (BTL) Product Listing.
5. Smart Sensors (SSs). Each SS shall conform to BACnet Smart Sensor (B-SS) device profile as specified in ANSI/ASHRAE 135-2004, BACnet Annex L and shall be listed as a certified B-SS in the BACnet Testing Laboratories (BTL) Product Listing.
6. BACnet Communication.
  - a. Each BC shall reside on or be connected to a BACnet network using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol and BACnet/IP addressing.
  - b. BACnet routing shall be performed by BCs or other BACnet device routers as necessary to connect BCs to networks of AACs and ASCs.
  - c. Each AAC shall reside on a BACnet network using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol with BACnet/IP addressing, or it shall reside on a BACnet network using the ARCNET or MS/TP Data Link/Physical layer protocol.
  - d. Each ASC shall reside on a BACnet network using the ARCNET or MS/TP Data Link/Physical layer protocol.
  - e. Each SA shall reside on a BACnet network using the ARCNET or MS/TP Data Link/Physical layer protocol.
  - f. Each SS shall reside on a BACnet network using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol with BACnet/IP addressing, or it shall reside on a BACnet network using ARCNET or MS/TP Data Link/Physical layer protocol.

C. Communication.

1. Service Port. Each controller shall provide a service communication port for connection to a Portable Operator's Terminal. Connection shall be extended to space temperature sensor ports where shown on drawings.
  2. Signal Management. BC and ASC operating systems shall manage input and output communication signals to allow distributed controllers to share real and virtual object information and to allow for central monitoring and alarms.
  3. Data Sharing. Each BC and AAC shall share data as required with each networked BC and AAC.
  4. Stand-Alone Operation. Each piece of equipment specified in Section 233000, Article 3.19 (Sequences of Operation) shall be controlled by a single controller to provide stand-alone control in the event of communication failure. All I/O points specified for a piece of equipment shall be integral to its controller. Provide stable and reliable stand-alone control using default values or other method for values normally read over the network.
- D. Environment. Controller hardware shall be suitable for anticipated ambient conditions.
1. Controllers used outdoors or in wet ambient conditions shall be mounted in waterproof enclosures and shall be rated for operation at -29°C to 60°C (-20°F to 140°F).
  2. Controllers used in conditioned space shall be mounted in dust-protective enclosures and shall be rated for operation at 0°C to 50°C (32°F to 120°F).
- E. Keypad. Provide a local keypad and display for each BC and AAC. Operator shall be able to use keypad to view and edit data. Keypad and display shall require password to prevent unauthorized use. If the manufacturer does not normally provide a keypad and display for each BC and AAC, provide the software and any interface cabling needed to use a laptop computer as a Portable Operator's Terminal for the system.
- F. Real-Time Clock. Controllers that perform scheduling shall have a real-time clock.
- G. Serviceability.
1. Controllers shall have diagnostic LEDs for power, communication, and processor.
  2. Wires shall be connected to a field-removable modular terminal strip or to a termination card connected by a ribbon cable.
  3. Each BC and AAC shall continually check its processor and memory circuit status and shall generate an alarm on abnormal operation. System shall continuously check controller network and generate alarm for each controller that fails to respond.
- H. Memory.

1. Controller memory shall support operating system, database, and programming requirements.
  2. Each BC and AAC shall retain BIOS and application programming for at least 72 hours in the event of power loss.
  3. Each ASC and SA shall use nonvolatile memory and shall retain BIOS and application programming in the event of power loss. System shall automatically download dynamic control parameters following power loss.
- I. Immunity to Power and Noise. Controllers shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shutdown below 80% nominal voltage. Operation shall be protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W at 1 m (3 ft).
  - J. Transformer. ASC power supply shall be fused or current limiting and shall be rated at a minimum of 125% of ASC power consumption.

## 2.6 Input and Output Interface

- A. General. Hard-wire input and output points to BCs, AACs, ASCs, or SAs.
- B. Protection. Shorting an input or output point to itself, to another point, or to ground shall cause no controller damage. Input or output point contact with up to 24 V for any duration shall cause no controller damage.
- C. Binary Inputs. Binary inputs shall monitor the on and off signal from a remote device. Binary inputs shall provide a wetting current of at least 12 mA and shall be protected against contact bounce and noise. Binary inputs shall sense dry contact closure without application of power external to the controller.
- D. Pulse Accumulation Inputs. Pulse accumulation inputs shall conform to binary input requirements and shall accumulate up to 10 pulses per second.
- E. Analog Inputs. Analog inputs shall monitor low-voltage (0-10 Vdc), current (4-20 mA), or resistance (thermistor or RTD) signals. Analog inputs shall be compatible with and field configurable to commonly available sensing devices.
- F. Binary Outputs. Binary outputs shall send an on-or-off signal for on and off control. Building Controller binary outputs shall have three-position (on-off-auto) override switches and status lights. Outputs shall be selectable for normally open or normally closed operation.
- G. Analog Outputs. Analog outputs shall send a modulating 0-10 Vdc or 4-20 mA signal as required to properly control output devices. Each Building Controller analog output shall have a two-position

(auto-manual) switch, a manually adjustable potentiometer, and status lights. Analog outputs shall not drift more than 0.4% of range annually.

- H. Tri-State Outputs. Control three-point floating electronic actuators without feedback with tri-state outputs (two coordinated binary outputs). Tri-State outputs may be used to provide analog output control in zone control and terminal unit control applications such as VAV terminal units, duct-mounted heating coils, and zone dampers.
- I. Universal Inputs and Outputs. Inputs and outputs that can be designated as either binary or analog in software shall conform to the provisions of this section that are appropriate for their designated use.

## 2.7 Power Supplies and Line Filtering

- A. Power Supplies. Control transformers shall be UL listed. Furnish Class 2 current-limiting type or furnish over-current protection in primary and secondary circuits for Class 2 service in accordance with NEC requirements. Limit connected loads to 80% of rated capacity.
  - 1. DC power supply output shall match output current and voltage requirements. Unit shall be full-wave rectifier type with output ripple of 5.0 mV maximum peak-to-peak. Regulation shall be 1.0% line and load combined, with 100-microsecond response time for 50% load changes. Unit shall have built-in over-voltage and over-current protection and shall be able to withstand 150% current overload for at least three seconds without trip-out or failure.
    - a. Unit shall operate between 0°C and 50°C (32°F and 120°F). EM/RF shall meet FCC Class B and VDE 0871 for Class B and MILSTD 810C for shock and vibration.
    - b. Line voltage units shall be UL recognized and CSA listed.

- B. Power Line Filtering.

- 1. Provide internal or external transient voltage and surge suppression for workstations and controllers. Surge protection shall have:
    - b. Dielectric strength of 1000 V minimum
    - c. Response time of 10 nanoseconds or less
    - d. Transverse mode noise attenuation of 65 dB or greater
    - e. Common mode noise attenuation of 150 dB or greater at 40-100 Hz

## 2.8 Auxiliary Control Devices

- A. Electric Valve Actuators.

- 1. Stall Protection. Mechanical or electronic stall protection shall prevent actuator damage throughout the actuator's rotation.

2. Spring-return Mechanism. Actuators used for power-failure and safety applications shall have an internal mechanical spring-return mechanism or an uninterruptible power supply (UPS).
3. Signal and Range. Proportional actuators shall accept a 0-10 Vdc or a 0-20 mA control signal and shall have a 2-10 Vdc or 4-20 mA operating range. (Floating motor actuators may be substituted for proportional actuators in terminal unit applications as described in paragraph 2.6H.)
4. Wiring. 24 Vac and 24 Vdc actuators shall operate on Class 2 wiring.
5. Manual Positioning. Operators shall be able to manually position each actuator when the actuator is not powered. Non-spring-return actuators shall have an external manual gear release. Spring-return actuators with more than 7 N·m (60 in.-lb) torque capacity shall have a manual crank.

B. Control Valves.

1. General. Select body and trim materials in accordance with manufacturer's recommendations for design conditions and service shown.
2. Type. Provide two- or three-way control valves for two-position or modulating service as shown.
3. Water Valves.
  - a. Valves providing two-position service shall be quick opening. Two-way valves shall have replaceable disc or ball.
  - b. Close-off (Differential) Pressure Rating. Valve actuator and trim shall provide the following minimum close-off pressure ratings.
    - i. Two-way: 150% of total system (pump) head.
    - ii. Three-way: 300% of pressure differential between ports A and B at design flow or 100% of total system (pump) head.
  - c. Ports. Valves providing modulating service shall have equal percentage ports.
  - d. Sizing.
    - i. Two-position service: line size.
    - ii. Two-way modulating service: select pressure drop equal to the greatest of twice the pressure drop through heat exchanger (load), 50% of the pressure difference between supply and return mains, or 35 kPa (5 psi).
    - iii. Three-way modulating service: select pressure drop equal to the smaller of twice the pressure drop through the coil exchanger (load) or 35 kPa (5 psi).

- e. Fail Position. Water valves shall fail normally open or closed as follows unless otherwise specified.
  - i. Water zone valves: normally open.
  - ii. Heating coils in air handlers: normally open.
  - iii. Other applications: as scheduled or as required by sequences of operation.

C. Binary Temperature Devices.

1. Low-Voltage Space Thermostats. Low-voltage space thermostats shall be 24 V, bimetal-operated, mercury-switch type, with adjustable or fixed anticipation heater, concealed setpoint adjustment, 13°C-30°C (55°F-85°F) setpoint range, 1°C (2°F) maximum differential, and vented ABS plastic cover.
2. Line-Voltage Space Thermostats. Line-voltage space thermostats shall be bimetal-actuated, open-contact type or bellows-actuated, enclosed, snap-switch type or equivalent solid-state type, with heat anticipator, UL listing for electrical rating, concealed setpoint adjustment, 13°C-30°C (55°F-85°F) setpoint range, 1°C (2°F) maximum differential, and vented ABS plastic cover.
3. Low-Limit Thermostats. Low-limit airstream thermostats shall be UL listed, vapor pressure type. Element shall be at least 6 m (20 ft) long. Element shall sense temperature in each 30 cm (1 ft) section and shall respond to lowest sensed temperature. Low-limit thermostat shall be manual reset only.

D. Temperature Sensors.

1. Type. Temperature sensors shall be Resistance Temperature Device (RTD) or thermistor.
2. Duct Sensors. Duct sensors shall be single point or averaging as shown. Averaging sensors shall be a minimum of 1.5 m (5 ft) in length per 1 m<sup>2</sup>(10 ft<sup>2</sup>) of duct cross-section.
3. Immersion Sensors. Provide immersion sensors with a separable stainless steel well. Well pressure rating shall be consistent with system pressure it will be immersed in. Well shall withstand pipe design flow velocities.
4. Space Sensors. Space sensors shall have setpoint adjustment, override switch, display, and communication port as shown.
5. Differential Sensors. Provide matched sensors for differential temperature measurement.

- E. Flow Switches. Flow-proving switches shall be paddle (water service only) or differential pressure type (air or water service) as shown. Switches shall be UL listed, SPDT snap-acting, and pilot duty rated (125 VA minimum).

1. Paddle switches shall have adjustable sensitivity and NEMA 1 enclosure unless otherwise specified.
2. Differential pressure switches shall have scale range and differential suitable for intended application and NEMA 1 enclosure unless otherwise specified.

F. Relays.

1. Control Relays. Control relays shall be plug-in type, UL listed, and shall have dust cover and LED "energized" indicator. Contact rating, configuration, and coil voltage shall be suitable for application.
2. Time Delay Relays. Time delay relays shall be solid-state plug-in type, UL listed, and shall have adjustable time delay. Delay shall be adjustable  $\pm 100\%$  from setpoint shown. Contact rating, configuration, and coil voltage shall be suitable for application. Provide NEMA 1 enclosure for relays not installed in local control panel.

G. Override Timers.

1. Unless implemented in control software, override timers shall be spring-wound line voltage, UL Listed, with contact rating and configuration required by application. Provide 0-6 hour calibrated dial unless otherwise specified. Flush mount timer on local control panel face or where shown.

H. Current Transmitters.

1. AC current transmitters shall be self-powered, combination split-core current transformer type with built-in rectifier and high-gain servo amplifier with 4-20 mA two-wire output. Full-scale unit ranges shall be 10 A, 20 A, 50 A, 100 A, 150 A, and 200 A, with internal zero and span adjustment. Unit accuracy shall be  $\pm 1\%$  full-scale at 500 ohm maximum burden.
2. Transmitter shall meet or exceed ANSI/ISA S50.1 requirements and shall be UL/CSA recognized.
3. Unit shall be split-core type for clamp-on installation on existing wiring.

I. Current Transformers.

1. AC current transformers shall be UL/CSA recognized and shall be completely encased (except for terminals) in approved plastic material.
2. Transformers shall be available in various current ratios and shall be selected for  $\pm 1\%$  accuracy at 5 A full-scale output.
3. Use fixed-core transformers for new wiring installation and split-core transformers for existing wiring installation.

J. Voltage Transmitters.

**TEMPERATURE CONTROLS**

1. AC voltage transmitters shall be self-powered single-loop (two-wire) type, 4-20 mA output with zero and span adjustment.
2. Adjustable full-scale unit ranges shall be 100-130 Vac, 200-250 Vac, 250-330 Vac, and 400-600 Vac. Unit accuracy shall be  $\pm 1\%$  full-scale at 500 ohm maximum burden.
3. Transmitters shall meet or exceed ANSI/ISA S50.1 requirements and shall be UL/CSA recognized at 600 Vac rating.

K. Voltage Transformers.

1. AC voltage transformers shall be UL/CSA recognized, 600 Vac rated, and shall have built-in fuse protection.
2. Transformers shall be suitable for ambient temperatures of 4°C-55°C (40°F-130°F) and shall provide  $\pm 0.5\%$  accuracy at 24 Vac and 5 VA load.
3. Windings (except for terminals) shall be completely enclosed with metal or plastic.

L. Power Monitors.

1. Power monitors shall be three-phase type and shall have three-phase disconnect and shorting switch assembly, UL listed voltage transformers, and UL listed split-core current transformers.
2. Power monitors shall provide selectable output: rate pulse for kWh reading or 4-20 mA for kW reading. Power monitors shall operate with 5 A current inputs and maximum error of  $\pm 2\%$  at 1.0 power factor or  $\pm 2.5\%$  at 0.5 power factor.

M. Current Switches.

1. Current-operated switches shall be self-powered, solid-state with adjustable trip current. Select switches to match application current and DDC system output requirements.

N. Pressure Transducers.

1. Transducers shall have linear output signal and field-adjustable zero and span.
2. Continuous operating conditions of positive or negative pressure 50% greater than calibrated span shall not damage transducer sensing elements.
3. Water pressure transducer diaphragm shall be stainless steel with minimum proof pressure of 1000 kPa (150 psi). Transducer shall have 4-20 mA output, suitable mounting provisions, and block and bleed valves.
4. Water differential pressure transducer diaphragm shall be stainless steel with minimum proof pressure of 1000 kPa (150 psi). Over-range limit (differential pressure) and maximum static pressure shall be 2000 kPa (300 psi.) Transducer shall have 4-20 mA output, suitable mounting provisions, and 5-valve manifold.

- O. Differential Pressure Switches. Differential pressure switches (air or water service) shall be UL listed, SPDT snap-acting, pilot duty rated (125 VA minimum) and shall have scale range and differential suitable for intended application and NEMA 1 enclosure unless otherwise specified.
- P. Pressure-Electric (PE) Switches. PE switches shall be UL listed, pilot duty rated (125 VA minimum) or motor control rated, metal or neoprene diaphragm actuated, operating pressure rated for 0-175 kPa (0-25 psig), with calibrated scale minimum setpoint range of 14-125 kPa (2-18 psig).
  - 1. Provide one- or two-stage switch action (SPDT, DPST, or DPDT) as required by application.
  - 2. Switches shall be open type (panel-mounted). Exception: Switches shall be enclosed type for remote installation. Enclosed type shall be NEMA 1 unless otherwise specified.
  - 3. Each pneumatic signal line to PE switches shall have permanent indicating gauge.
- Q. Local Control Panels.
  - 1. Indoor control panels shall be fully enclosed NEMA 1 construction with hinged door key-lock latch and removable sub-panels. A common key shall open each control panel and sub-panel.
  - 2. Prewire internal and face-mounted device connections with color-coded stranded conductors tie-wrapped or neatly installed in plastic troughs. Field connection terminals shall be UL listed for 600 V service, individually identified per control and interlock drawings, with adequate clearance for field wiring.
  - 3. Each local panel shall have a control power source power switch (on-off) with overcurrent protection.
- R. Flow Meters.
  - 1. Provide turbine type in-line flow meter with 0.5% accuracy. Meter shall be 316 SS suitable for outdoor use with a BACnet communication interface and submersible grade electronics enclosure..

## 2.9 Wiring and Raceways

- A. General. Provide copper wiring, plenum cable, and raceways as specified in Section 16050.
- B. Insulated wire shall use copper conductors and shall be UL listed for 90°C (200°F) minimum service.

## 2.10 Fiber Optic Cable System

- A. Optical Cable. Optical cables shall be duplex 900 mm tight-buffer construction designed for intra-building environments. Sheath shall be UL listed OFNP in accordance with NEC Article 770. Optical fiber shall meet the requirements of FDDI, ANSI X3T9.5 PMD for 62.5/125mm.
- B. Connectors. Field terminate optical fibers with ST type connectors. Connectors shall have ceramic ferrules and metal bayonet latching bodies.

## **PART 3: EXECUTION**

### **3.1 Examination**

- A. Thoroughly examine project plans for control device and equipment locations. Report discrepancies, conflicts, or omissions to University Representative for resolution before starting rough-in work.
- B. Inspect site to verify that equipment can be installed as shown. Report discrepancies, conflicts, or omissions to University Representative for resolution before starting rough-in work.
- C. Examine drawings and specifications for work of others. Report inadequate headroom or space conditions or other discrepancies to University Representative and obtain written instructions for changes necessary to accommodate Section 15800 work with work of others. Contractor shall perform at his expense necessary changes in specified work caused by failure or neglect to report discrepancies.

### **3.2 Protection**

- A. Contractor shall protect against and be liable for damage to work and to material caused by Contractor's work or employees.
- B. Contractor shall be responsible for work and equipment until inspected, tested, and accepted. Protect material not immediately installed. Close open ends of work with temporary covers or plugs during storage and construction to prevent entry of foreign objects.

### **3.3 Coordination**

- A. Site.
  - 1. Assist in coordinating space conditions to accommodate the work of each trade where work will be installed near or will interfere with work of other trades. If installation without coordination causes interference with work of other trades, Contractor shall correct conditions without extra charge.

2. Coordinate and schedule work with other work in the same area and with work dependent upon other work to facilitate mutual progress.
- B. Submittals. See Section 15950 Article 1.10 (Submittals).
- C. Test and Balance.
  1. Provide Test and Balance Contractor a single set of necessary tools to interface to control system for testing and balancing.
  2. Train Test and Balance Contractor to use control system interface tools.
  3. Provide a qualified technician to assist with testing and balancing the first 20 terminal units.
  4. Test and Balance Contractor shall return tools undamaged and in working condition at completion of testing and balancing.
- D. Coordination with Other Controls. Integrate with and coordinate controls and control devices furnished or installed by others as follows.
  1. Communication media and equipment shall be provided as specified in Section 15950 Article 2.2 (Communication).
  2. Each supplier of a controls product shall configure, program, start up, and test that product to meet the sequences of operation described in Section 15950 regardless of where within the contract documents those products are described.
  3. Coordinate and resolve incompatibility issues that arise between control products provided under this section and those provided under other sections or divisions of this specification.
  4. Contractor shall be responsible for integration of control products provided by multiple suppliers regardless of where integration is described within the contract documents.

### 3.4 General Workmanship

- A. Install equipment, piping, and wiring or raceway horizontally, vertically, and parallel to walls wherever possible.
- B. Provide sufficient slack and flexible connections to allow for piping and equipment vibration isolation.
- C. Install equipment in readily accessible locations as defined by National Electrical Code (NEC) Chapter 1 Article 100 Part A.
- D. Verify wiring integrity to ensure continuity and freedom from shorts and ground faults.
- E. Equipment, installation, and wiring shall comply with industry specifications and standards and local codes for performance, reliability, and compatibility.

### 3.5 Field Quality Control

## TEMPERATURE CONTROLS

- A. Work, materials, and equipment shall comply with rules and regulations of applicable local, state, and federal codes and ordinances as identified in Section 15950 Article 1.8 (Codes and Standards).
- B. Continually monitor field installation for code compliance and workmanship quality.
- C. Contractor shall arrange for work inspection by local or state authorities having jurisdiction over the work.

### 3.6 Wiring

- A. Control and interlock wiring and installation shall comply with national and local electrical codes and manufacturer's recommendations.
- B. NEC Class 1 (line voltage) wiring shall be UL listed in approved raceway as specified by NEC and Section 16050.
- C. Low-voltage wiring shall meet NEC Class 2 requirements. Subfuse low-voltage power circuits as required to meet Class 2 current limit.
- D. NEC Class 2 (current-limited) wires not in raceway but in concealed and accessible locations such as return air plenums shall be UL listed for the intended application.
- E. Install wiring in raceway where subject to mechanical damage and at levels below 3 m (10ft) in mechanical, electrical, or service rooms.
- F. Install Class 1 and Class 2 wiring in separate raceways. Boxes and panels containing high-voltage wiring and equipment shall not be used for low-voltage wiring except for the purpose of interfacing the two through relays and transformers.
- G. Do not install wiring in raceway containing tubing.
- H. Run exposed Class 2 wiring parallel to a surface or perpendicular to it and tie neatly at 3 m (10 ft) intervals.
- I. Use structural members to support or anchor plenum cables without raceway. Do not use ductwork, electrical raceways, piping, or ceiling suspension systems to support or anchor cables.
- J. Secure raceways with raceway clamps fastened to structure and spaced according to code requirements. Raceways and pull boxes shall not be hung on or attached to ductwork, electrical raceways, piping, or ceiling suspension systems.
- K. Size raceway and select wire size and type in accordance with manufacturer's recommendations and NEC requirements.
- L. Include one pull string in each raceway 2.5 cm (1 in.) or larger.
- M. Use color-coded conductors throughout.

- N. Locate control and status relays in designated enclosures only. Do not install control and status relays in packaged equipment control panel enclosures containing Class 1 starters.
- O. Conceal raceways except within mechanical, electrical, or service rooms. Maintain minimum clearance of 15 cm (6 in.) between raceway and high-temperature equipment such as steam pipes or flues.
- P. Adhere to requirements in Section 16050 where raceway crosses building expansion joints.
- Q. Install insulated bushings on raceway ends and enclosure openings. Seal top ends of vertical raceways.
- R. Terminate control and interlock wiring related to the work of this section. Maintain at the job site updated (as-built) wiring diagrams that identify terminations.
- S. Flexible metal raceways and liquid-tight flexible metal raceways shall not exceed 1 m (3 ft) in length and shall be supported at each end. Do not use flexible metal raceway less than ½ in. electrical trade size. Use liquid-tight flexible metal raceways in areas exposed to moisture including chiller and boiler rooms.
- T. Install raceway rigidly, support adequately, ream at both ends, and leave clean and free of obstructions. Join raceway sections with couplings and according to code. Make terminations in boxes with fittings. Make terminations not in boxes with bushings.

### 3.7 Communication Wiring

- A. Communication wiring shall be low-voltage Class 2 wiring and shall comply with this section.
- B. Install communication wiring in separate raceways and enclosures from other Class 2 wiring.
- C. During installation do not exceed maximum cable pulling, tension, or bend radius specified by the cable manufacturer.
- D. Verify entire network's integrity following cable installation using appropriate tests for each cable.
- E. Install lightning arrestor according to manufacturer's recommendations between cable and ground where a cable enters or exits a building.
- F. Each run of communication wiring shall be a continuous length without splices when that length is commercially available. Runs longer than commercially available lengths shall have as few splices as possible using commercially available lengths.
- G. Label communication wiring to indicate origination and destination.
- H. Ground coaxial cable according to NEC regulations article on "Communications Circuits, Cable, and Protector Grounding."

### 3.8 Fiber Optic Cable

## TEMPERATURE CONTROLS

- A. During installation do not exceed maximum pulling tensions specified by cable manufacturer. Post-installation residual cable tension shall be within cable manufacturer's specifications.
- B. Install cabling and associated components according to manufacturers' instructions. Do not exceed minimum cable and unjacketed fiber bend radii specified by cable manufacturer.

### 3.9 Installation of Sensors

- A. Install sensors according to manufacturer's recommendations.
- B. Mount sensors rigidly and adequately for operating environment.
- C. Air seal wires attached to sensors in their raceways or in the wall to prevent sensor readings from being affected by air transmitted from other areas.
- D. Use averaging sensors in mixing plenums and hot and cold decks. Install averaging sensors in a serpentine manner vertically across duct. Support each bend with a capillary clip.
- E. Install mixing plenum low-limit sensors in a serpentine manner horizontally across duct. Support each bend with a capillary clip. Provide 3 m (1 ft) of sensing element for each 1 m<sup>2</sup> (1 ft<sup>2</sup>) of coil area.
- F. Install pipe-mounted temperature sensors in wells. Install liquid temperature sensors with heat-conducting fluid in thermal wells.

### 3.10 Flow Switch Installation

- A. Use correct paddle for pipe diameter.
- B. Adjust flow switch according to manufacturer's instructions.

### 3.11 Actuators

- A. General. Mount actuators and adapters according to manufacturer's recommendations.
- B. Electric and Electronic Damper Actuators. Mount actuators directly on damper shaft or jackshaft unless shown as a linkage installation. Link actuators according to manufacturer's recommendations.
  - 1. For low-leakage dampers with seals, mount actuator with a minimum 5° travel available for damper seal tightening.
  - 2. To compress seals when spring-return actuators are used on normally closed dampers, power actuator to approximately 5° open position, manually close the damper, then tighten linkage.
  - 3. Check operation of damper-actuator combination to confirm that actuator modulates damper smoothly throughout stroke to both open and closed positions.
  - 4. Provide necessary mounting hardware and linkages for actuator installation.

- C. Valve Actuators. Connect actuators to valves with adapters approved by actuator manufacturer.

### 3.12 Warning Labels

- A. Affix permanent warning labels to equipment that can be automatically started by the control system.
1. Labels shall use white lettering (12-point type or larger) on a red background.
  2. Warning labels shall read as follows.

**CAUTION**

This equipment is operating under automatic control and may start or stop at any time without warning. Switch disconnect to "Off" position before servicing.

- B. Affix permanent warning labels to motor starters and control panels that are connected to multiple power sources utilizing separate disconnects.
1. Labels shall use white lettering (12-point type or larger) on a red background.
  2. Warning labels shall read as follows.

**CAUTION**

This equipment is fed from more than one power source with separate disconnects. Disconnect all power sources before servicing.

### 3.13 Identification of Hardware and Wiring

- A. Label wiring and cabling, including that within factory-fabricated panels, with control system address or termination number at each end within 5 cm (2 in.) of termination.
- B. Label pneumatic tubing at each end within 5 cm (2 in.) of termination with a descriptive identifier.
- C. Permanently label or code each point of field terminal strips to show instrument or item served.
- D. Label control panels with minimum 1 cm (½ in.) letters on laminated plastic nameplates.
- E. Label each control component with a permanent label. Label plug-in components such that label remains stationary during component replacement.
- F. Label room sensors related to terminal boxes or valves with nameplates.
- G. Manufacturers' nameplates and UL or CSA labels shall be visible and legible after equipment is installed.
- H. Label identifiers shall match record documents.

### 3.14 Programming

## TEMPERATURE CONTROLS

- A. Point Naming. Name points as shown on the equipment points list provided with each sequence of operation. See Section 15950, (Sequences of Operation). Where multiple points with the same name reside in the same controller, each point name may be customized with its associated Program Object number. For example, "Zone Temp 1" for Zone 1, "Zone Temp 2" for Zone 2.
- B. Software Programming. Programming shall provide actions for each possible situation. Graphic- or parameter-based programs shall be documented. Text-based programs shall be modular, structured, and commented to clearly describe each section of the program.
  - 1. Application Programming. Provide application programming that adheres to sequences of operation, , specified in Section 15950. Program documentation or comment statements shall reflect language used in sequences of operation.
  - 2. System Programming. Provide system programming necessary for system operation.
- C. Operator Interface.
  - 1. Standard Graphics. Provide graphics as specified in Section 15950 Article 2.3 Paragraph E.2 (System Graphics). Show on each equipment graphic input and output points and relevant calculated points such as indicated in Section 15950, (Sequences of Operation). Point information on graphics shall dynamically update.
  - 2. Install, initialize, start up, and troubleshoot operator interface software and functions (including operating system software, operator interface database, and third-party software installation and integration required for successful operator interface operation) as described in Section 15950.

### 3.15 Control System Checkout and Testing

- A. Startup Testing. Complete startup testing to verify operational control system before notifying University of system demonstration. Provide University with schedule for startup testing. University may have representative present during any or all startup testing.
  - 1. Calibrate and prepare for service each instrument, control, and accessory equipment furnished under Section 15950
  - 2. .
  - 3. Verify that control wiring is properly connected and free of shorts and ground faults. Verify that terminations are tight.
  - 4. Enable control systems and verify each input device's calibration. Calibrate each device according to manufacturer's recommendations.

5. Verify that binary output devices such as relays, solenoid valves, two-position actuators and control valves, and magnetic starters, operate properly and that normal positions are correct.
6. Verify that analog output devices such as I/Ps and actuators are functional, that start and span are correct, and that direction and normal positions are correct. Check control valves and automatic dampers to ensure proper action and closure. Make necessary adjustments to valve stem and damper blade travel.
7. Prepare a log documenting startup testing of each input and output device, with technician's initials certifying each device has been tested and calibrated.
8. Verify that system operates according to sequences of operation. Simulate and observe each operational mode by overriding and varying inputs and schedules. Tune PID loops and each control routine that requires tuning.
9. Alarms and Interlocks.
  - a. Check each alarm with an appropriate signal at a value that will trip the alarm.
  - b. Trip interlocks using field contacts to check logic and to ensure that actuators fail in the proper direction.
  - c. Test interlock actions by simulating alarm conditions to check initiating value of variable and interlock action.

### 3.16 Control System Demonstration and Acceptance

- A. Demonstration. Prior to acceptance, perform the following performance tests to demonstrate system operation and compliance with specification after and in addition to tests specified in Article 3.17 (Control System Checkout and Testing). Provide University Representative with log documenting completion of startup tests.
  1. Engineer will be present to observe and review system demonstration. Notify Engineer at least 10 days before system demonstration begins.
  2. Demonstration shall follow process submitted and approved under Section 15950 Article 1.10 (Submittals). Complete approved checklists and forms for each system as part of system demonstration.
  3. Demonstrate actual field operation of each sequence of operation as specified in Section 15950, Article 3.19. Provide at least two persons equipped with two-way communication. Demonstrate calibration and response of any input and output points requested by University Representative. Provide and operate test equipment required to prove proper system operation.

4. Demonstrate compliance with Section 15950 Part 1 (System Performance).
5. Demonstrate compliance with sequences of operation through each operational mode.
6. Demonstrate complete operation of operator interface.
7. Demonstrate each of the following.
  - a. DDC loop response. Supply graphical trend data output showing each DDC loop's response to a setpoint change representing an actuator position change of at least 25% of full range. Trend sampling rate shall be from 10 seconds to 3 minutes, depending on loop speed. Each sample's trend data shall show setpoint, actuator position, and controlled variable values. Engineer will require further tuning of each loop that displays unreasonably under- or over-damped control.
  - b. Demand limiting. Supply trend data output showing demand-limiting algorithm action. Trend data shall document action sampled each minute over at least a 30-minute period and shall show building kW, demand-limiting setpoint, and status of setpoints and other affected equipment parameters.
  - c. Building fire alarm system interface.
  - d. Trend logs for each system. Trend data shall indicate setpoints, operating points, valve positions, and other data as specified in the points list provided with each sequence of operation in Section 15950, Article 3.19. Each log shall cover three 48-hour periods and shall have a sample frequency not less than 10 minutes or as specified on its points list. Logs shall be accessible through system's operator interface and shall be retrievable for use in other software programs as specified in Section 15950 Article 2.3 Paragraph E.11 (Trend Configuration).
8. Tests that fail to demonstrate proper system operation shall be repeated after Contractor makes necessary repairs or revisions to hardware or software to successfully complete each test.

B. Acceptance.

1. After tests described in this specification are performed to the satisfaction of the University Representative, the University Representative will accept control system as meeting completion requirements. University Representative may exempt tests from completion requirements that cannot be performed due to circumstances beyond Contractor's control. University Representative will provide written statement of each exempted test. Exempted tests shall be performed as part of warranty.

2. System shall not be accepted until completed demonstration forms and checklists are submitted and approved as required in Section 15950 Article 1.10 (Submittals).

### 3.17 Cleaning

- A. Each day clean up debris resulting from work. Remove packaging material as soon as its contents have been removed. Collect waste and place in designated location.
- B. On completion of work in each area, clean work debris and equipment. Keep areas free from dust, dirt, and debris.
- C. On completion of work, check equipment furnished under this section for paint damage. Repair damaged factory-finished paint to match adjacent areas. Replace deformed cabinets and enclosures with new material and repaint to match adjacent areas.

### 3.18 Training

- A. Provide training for a designated staff of University's representatives. Training shall be provided via self-paced training, web-based or computer-based training, classroom training, or a combination of training methods.
- B. Training shall enable students to accomplish the following objectives.
  1. Proficiently operate system
  2. Understand control system architecture and configuration
  3. Understand DDC system components
  4. Understand system operation, including DDC system control and optimizing routines (algorithms)
  5. Operate workstation and peripherals
  6. Log on and off system
  7. Access graphics, point reports, and logs
  8. Adjust and change system setpoints, time schedules, and holiday schedules
  9. Recognize common HVAC system malfunctions by observing system graphics, trend graphs, and other system tools
  10. Understand system drawings and Operation and Maintenance manual
  11. Understand job layout and location of control components
  12. Access data from DDC controllers
  13. Operate portable operator's terminals
  14. Create and change system graphics

15. Create, delete, and modify alarms, including configuring alarm reactions
  16. Create, delete, and modify point trend logs (graphs) and multi-point trend graphs
  17. Configure and run reports
  18. Add, remove, and modify system's physical points
  19. Create, modify, and delete application programming
  20. Add operator interface stations
  21. Add a new controller to system
  22. Download firmware and advanced applications programming to a controller
  23. Configure and calibrate I/O points
  24. Maintain software and prepare backups
  25. Interface with job-specific, third-party operator software
  26. Add new users and understand password security procedures
- C. Divide presentation of objectives into three sessions (1-13, 14-23, and 24-26). Participants will attend one or more of sessions, depending on knowledge level required.
1. Day-to-day Operators (objectives 1-13)
  2. Advanced Operators (objectives 1-13 and 14-23)
  3. System Managers and Administrators (objectives 1-13 and 24-26)
- D. Provide course outline and materials according to Section 15950 Article 1.8 (Submittals). Provide one copy of training material per student.
- E. Instructors shall be factory-trained and experienced in presenting this material.
- F. Perform classroom training using a network of working controllers representative of installed hardware.

### 3.19 Sequences of Operation

#### SUMMARY

- A. Provide automatic control sequences, instrumentation, and integration for the following heating and cooling plant equipment serving a four-pipe distribution system with two existing multizone air-handling units (AHUs):
1. One (1) gas-fired heating water boiler.
  2. One (1) air-cooled chiller.
  3. Two (2) chilled water pumps (one duty, one standby) with VFDs used for soft-start only.
  4. Two (2) heating water pumps (one duty, one standby) with VFDs used for soft-start only.

5. Existing (2) AHUs with three-way chilled water and heating water control valves at coils, with valves replaced under this project. The (2) heating water and (2) chilled water 3-way valves shall be replaced.
- B. The existing Johnson Controls (JCI) BACnet building automation system (BAS) shall perform all automatic control, monitoring, alarming, trending, scheduling, and operator interface functions described herein.
- C. Pump and VFD work is under Alternate No. 1. Sequence of operation shall be implemented regardless of acceptance of Alternate No. 1, with point mapping and final commissioning adjusted to suit existing or new pump/VFD equipment.

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#### CONTROL POINTS – CHILLED WATER SYSTEM

##### A. Air-Cooled Chiller

1. Analog Inputs (AI):
  - a. CHWS-T: Chilled water supply temperature.
  - b. CHWR-T: Chilled water return temperature.
  - c. OAT: Outdoor air temperature (shared point acceptable).
  - d. CHILLER-KW (if available): Chiller electrical demand.
2. Binary Inputs (BI):
  - a. CHILLER-RUN: Chiller run status.
  - b. CHILLER-ALM: General chiller alarm / lockout status.
  - c. CHW-FLOW-PROOF: Chilled water flow or differential pressure switch status.
3. Analog Outputs (AO):
  - a. CHILLER-SP (optional): Chilled water leaving temperature setpoint (if BMS-adjustable).
4. Binary Outputs (BO):
  - a. CHILLER-EN: Chiller enable / start command.

##### B. Chilled Water Pumps (CHWP-1, CHWP-2)

1. Analog Inputs (AI):
  - a. CHWP-1-VFD-SPD: VFD output frequency or speed feedback (for monitoring only).
  - b. CHWP-2-VFD-SPD: VFD output frequency or speed feedback (for monitoring only).
2. Binary Inputs (BI):
  - a. CHWP-1-RUN: Pump 1 status from VFD or starter.
  - b. CHWP-2-RUN: Pump 2 status from VFD or starter.
  - c. CHWP-1-FLT: Pump 1 fault / VFD fault.

#### TEMPERATURE CONTROLS

- 
- d. CHWP-2-FLT: Pump 2 fault / VFD fault.
  - e. CHW-FLOW-PROOF: System flow or DP switch (may be shared with chiller BI).
  - 3. Analog Outputs (AO):
    - a. CHWP-1-VFD-SPD-CMD: VFD speed command (fixed at 100% during run; used for ramp/soft-start).
    - b. CHWP-2-VFD-SPD-CMD: Same as above.
  - 4. Binary Outputs (BO):
    - a. CHWP-1-CMD: Start/stop command to Pump 1 VFD.
    - b. CHWP-2-CMD: Start/stop command to Pump 2 VFD.
- C. AHU Chilled Water Valves (per AHU)
- 1. Analog Inputs (AI):
    - a. AHU-DAT: AHU discharge air temperature.
  - 2. Binary Inputs (BI):
    - a. AHU-CHW-VALVE-ENDSW (if provided).
  - 3. Analog Outputs (AO):
    - a. AHU-CHW-VALVE-POS: Modulating three-way chilled water valve position (0–100%).
- 

## CONTROL POINTS – HEATING WATER SYSTEM

### A. Boiler

- 1. Analog Inputs (AI):
  - a. HWS-T: Heating water supply temperature.
  - b. HWR-T: Heating water return temperature.
  - c. OAT: Outdoor air temperature (shared).
- 2. Binary Inputs (BI):
  - a. BOILER-RUN: Boiler firing status.
  - b. BOILER-ALM: General boiler lockout / alarm.
  - c. HW-FLOW-PROOF: Heating water flow or differential pressure switch status.
- 3. Analog Outputs (AO):
  - a. BOILER-SP (if BMS-adjustable): Boiler HW supply temperature setpoint.
- 4. Binary Outputs (BO):
  - a. BOILER-EN: Boiler enable / run command.

### B. Heating Water Pumps (HWP-1, HWP-2)

- 
1. Analog Inputs (AI):
    - a. HWP-1-VFD-SPD: VFD output frequency or speed feedback.
    - b. HWP-2-VFD-SPD: VFD output frequency or speed feedback.
  2. Binary Inputs (BI):
    - a. HWP-1-RUN: Pump 1 run status.
    - b. HWP-2-RUN: Pump 2 run status.
    - c. HWP-1-FLT: Pump 1 fault / VFD fault.
    - d. HWP-2-FLT: Pump 2 fault / VFD fault.
    - e. HW-FLOW-PROOF: System flow or DP switch.
  3. Analog Outputs (AO):
    - a. HWP-1-VFD-SPD-CMD: VFD speed command (ramp to 100%).
    - b. HWP-2-VFD-SPD-CMD: VFD speed command (ramp to 100%).
  4. Binary Outputs (BO):
    - a. HWP-1-CMD: Start/stop command to Pump 1 VFD.
    - b. HWP-2-CMD: Start/stop command to Pump 2 VFD.
- C. AHU Heating Water Valves (per AHU)
1. Analog Inputs (AI):
    - a. AHU-DAT: Shared discharge air temperature input used for both heating and cooling valve control.
  2. Binary Inputs (BI):
    - a. AHU-HW-VALVE-ENDSW (if provided).
  3. Analog Outputs (AO):
    - a. AHU-HW-VALVE-POS: Modulating three-way heating water valve position (0–100%).
- 

## PART 3 – EXECUTION

### 3.1 CHILLED WATER SYSTEM – SEQUENCE OF OPERATION

#### A. General

1. The BAS shall automatically start/stop the chilled water plant in response to operator-defined schedules, space/zone loads, and system temperature conditions.
2. All time delays, setpoints, and thresholds described below shall be adjustable at the BAS front end.

#### B. Chilled Water Pump Lead/Standby Operation

1. CHWP-1 shall be the default lead (duty) pump; CHWP-2 shall be standby.
2. The BAS shall provide a software switch to designate either pump as lead.

## TEMPERATURE CONTROLS

3. When the chilled water plant is enabled:
  - a. BAS shall issue CHWP-lead-CMD = ON.
  - b. BAS shall ramp CHWP-lead-VFD-SPD-CMD from 0% to 100% over a minimum of 10 seconds for soft-start.
  - c. BAS shall prove CHWP-lead-RUN and CHW-FLOW-PROOF within 10 seconds (adjustable).
4. If CHWP-lead-RUN or CHW-FLOW-PROOF is not proven within the time delay, or if either is lost during operation:
  - a. BAS shall command CHWP-lead-CMD = OFF.
  - b. BAS shall issue CHWP-standby-CMD = ON and command CHWP-standby-VFD-SPD-CMD to ramp to 100%.
  - c. BAS shall generate a pump failure alarm identifying the failed pump.
5. During normal operation, pump VFDs shall maintain 100% speed; no differential pressure regulation is required.
6. BAS may rotate lead/lag assignment on an adjustable interval (e.g., weekly or monthly) to equalize run hours.

#### C. Chiller Enable / Disable

1. Chiller Enable Conditions:
  - a. Chilled water system is scheduled ON or placed in occupied mode.
  - b. At least one AHU chilled water valve position exceeds an adjustable threshold (e.g., 20%).
  - c. CHWS-T is greater than CHWS-SP + 2 °F (adjustable differential).
  - d. OAT is above adjustable chiller lockout setpoint (e.g., 60 °F).
2. On satisfaction of all enable conditions:
  - a. BAS shall start lead CHWP in accordance with Section 3.1.B.
  - b. After CHW-FLOW-PROOF is established, BAS shall issue CHILLER-EN = ON.
3. Chiller Operation:
  - a. Chiller internal controls shall modulate capacity to maintain CHWS-SP.
  - b. Default CHWS-SP shall be 42–45 °F (adjustable).
4. Chiller Disable Conditions:
  - a. All AHU chilled water valves are commanded below the minimum threshold for an adjustable time delay (e.g., 15 minutes), or
  - b. CHWR-T is less than an adjustable low-load threshold, or
  - c. System is scheduled OFF and no override is active.

5. On disable:
  - a. BAS shall issue CHILLER-EN = OFF.
  - b. After an adjustable pump overrun (e.g., 2–5 minutes), BAS shall stop the lead CHWP.

**D. AHU Chilled Water Valve Control**

1. Each AHU chilled water three-way valve shall be BAS-controlled to maintain AHU-DAT at its cooling discharge air temperature setpoint.
2. Valve control:
  - a. At 0% command, valve shall be full bypass (no flow through coil).
  - b. At 100% command, valve shall be full flow through coil (no bypass).
3. BAS shall sequence valve position as part of AHU control logic, including coordination with heating coil operation at each unit.

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**HEATING WATER SYSTEM – SEQUENCE OF OPERATION**

**A. General**

1. The BAS shall automatically start/stop the heating water plant in response to operator schedules, space/zone calls for heat, and outdoor air conditions.
2. All time delays, setpoints, and resets shall be adjustable at the BAS.

**B. Heating Water Pump Lead/Standby Operation**

1. HWP-1 shall be the default lead (duty) pump; HWP-2 shall be standby.
2. BAS shall allow operator selection of lead pump.
3. When the heating water plant is enabled:
  - a. BAS shall issue HWP-lead-CMD = ON.
  - b. BAS shall ramp HWP-lead-VFD-SPD-CMD from 0% to 100% over a minimum of 10 seconds for soft-start.
  - c. BAS shall prove HWP-lead-RUN and HW-FLOW-PROOF within 10 seconds (adjustable).
4. Failure to prove or loss of proof shall result in:
  - a. Commanding HWP-lead-CMD = OFF.
  - b. Starting HWP-standby in the same manner.
  - c. Generating an alarm indicating pump or flow failure.
5. During normal operation, pump VFDs shall maintain 100% speed; no differential pressure regulation is required.
6. BAS may rotate lead/lag assignment based on run hours or schedule.

**C. Boiler Enable / Disable**

**TEMPERATURE CONTROLS**

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1. Boiler Enable Conditions:
    - a. Heating system is scheduled ON or in occupied mode.
    - b. At least one AHU heating water valve position exceeds an adjustable threshold (e.g., 20%) or HWS-T is less than HWS-SP – 5 °F (adjustable differential).
    - c. OAT is below an adjustable boiler lockout temperature (e.g., 65 °F).
  2. On satisfaction of enable conditions:
    - a. BAS shall start lead HWP in accordance with Section 3.2.B.
    - b. After HW-FLOW-PROOF is established, BAS shall issue BOILER-EN = ON.
  3. Boiler Operation:
    - a. Boiler internal controls shall modulate firing rate to maintain HWS-SP.
    - b. Default HWS-SP shall be 140–160 °F as indicated on drawings.
    - c. Outdoor air reset (if specified):
      1. At low OAT (e.g., 20 °F), HWS-SP shall be at maximum (e.g., 180 °F).
      2. At high OAT (e.g., 60 °F), HWS-SP shall be at minimum (e.g., 140 °F).
      3. BAS shall linearly reset HWS-SP between these values.
  4. Boiler Disable Conditions:
    - a. All AHU heating water valves are commanded closed or below threshold for an adjustable time delay, and
    - b. HWS-T is greater than or equal to HWS-SP, and
    - c. OAT rises above boiler lockout plus differential (e.g., 68 °F), or
    - d. System is scheduled OFF and no override is active.
  5. On disable:
    - a. BAS shall issue BOILER-EN = OFF.
    - b. After an adjustable pump overrun (e.g., 5 minutes), BAS shall stop lead HWP.
- D. AHU Heating Water Valve Control
1. Each AHU heating water three-way valve shall be BAS-controlled to maintain AHU-DAT at its heating discharge air temperature setpoint whenever there is a call for heat.
  2. Valve control:
    - a. At 0% command, valve shall be full bypass (no flow through heating coil).
    - b. At 100% command, valve shall be full flow through heating coil (no bypass).
  3. BAS shall coordinate heating and cooling coil sequencing to avoid simultaneous heating and cooling at each AHU.
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## **BAS INTEGRATION, ALARMS, AND TRENDS**

### **A. General**

1. All points listed in Part 2 shall be fully integrated into the existing JCI BACnet BAS, with objects, graphics, and trends configured as required for proper operation and diagnostics.
2. Provide all programming, tuning, and commissioning necessary to achieve sequences described herein.
3. All available points from the VFD's boiler and chiller shall be integrated into the existing JCI BAC NET BAS

### **B. Alarms**

1. Provide visual and logging alarms, with optional remote notification where existing BAS capabilities permit, for at least the following conditions:
  - a. CHWP or HWP failure to start or loss of flow proof.
  - b. Chiller lockout or general alarm.
  - c. Boiler lockout or general alarm.
  - d. Low CHWS-T and high CHWS-T (adjustable thresholds).
  - e. Low HWS-T and high HWS-T (adjustable thresholds).
2. Alarms shall include point name, description, time/date stamp, and acknowledgement status.

### **C. Trending**

1. BAS shall trend, at a minimum:
  - a. CHWS-T, CHWR-T, CHILLER-RUN status.
  - b. HWS-T, HWR-T, BOILER-RUN status.
  - c. Pump run status (all CHWP and HWP).
  - d. Representative AHU chilled and heating water valve positions and AHU-DAT.
2. Trend intervals shall be adjustable and initially set to 15 minutes or as required for commissioning.

### **Miscellaneous**

1. Provide new temperature sensors for chilled water and heating water
2. Update graphics as required

**END OF SECTION 15950**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Furnish all labor, tools, materials, fixtures, equipment, accessories, transportation, etc., required for complete electrical lighting and power systems, complete with necessary auxiliaries as indicated on drawings and as hereinafter specified.
- B. The GENERAL CONDITIONS of the Contract, Drawings and Specifications shall apply to all work under this Section. Separation of Specifications into Sections is for convenience only and is not intended to establish limits of work or liability.
- C. In general, the work shall consist of the following installations:
  - 1. Power wiring and connection to new mechanical equipment.
- D. Prior to submitting quotation for electrical work, Contractor shall visit and examine the job site in order to become familiar with all existing conditions pertinent to the work to be performed thereon. No additional compensation will be allowed for failure to be so informed.
- E. It is the intent of these specifications that in all particulars, the materials and workmanship shall conform to the best practice and that the equipment and accessories as furnished and installed shall be complete and ready to operate.
- F. All materials shall be new, except where otherwise indicated, and shall conform with the standards of underwriters' Laboratories in every case where such a standard has been established for the particular type of material in question.
- G. The drawings showing the layout of electrical work indicate approximate location of the outlets, receptacles, panelboards and other electrical equipment, unless noted otherwise. The runs of feeders and branches are schematic only and are not intended to show the exact routing of conduits. Certain routings are as shown to avoid areas with asbestos materials, and may not allow for deviation. The final determination of the routing shall be governed by structural conditions, other conditions and other construction. The Contractor shall consult all drawings which may affect the location of any outlet, apparatus, or equipment to avoid possible interference and any reasonable changes in the location of an outlet, apparatus or equipment, up to the time of rough-in, is reserved by the University Representative, and any minor deviations shall be made without additional cost. It shall be the Contractor's responsibility to see that all equipment such as junction boxes, panelboards, switches, and other apparatus, as may require maintenance from time to time, are made easily accessible. Although the location of the equipment may be shown on the drawings, the construction may disclose the fact that such location does not make its position readily accessible, in which case the Contractor shall call the University Representative's attention to the condition before advancing the construction to a point where a change in location would require additional cost.

**1.2 MEASUREMENTS**

Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings, and accessories necessary. The Contractor shall carefully investigate structural conditions, walls, furring and chase locations and room finishes and shall make actual measurements on the job so that the panelboards, switches, receptacles, lighting fixtures and accessories shall fit.

### 1.3 LAWS, CODES AND PERMITS

- A. Latest edition of the following listed established standards constitute part of the specification requirements.

National Electrical Code - 2005 (NFPA No. 70)  
Applicable State Requirements  
Underwriters' Laboratories (UL)  
Electrical Testing Laboratories (ETL)  
American National Standard Institute (ANSI)  
NFPA 101 Life Safety Code – 2007

### 1.4 JOB CONDITIONS

- A. Accompanying drawings, including plans, details, diagrams, notes, etc., are shown to limit and explain structural conditions, construction requirements, sizes, capacities and method of installation and erection. Structural and other conditions may require certain modifications and adjustments from conditions shown. Such deviations are permissible; however, specific sizes capacities and requirements affecting the satisfactory performance and operation of the installation shall remain unchanged. Make allowance for normal job conditions and interferences.
- B. Ask for details whenever uncertain about method of installation. Lack of details not requested shall not excuse improper installation and correction shall be responsibility of the Contractor.
- C. Schedule and perform all electrical work to avoid delays to the Contractor and other trades.
- D. In addition to the basic work covered under this contract, the Contractor shall plan and schedule the work to permit continuous operation of essential services of existing facilities. Planning shall also include scheduling necessary interruptions of electrical service to existing building at times when such interruptions will cause minimum interference with existing routine and services. All such interruptions shall be made only after consultation with the University. This is extremely important since included in the work is a relocation and rerouting of and connecting to existing facilities. No additional compensation will be allowed for failure to be so informed. Contractor shall provide temporary power connections as required to execute work as shown on drawings.
- E. It is essential that all adjacent areas of the building be kept in operation at all times, except when specific permission is given to contrary. Before any power or equipment is shut down for disconnecting, tie-ins, or rearranging of services, make arrangements with University representative to do this work at night, or Sunday, or at special time of day or year with length of shutdown agreed upon before work is begun. Contractor to bear any overtime or work costs in this connection.

- F. All piping, conduits, conductors and other electrical items in way of construction, shall be rerouted, relocated or otherwise adjusted to work out with such construction or changes shown or specified in any or all of various sections of specifications. Unknown electrical devices that are encountered will be referred immediately to University Representative for method of disposition before continuation of work.
- G. The Contractor shall review the drawings to become familiar with the phasing of construction required for this project.

## **PART 2 PRODUCTS AND INSTALLATION**

### **2.1 APPROVALS**

- A. Name of manufacturer or catalog numbers are mentioned herein in order to establish a standard as to design and quality. Other products similar in design and of equal quality may be used if submitted to the University Representative and approved by him.
- B. Within twenty-one (21) days after award of General Contract, Contractor shall submit complete dimensional shop drawings and descriptive literature covering the following equipment and materials. Written approval thereof must be obtained before ordering or installation.

Safety Switches  
Wiring

Conduit and Fittings

- C. Comply with requirements regarding submittals, number of copies, and procedures.

### **2.2 PROTECTION OF FIXTURES, MATERIAL AND EQUIPMENT**

- A. Contractor shall continuously maintain adequate protection of all his work from damage and shall protect the University's property from injury or loss, except as may be caused by agents or employees of the University. He shall adequately protect adjacent property as provided by law.
- B. Conduit openings shall be capped or plugged during installation. Fixtures and equipment shall be tightly covered and protected against dirt, moisture, chemical and mechanical injury. At the completion of the work, the fixtures, material and equipment shall be thoroughly cleaned and delivered in condition satisfactory to the University Representative.

### **2.3 CUTTING, PATCHING, AND SEALING**

- A. All cutting and patching for the work of this Section shall be in accordance with the requirements of the GENERAL CONDITIONS. The Contractor shall perform all necessary cutting and patching required for the installation of work. Where floor or roof is cut or penetrated the structural integrity shall be maintained or restored. Cutting of structural members is prohibited except with prior approval of the University Representative.
- B. Penetrations of all walls, floors, and ceilings shall be sealed with a material capable of preventing the passage of flames and gases in accordance with the requirements of the test standard ASTM-E-814 for fire stops. The integrity of the fire rating, as indicated on the architectural drawings, shall be maintained.

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## **2.4 CLEANING UP**

- A. This Contractor shall promptly remove from the jobsite all debris, surplus and waste materials, empty crates and cartons resulting from his work.
- B. This Contractor shall remove all oil, grease or other stains resulting from his work performed in the building or the exterior thereof.

## **2.5 TESTING AND BALANCING**

- A. Make tests which may be required by the University or the University Representative in connection with the operation of the electrical system in the building.
- B. All tests shall be made in accordance with the latest standards of the IEEE and the NEC.
- C. The installation shall be tested for performance, grounds, and insulation resistance. "Megger" type instrument shall be used. Circuit continuity tests and operational tests on all equipment furnished and/or connected by him shall be made by the Contractor after such equipment has been installed.
- D. The tests shall be made in the presence of the University Representative. The Contractor shall notify the University or his representative. The Contractor shall notify the University and the University Representative at least seventy-two (72) hours in advance of tests. The Contractor shall provide all testing equipment and all costs shall be borne by him. Written reports shall be made of all tests. All faults shall be corrected immediately.

## **2.6 PAINTING**

- A. Contractor shall touch-up or refinish all items of electrical equipment furnished with a factory finish coat of paint and which may have been damaged regardless of cause.
- B. All electrical equipment such as switches, panelboards, motor controllers, etc., shall be suitably identified with micarta nameplates.

## **2.7 GUARANTEE**

Upon completion of all tests and acceptance, the Contractor shall furnish the University a written guarantee covering all electrical work under this Contract for a period of one (1) year from date of final acceptance. Upon notice from the University or University Representative during the Guarantee period, the Contractor shall replace defective materials and correct faults of workmanship and repair any damage caused thereby promptly and free of any charge. Fuses and lamps are excluded from the guarantee.

## **2.8 CONTRACTOR'S QUALIFICATIONS**

The Contractor must be licensed to perform such work as required by State and Local laws.

## **2.9 DIRECTORY CARDS, NAMEPLATES AND EQUIPMENT LABELS**

Provide in the directory frame of each panelboard and for each feeder switch or circuit breaker, neatly typed directory cards indicating the general area and type of electrical load.

## **2.10 SUBSTITUTION**

- A. All specified material, equipment, fixtures, etc., entering into the work under this section of contract are subject to the prior approval or disapproval of the University Representative. Refer to Section 3.3 (Substitutions) in Instructions to Bidders for approval procedures.
- B. Materials, equipment, fixtures, etc., herein named or indicated on drawings establish the type, size, appearance and quality required of products other manufacturers must meet to be acceptable.
- C. Requests for substitutions must include necessary data to conclusively demonstrate equality in type, size, appearance, quality, etc. Any deviation in the opinion of University Representative may be cause for rejection.

## **PART 3 EXECUTION**

### **3.1 COMMISSIONING**

- A. Contractor shall install all items of equipment as identified in this specification in strict accordance with manufacturer's requirements (whether identified in this specification or not), shop drawings and contract documents. Contractor shall insure a complete installation. Start-up of all equipment shall be by manufacturer authorized representative. Start-up services shall be provided for as long a period of time as is necessary to insure proper operation of the equipment items. The start-up technician shall conduct all operating tests as required to insure the equipment is operating in accordance with design parameters. Complete testing of all safety and emergency control devices shall be made. The start-up technician shall submit a written report to the University Representative (prior to final punch list inspection) containing all test data recorded as required above and a letter certifying that the equipment is operating properly.
- B. Other specific items of commissioning shall be as follows:
  - 1. Test and balance all new power feeders over 50 amps in accordance with Section 16010, Article 2.5.
  - 2. Provide written reports for all tests described above prior to final punch list inspection.

END OF SECTION - 16010

## SECTION 16050 – ELECTRICAL MATERIALS AND METHODS

### PART 1 GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Applicable items of this Section shall apply to all sections of ELECTRICAL.

### PART 2 PRODUCTS AND INSTALLATION

#### 2.1 METHODS OF WIRING

- A. No wire shall be smaller than No. 12 except those for fixture drops and for control circuits of equipment. All wire shall have 600-volt insulation equivalent to type THHN/THWN unless otherwise noted on the drawings.
- B. Conductors shall be continuous from outlet to outlet and no splices shall be made except in outlet or junction boxes.
- C. Homeruns to panelboards may be collected in one or more conduits provided all circuiting is done in accordance with Code requirements and the maximum unbalanced current does not exceed the capacity of the neutral conductors.
- D. Powdered soapstone or approved pulling compound shall be used as a pulling lubricant for all non-lead covered conductors. Use Thomas and Betts Wireslick, Ideal 77 or equal.
- E. All empty conduits installed shall contain a #14 fish wire.
- F. Conduit sizes shall conform to the requirements of the National Electric Code and/or sizes shown on the drawings. Minimize size conduit shall be 1/2".
- G. Vertical penetrations of concrete slabs shall be cored and sealed with fire stop. Size and location of all sleeves are subject to the approval of the structural engineer. Conduits routed below the first floor slab shall be rigid galvanized conduit, supported using 3/8" stainless steel threaded rods and steel framing, hot-dipped galvanized after fabrication. Supports shall be spaced in accordance with NEC-346-12. Any exposed conduits on exterior of building, shall be heavy wall hot dipped galvanized rigid conduit.
- H. Conduits in metal stud walls, exposed within mechanical and electrical rooms, and above ceilings shall be EMT. Conduits in hollow cmu walls shall be EMT with concrete tight set screw fittings. Conduits in solid, infilled cmu walls shall be Schedule 40 PVC.
- I. All raceways shall be concealed unless otherwise indicated.
- J. All conduit and tubing shall be Armco, Plastic Wire & Cable, Steelduct, Republic, Allied, or approved equal.
- K. Branch circuit conduits feeding outlets in masonry walls shall be concealed in masonry. Where outlet boxes are indicated in bare masonry walls, the box shall be mounted so that two edges of the box or plaster cover will fall in a mortar joint. Where switchboxes will not accommodate the number of conductors required and 4" square or larger boxes are installed,

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the device covers shall be manufactured by Steel City Manufacturing Co., or Appleton, 1" minimum in depth, with straight rectangular openings for drywall construction. Where grouting is required to fill up improperly cut openings in the masonry, the work will be rejected. Contractor shall cooperate with the bricklayer to insure a neat and workmanlike job.

- L. Solderless Fixed spring connectors (T & B 10-100, Ideal wrap-cap, or equal) shall be used for all branch circuit wiring and fixture connections on all conductors #10 AWG and smaller. Split bolt or 2 bolt connectors (T & B 6 HPW, O-Z Gedney PMX, or equal) shall be used for connections and splices on all conductors #8 AWG or larger.
- M. Connections to all motors not equipped with a portable cord shall be made with a short piece of flexible metal conduit between rigid conduit system and motor terminal box. Ground bond of separate copper conductor shall be made between motor frame and rigid conduit system. In all outdoor locations, liquid tight flexible metal conduit shall be used.
- N. All recessed fixtures, unless they contain a box approved for THW wire shall be wired with THHN, in three feet (3') maximum of flexible metal conduit from a box at least one foot (1') from the fixture. Not more than two individual or two rows of continuous fixtures shall be connected to any one of these outlet boxes. This box shall be located above the ceiling and shall be accessible by removing fixture. Installation of blank covers on ceilings to provide access to such boxes will not be acceptable.
- O. Splices in all low voltage wiring shall be made at terminal blocks furnished with the equipment. At junction boxes or where other splices are required, these splices shall be soldered.
- P. Other routings than those indicated may not be used without the approval of the University Representative, but Contractor shall make allowance for possible obstructions to routes indicated. Conduits shall be grouped together and run on common hangers parallel to building lines in areas of open ceilings.

## **2.2 WIRING IN RACEWAYS**

- A. Conduit sizes shall conform to requirements of the National Electrical Code and/or sizes shown on drawings.
- B. It is not mandatory that all conduits be routed as shown on the drawings. Other routings facilitating speed and ease of installation may be used, provided the general intent of these specifications is followed and the specific intent of the particular circuit or circuits and the National Electrical Code are not violated; such changes and must be approved by the Engineer before work is done. Contractor shall make full allowances for possible obstructions to these routes, as no extra charges will be allowed for added lengths that may be necessary.
- C. Conduits shall be installed in a neat appearing manner and shall be rigidly secured in place. The use of wooden plugs in masonry or concrete as a base to fasten raceways will not be permitted. Approved anchors only shall be used for this purpose. Exposed conduits shall be installed with runs arranged parallel or perpendicular to walls and ceilings, with rigid angle turns consisting of symmetrical bends, condulets and junction boxes. Bends and offsets shall be held to a minimum. Conduits shall be kept at least six (6") inches from parallel runs of hot piping flues, or other hot objects.

## **ELECTRICAL MATERIALS AND METHODS**

- D. Conduits shall be cut with a hacksaw; ends must be square, threads cut and cleaned before reaming. Conduits must be securely fastened to all outlet and junction boxes with two locknuts and one bushing of approved make, care being exercised to see that full number of threads project through to permit bushings to butt up tight against the end of the conduit, after which the locknuts shall be screwed tight. Conduit shall be joined by approved conduit couplings and shall have ends butted in all cases where couplings are used. Use three piece threaded electrical unions where standard couplings cannot be used. The use of running threads will not be permitted. Where condulets cannot be joined by standard thread couplings, approved type conduit unions shall be used. Connectors and couplings for electric metallic tubing shall be of the set screw type. Couplings for rigid heavy-wall conduit shall be of the threaded type.
- E. Conduit fittings shall be Crouse-Hinds or Appleton grounding type, or approved equal.
- F. Insulated bushings shall be provided for all conductors #4 and larger.
- G. No wire shall be pulled in until the conduit system is complete and plastering dried. This does not include the white finish coat of plaster.
- H. During Construction, all outlet boxes and conduit stub-ins shall be suitably protected against the entrance of foreign material.

## **2.3 BOXES AND FITTINGS**

- A. Boxes and fittings shall conform to requirements of Article 370 of the N.E.C.
- B. Junction and pull boxes required by field conditions shall be installed whether indicated on drawings or not.
- C. The location of outlets not specifically dimensioned on the drawings should be considered as approximate only. The Contractor shall study the general plans with relation to the spaces surrounding each outlet in order that his work fit the work of others so that when fixtures or other fittings are installed, they will be symmetrically located according to design requirements.
- D. Use only galvanized outlet and junction boxes, conduit fittings, covers, and supports for interior wiring and cast fittings and boxes with gasketed covers for exterior wiring. The Contractor shall provide all necessary structural supports for boxes and cabinets. Kindorf or Unistrut channels shall be used where applicable.
- E. Boxes for concealed outlets shall be 4" square by 1-1/2" deep, or larger, with raised device covers as required, except that 2-3/4" deep switch boxes may be used where only one conduit enters a box.
- F. Boxes for concealed ceiling outlets shall be 4" octagonal by 1-1/2" deep, or larger. Boxes in plaster ceilings shall have plaster covers. Fixture outlet boxes shall be equipped with fixture studs secured to the boxes.

- G. Outlet boxes for exposed work shall be 4" square by 1-1/2" deep, or larger. Boxes shall have Appleton 1/2" deep surface metal covers to accommodate the devices indicated, or approved equal.
- H. In walls or ceilings of concrete, tile or other non-combustible material, boxes and fittings shall be so installed that the front edge of the box or fitting will not set back of the finished surface more than 1/4". In walls or ceilings constructed of wood or other combustible material, outlet boxes and fittings shall be set flush with the finished surface.
- I. If a fixture, canopy or pan is used as an outlet box cover, any combustible wall or ceiling finish between the edge of the canopy and the outlet box shall be covered with non-combustible material.
- J. Fixture studs shall be installed in all fixture outlets. In each case, the maximum permissible number of conductors shall be reduced by one.
- K. Appropriate galvanized blank covers, subject to approval of the Engineer, shall be installed over outlet or junction boxes which do not house a device. Multiple devices shall be installed in one-piece multi-gang box with one-piece multi-gang cover plates. On surface mounted switch and receptacle outlets, provide raised covers to permit mounting devices without additional device plates.
- L. For junction and pull boxes, 14 gauge or thicker sheetmetal. Attach covers by means of 1/4" X 20 round head machine screws. In damp locations, provide rubber or neoprene gaskets.
- M. Attention is called to National Electrical Code, Article 370, Paragraph 370-16, Sub-paragraph (a) and (b) relative to allowable number of conductors in outlet boxes. Contractor shall make provisions to prevent overcrowding outlet and junction boxes regardless of number of conductors shown on the drawings at the outlets. There shall be no deviations from Code requirements on this subject.

## **2.4 CONDUCTORS**

- A. All conductors shall be copper and no wire shall be less than #12 AWG except as otherwise noted herein and or indicated on drawings.
- B. All conductors, except as herein noted and/or as indicated on drawings, shall have 600 volt insulation type THHN/THWN. Wiring through channels of continuous surface or suspended fluorescent fixtures shall be Type RHH, or THHN.
- C. Recessed fluorescent fixtures shall be fed with type THHN, or RHH conductors and recessed incandescent fixtures shall be fed with Type THHN conductors.
- D. Conductors #8 and larger shall be stranded. Feeders shall be of the size and type indicated on drawings.
- E. Type MC cable shall not be used.

## **2.5 GROUNDING**

- A. Grounding shall conform to the requirements of Article 250 of the N.E.C.

## **ELECTRICAL MATERIALS AND METHODS**

- B. Contractor shall provide grounding as indicated on drawings, or as required by the modifications to the distribution system.
- C. A grounding conductor shall be provided in all conduit. The grounding conductor shall be green insulated, with a minimum size of #12 AWG, or as indicated on the drawings or per NEC-250. Grounding conductors routed entirely in soil as part of the ground loop shall be bare copper. The grounding conductor connecting the electrical service to the ground system shall be green insulated copper.
- D. Bond jumpers shall be used around concentric or eccentric knockouts on service equipment.
- E. Grounding pole of each polarized receptacle shall be bonded to its outlet box with copper wire and machine or self-tapping screw.

## **2.6 EQUIPMENT SUPPORTS**

All electrical switches, panels, appurtenances, etc., shall be rigidly supported on Unistrut or equal steel framing which shall be securely fastened to walls, floors, ceilings, etc., as required. Details of framing must be submitted to Engineer for approval before installation.

## **2.7 MOUNTING HEIGHTS**

- A. If not otherwise indicated in the drawings, mounting heights to centerline of outlets shall be as follows:
- B. Receptacles - 18" above finished floor except above counter where indicated, or as directed by Owner.
- C. Light Switches - 48" above finished floor.
- D. Panelboard - Not more than 6'-0" from topmost operating handle to floor.
- E. Bracket Fixtures - 8'-0" above floor, or where mounted above exterior door, mirror, medicine cabinet, at a height just sufficient to clear the swing of the door or medicine cabinet.
- F. The above mounting heights may be adjusted as required to permit bottom or top of plate to align with mortar joints in unfinished masonry walls, provided joints are not raked. Where joints are raked, adjust height as required to insure that center of outlet box will be in center of a masonry unit.

## **2.8 SAFETY SWITCHES**

- A. Safety switches shall be of the visible blade, heavy duty knife switch type. They shall be of the fused or unfused type as required. Fused switches shall have positive pressure fuse clips. Switches shall be fully interlocked with provision to neutralize the interlock by a screwdriver while under load without interrupting the circuit. Switches shall be complete with insulated base and pressure or solderless lugs. All switches shall be horsepower rated, capable of breaking stalled-rotor motor current at these ratings. Outdoor locations shall have NEMA Type 3R enclosures, indoor locations shall have NEMA 1 enclosures.

## **ELECTRICAL MATERIALS AND METHODS**

- B. Switches shall have provision for padlocking in the "ON" or "OFF" positions. Safety switches, as indicated on plans, shall be Siemens, General Electric, Cutler-Hammer, or Square D.

## 2.9 TERMINATIONS

All termination lugs shall be rated 75 degrees C or higher, and shall be compatible with number and size of wires to be terminated.

END OF SECTION - 16050

**SECTION 16900 - ELECTRICAL EQUIPMENT CONNECTIONS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Applicable items of all other ELECTRICAL SECTIONS shall apply to this Section.
- B. All Drawings and General Provisions of the Contract, including General Conditions, Supplementary Conditions apply to this Section.

**PART 2 - PRODUCTS**

Not used

**PART 3 - EXECUTION**

**3.1 MECHANICAL EQUIPMENT**

- A. All power wiring associated with the MECHANICAL SECTION of these Specifications shall be done by this Contractor.
- B. Contractor will furnish and set all motors.
- C. Overload elements in all starters shall be selected according to actual motor nameplate full load current. Responsibility for this coordination shall lie with the Contractor who has furnished the particular starter.
- D. All manual starting switches shall be furnished and installed by the Contractor.
- E. All disconnect switches shall be furnished and installed as indicated and as required by the Contractor.
- F. Refer to MECHANICAL SECTION and to MECHANICAL PLANS for any additional electrical work required.

END OF SECTION - 16900

NET CHARTER  
CHILLER & BOILER REPLACEMENT  
EAST CAMPUS  
LSU NEW ORLEANS  
NEW ORLEANS, LOUISIANA  
SP #5331  
BTB #2933



VICINITY MAP  
MAP SCALE  
TRUE NORTH

1. CONSTRUCTION NOTES:
2. SHUTDOWNS MUST BE SCHEDULED WITH UNIVERSITY REPRESENTATIVE A MINIMUM OF ONE WEEK BEFORE PERFORMING WORK.
3. CONTRACTOR SHALL VISIT SITE AND INCLUDE ALL OFFSETS REQUIRED FOR CONDITIONS SHOWN ON DRAWINGS.
4. ALL SURPLUS MATERIAL SHALL BE HAULED OFF SITE AND LEGALLY DISPOSED OF.
5. THE CONTRACTOR SHALL HAVE 180 CALENDAR DAYS TO COMPLETE THE WORK.
6. ALL ELECTRICAL WORK SHALL CONFORM TO THE NATIONAL ELECTRICAL CODE.
7. COORDINATE ALL CONTROL WORK WITH EXISTING JCI METASYS CONTROL SYSTEM.

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| T1  | TITLE SHEET                                  |
| ME1 | PARTIAL FLOOR PLAN - MECHANICAL & ELECTRICAL |
| ME2 | SCHEDULES & DETAILS                          |



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chiller & boiler replacement  
**LSU New Orleans**  
East Campus  
New Orleans, Louisiana 70148

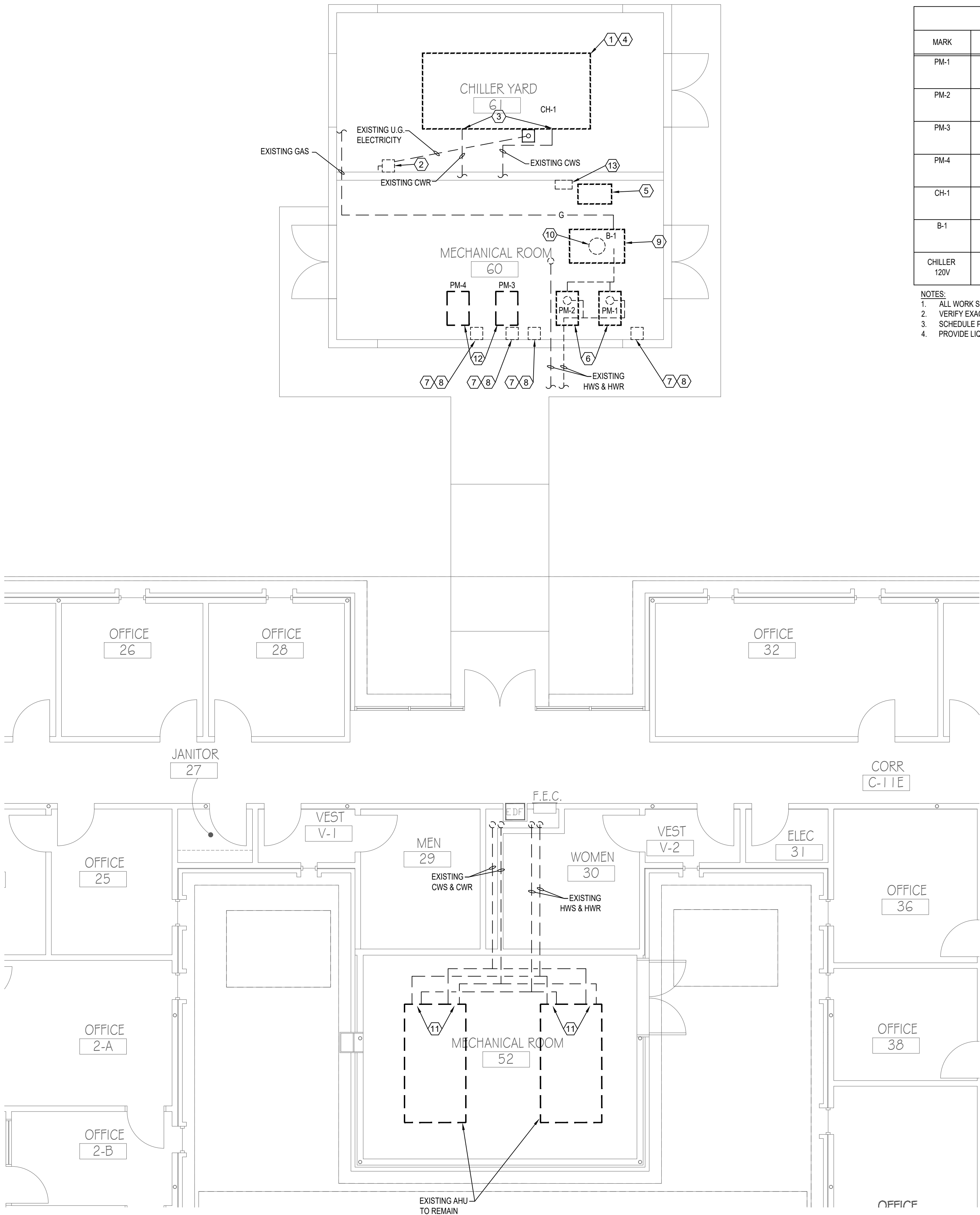


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These plans were prepared in this office under our personal supervision, and to the best of our knowledge comply with state and local codes. We will generally administer construction.

| revisions |
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**T1**



PARTIAL FLOOR PLAN - MECHANICAL & ELECTRICAL  
SCALE: 3/16" = 1' - 0"

| EQUIPMENT       |     |         |       | ELECTRICAL          | SCHEDULE     |                               |                                                                                           |
|-----------------|-----|---------|-------|---------------------|--------------|-------------------------------|-------------------------------------------------------------------------------------------|
| MARK            | HP  | AMPS    | VOLTS | DISCONNECTING MEANS | CONDUIT SIZE | WIRE SIZE                     | PANEL TERMINATION                                                                         |
| PM-1            | 3   | 10.6    | 208   | VFD1                | 1/2"         | 3-#12 CONDUCTORS<br>1-#12 GRD | REPLACE STARTER WITH VFD. THIS WORK IS ALTERNATE #1.                                      |
| PM-2            | 3   | 10.6    | 208   | VFD2                | 1/2"         | 3-#12 CONDUCTORS<br>1-#12 GRD | REPLACE STARTER WITH VFD. THIS WORK IS ALTERNATE #1.                                      |
| PM-3            | 7.5 | 24.2    | 208   | VFD3                | 1/2"         | 3-#10 CONDUCTORS<br>1-#10 GRD | REPLACE STARTER WITH VFD. THIS WORK IS ALTERNATE #1.                                      |
| PM-4            | 7.5 | 24.2    | 208   | VFD4                | 1/2"         | 3-#10 CONDUCTORS<br>1-#10 GRD | REPLACE STARTER WITH VFD. THIS WORK IS ALTERNATE #1.                                      |
| CH-1            | -   | 285 MCA | 208   | EXISTING            | 3"           | 3-350 KCMIL<br>1-4# GRD       | CONNECT TO EXISTING DISCONNECT SWITCH.                                                    |
| B-1             | -   | 7.5     | 120   | EXISTING            | 1/2"         | 2-#12 CONDUCTORS<br>1-#12 GRD | CONNECT TO EXISTING WIRING AND CONDUIT.                                                   |
| CHILLER<br>120V | -   | -       | 120   | EXISTING            | 1/2"         | 2-#12 CONDUCTORS<br>1-#12 GRD | CONNECT TO EXISTING WIRING AND CONDUIT. PROVIDE JUNCTION BOX AND RUN TO TO CHILLER PANEL. |

- NOTES:
- ALL WORK SHALL BE IN ACCORDANCE WITH THE NEC.
  - VERIFY EXACT ROUTING OF ALL CONDUIT IN THE FIELD.
  - SCHEDULE POWER SHUTDOWNS WITH THE OWNER.
  - PROVIDE LIQUID TYPE FLEXIBLE CONDUIT AT CONNECTIONS TO CHILLER AND PUMPS.

GENERAL NOTES THIS SHEET:

- ALL MECHANICAL AND ELECTRICAL TO REMAIN UNLESS NOTED OTHERWISE.
- EXISTING MECHANICAL AND ELECTRICAL TO BE REMOVED IS SPECIFICALLY NOTED. VERIFY EXACT LOCATION ON SITE AND CAP PIPING/ TERMINATE WIRING WHERE INDICATED OR AS REQUIRED FOR A COMPLETE DEMOLITION.
- REMOVE ALL UNUSED CONDUIT, WIRING, CONTROLS, SUPPORTS, ETC.
- REPAIR EXISTING PIPING INSULATION WHERE CONNECTIONS ARE MADE TO EXISTING PIPING.
- ALL NEW CONDUIT SHALL BE MINIMUM 1/2" EMT WITH 2#12 AWG AND 1#12 GRD UNLESS NOTED OTHERWISE.
- GROUNDING SHALL BE IN ACCORDANCE WITH ARTICLE 250 OF THE NEC.
- FINAL ELECTRICAL CONNECTIONS TO PUMPS AND CHILLERS SHALL BE MADE WITH 3' OF LIQUIDTIGHT FLEXIBLE CONDUIT.
- PROVIDE MANUAL AIR VENTS AT ALL PIPING HIGH POINTS AND 1-1/2" DRAIN VALVES AT PIPING LOW POINTS.
- PROVIDE REDUCERS AND ELBOWS IN PIPING AS REQUIRED FOR CONNECTIONS TO EQUIPMENT.
- MAINTAIN 3' CLEARANCE IN FRONT OF ELECTRICAL EQUIPMENT.
- REFER TO MANUFACTURER'S RECOMMENDATIONS FOR EQUIPMENT INSTALLATION RECOMMENDATIONS. PROVIDE ALL REQUIRED PIPING.
- PROVIDE SENSOR WELLS AS REQUIRED FOR TEMPERATURE CONTROLS. ALL CONTROL PIPING AND SENSOR PIPING SHALL BE 304 SS.
- PROVIDE THERMOMETERS AT INLET AND OUTLET OF CHILLER.
- EXISTING CONTROLS ARE JCI.

SPECIFIC NOTES THIS SHEET:

- REMOVE EXISTING AIR COOLED CHILLER AND REPLACE WITH NEW AIR COOLED CHILLER.
- EXISTING 400A, DS. MODIFY EXISTING FEEDER FROM ABOVE GROUND TO CHILLER AS REQUIRED FOR NEW CHILLER ELECTRICAL CONNECTION.
- DISCONNECT EXISTING CWS & CWR AS REQUIRED FOR NEW CHILLER INSTALLATION. MODIFY PIPING AS REQUIRED AND RECONNECT TO NEW CHILLER. SEE DETAIL ON ME2.0.
- DISCONNECT 120V CIRCUIT FROM EXISTING CHILLER. MODIFY AS REQUIRED AND RECONNECT TO NEW CHILLER.
- REMOVE EXISTING AIR COMPRESSOR INCLUDING POWER BACK TO PANEL. REMOVE ALL ACCESSORIES AND AIR PIPING IN MECHANICAL ROOM.
- UNDER ALTERNATE #1, REMOVE EXISTING HEATING WATER PUMP AND REPLACE WITH NEW PUMP. DISCONNECT EXISTING PIPING AND RECONNECT TO NEW PUMP. ENTIRE PUMP TREE (VALVES, STRAINERS, ETC.) TO BE REPLACED. SEE DETAIL ON ME2.0.
- UNDER ALTERNATE #1, REPLACE STARTER WITH VFD. DISCONNECT AND RECONNECT WIRING AS REQUIRED.
- DISCONNECT AND RECONNECT POWER TO PUMPS. MODIFY AS REQUIRED.
- REMOVE AND REPLACE EXISTING BOILER. DISCONNECT AND RECONNECT HWS & HWR PIPING. GAS PIPING AND ELECTRICAL CIRCUIT. MODIFY AS REQUIRED. SEE DETAIL ON ME2.0.
- REMOVE EXISTING FLUE AND REPLACE WITH NEW 6"Ø FLUE THRU ROOF. MODIFY EXISTING ROOF PENETRATION FOR NEW FLUE AS REQUIRED. PROVIDE 304 SS CURB CAP SEALING EXISTING FLUE PENETRATIONS.
- REMOVE EXISTING CHILLER AND HEATING WATER CONTROLS VALVES AND REPLACE WITH NEW DDC VALVES. SEE VALVE SCHEDULE ON ME2.0.
- UNDER ALTERNATE #1, REMOVE EXISTING CHILLED WATER PUMP AND REPLACE WITH NEW PUMP. DISCONNECT EXISTING PIPING AND RECONNECT TO NEW PUMP. ENTIRE PUMP TREE (VALVES, STRAINERS, ETC.) TO BE REPLACED. SEE DETAIL ON ME2.0.
- REMOVE EXISTING AIR DRYER AND ALL ASSOCIATED PIPING AND WIRING.



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19 JUNE, 2026

sheet

ME1.0

| VARIABLE |         | FREQUENCY |      | DRIVE |        | SCHEDULE (ALTERNATE #1)                                                            |
|----------|---------|-----------|------|-------|--------|------------------------------------------------------------------------------------|
| MARK     | SERVICE | HP        | VOLT | PH    | TYPE   | DESCRIPTION                                                                        |
| VFD-1,2  | PM-1,2  | 3         | 208  | 3     | NEMA-1 | PWM VARIABLE FREQ. DRIVE WITH CIRCUIT BREAKER, MANUAL BYPASS<br>ABB ACH 550 SERIES |
| VFD-3,4  | PM-3,4  | 7.5       | 208  | 3     | NEMA-1 | PWM VARIABLE FREQ. DRIVE WITH CIRCUIT BREAKER, MANUAL BYPASS<br>ABB ACH 550 SERIES |

| PACKAGED |     | AIR  |               | COOLED                              | CHILLER                       | SCHEDULE                                                                                                                                                                                                                                                                                                                  |
|----------|-----|------|---------------|-------------------------------------|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MARK     | GPM | TONS | EWTLWTF<br>F° | PRESS. DROP<br>FT. H <sub>2</sub> O | COND. AIR<br>ENT. TEMP.<br>F° | DESCRIPTION                                                                                                                                                                                                                                                                                                               |
| CH-1     | 134 | 56.1 | 54/44         | 7.2                                 | 95                            | PACKAGED AIR COOLED SCROLL CHILLER, HIGH EFFICIENCY, IPLV17.5, 10.85 EER, R-454B, SINGLE POINT POWER INCLUDING MAIN DISCONNECT, DUAL REFRIGERANT CIRCUIT, 5-YEAR FULL WARRANTY, BACNET INTERFACE, LOW AMBIENT, LOUVERED ENCLOSURE, LOW SOUND PACKAGE, 65 KA SCC, HOT GAS BYPASS, COATED CONDENSER COILS.<br>YORK YLAA0058 |

CARRIER, TRANE EQUALS

| CONTROL VALVE SCHEDULE |             |     |                        |                    |                   |
|------------------------|-------------|-----|------------------------|--------------------|-------------------|
| MARK                   | SERVICE     | GPM | PRESSURE<br>DROP (PSI) | VALVE<br>SIZE (IN) | PIPE<br>SIZE (IN) |
| CV-1                   | CW<br>AHU-1 | 69  | -                      | 2"                 | EXIST             |
| CV-2                   | HW<br>AHU-1 | 45  | -                      | 1-1/2"             | EXIST             |
| CV-3                   | CW<br>AHU-2 | 94  | -                      | 2-1/2"             | EXIST             |
| CV-4                   | HW<br>AHU-2 | 62  | -                      | 2"                 | EXIST             |

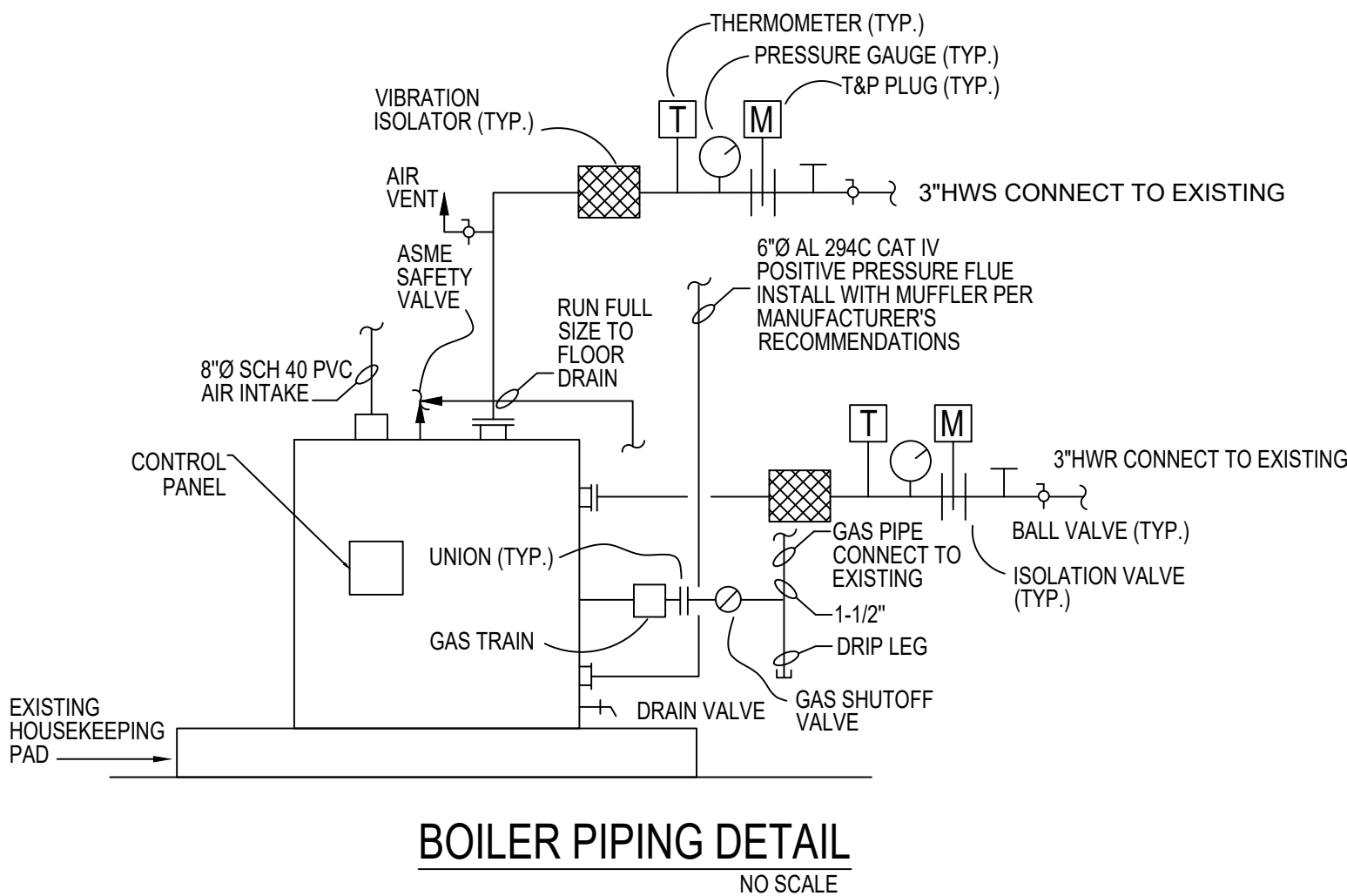
- NOTES:
- ALL VALVES TO HAVE DDC ELECTRIC ACTUATORS.
  - PROVIDE REDUCERS AS REQUIRED.

| PUMP     |                  | SCHEDULE (ALTERNATE #1) |                                |            |       |      |      |           |              |                                                                 |  |
|----------|------------------|-------------------------|--------------------------------|------------|-------|------|------|-----------|--------------|-----------------------------------------------------------------|--|
| MARK     | SERVICE          | GPM                     | FT<br>HEAD<br>H <sub>2</sub> O | ELECTRICAL |       | DATA |      | MIN EFF % | MOTOR<br>EFF | DESCRIPTION                                                     |  |
|          |                  |                         |                                | H.P.       | VOLTS | PH.  | RPM  |           |              |                                                                 |  |
| PM -1, 2 | HEATING<br>WATER | 110                     | 40                             | 3          | 208   | 3    | 1750 | 65        | 93           | CLOSE COUPLED BASE MOUNTED END SUCTION<br>AURORA 3801-2X2.5X7A  |  |
| PM -3, 4 | CHILLED<br>WATER | 160                     | 65                             | 7.5        | 208   | 3    | 1750 | 66        | 93           | CLOSE COUPLED BASE MOUNTED END SUCTION<br>AURORA 3801-2X2.5X9.5 |  |

B&G, TACO EQUALS

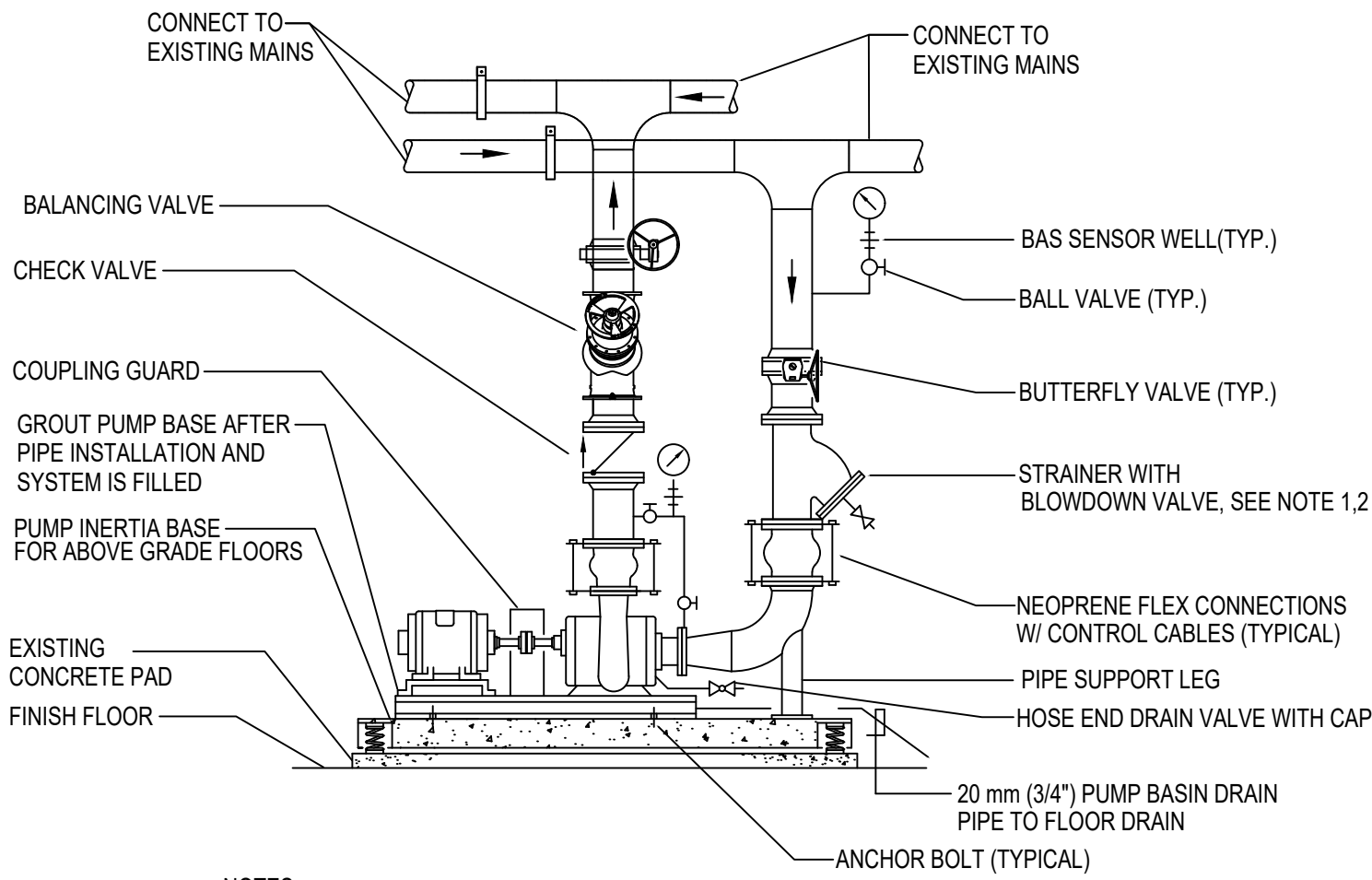
| GAS FIRED HOT WATER BOILER SCHEDULE |                |                 |                                    |                                |              |                                  |                         |                 |            |      |      |                                                                            |
|-------------------------------------|----------------|-----------------|------------------------------------|--------------------------------|--------------|----------------------------------|-------------------------|-----------------|------------|------|------|----------------------------------------------------------------------------|
| MARK                                | MBTUH<br>INPUT | MBTUH<br>OUTPUT | DESIGN<br>PRESS.<br>RATING<br>PSIG | DESIGN<br>TEMP<br>RATING<br>°F | GPM          | WTR.P.D.<br>FT. H <sub>2</sub> O | LVG<br>WATER<br>TEMP °F | WATER<br>Δ T °F | ELECTRICAL |      | DATA | DESCRIPTION                                                                |
|                                     |                |                 |                                    |                                |              |                                  |                         |                 | FLA        | VOLT | PH   |                                                                            |
| B-1                                 | 1500           | 1275            | 160                                | 250                            | 110<br>63MIN | 7.3                              | 160<br>(ADJ)            | 20<br>(ADJ)     | 7.5        | 120  | 1    | HIGH EFFICIENCY CONDENSING STYLE BOILER.<br><br>THERMAL SOLUTIONS EVA-1500 |

AERCO, LOCHINVAR EQUALS



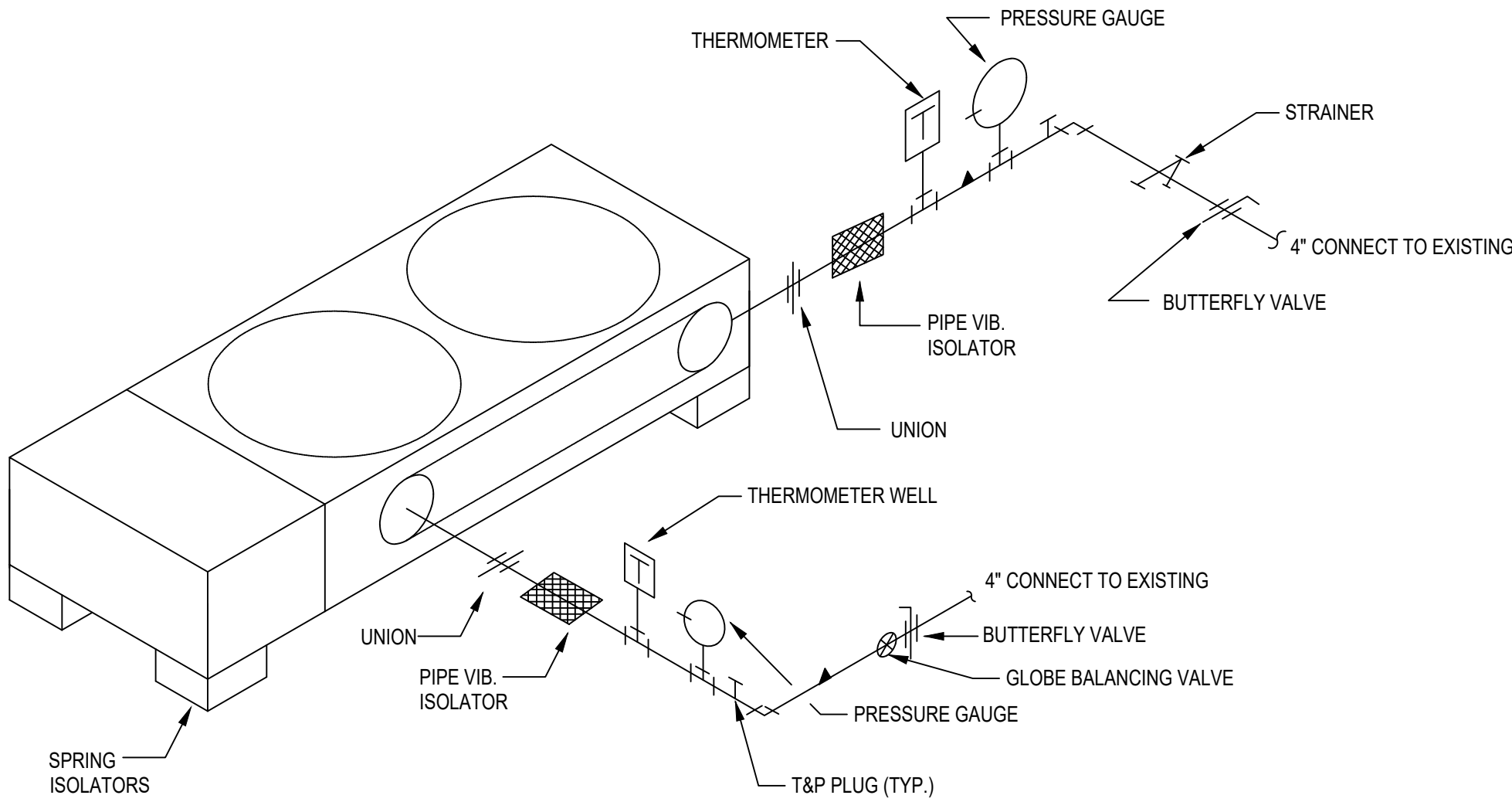
BOILER PIPING DETAIL  
NO SCALE

| MECHANICAL |                        | LEGEND  |                          |
|------------|------------------------|---------|--------------------------|
| SYMBOL     | DESCRIPTION            | SYMBOL  | DESCRIPTION              |
| — CDS —    | CONDENSER WATER SUPPLY | F.D.    | FLOOR DRAIN              |
| — CDR —    | CONDENSER WATER RETURN | (TYP)   | TYPICAL                  |
| — CWS —    | CHILLED WATER SUPPLY   | CONN.   | CONNECTION               |
| — CWR —    | CHILLED WATER RETURN   |         | GATE VALVE               |
| — HWS —    | HEATING WATER SUPPLY   |         | CHECK VALVE              |
| — HWR —    | HEATING WATER RETURN   |         | VALVE IN VERTICAL RISE   |
| — G —      | GAS PIPING             |         | UNION                    |
| DN         | DOWN                   |         | FLOOR DRAIN              |
|            | BALL VALVE             |         | PIPING TEE               |
|            | CONTROL TEMP. SENSOR   |         | CONTROL FLOW METER       |
|            | PRESSURE GAUGE         | — V —   | VENT PIPING              |
|            | BALANCING VALVE        | — UGV — | UNDER GROUND VENT PIPING |
|            | THERMOMETER            |         | ASME T & P RELIEF        |
| CO         | CLEAN OUT              |         | CONTROL VALVE            |
|            | THERMOMETER            |         | FLOW CONTROL VALVE       |



- NOTES:
- SUCTION DIFFUSER MAY BE USED INSTEAD OF Y STRAINER.
  - STRAINER SCREEN SHALL BE CLEANED PRIOR TO WATER BALANCING.

PUMP PIPING DETAIL (TYPICAL)  
NO SCALE



PACKAGED AIR COOLED CHILLER DETAIL  
NO SCALE

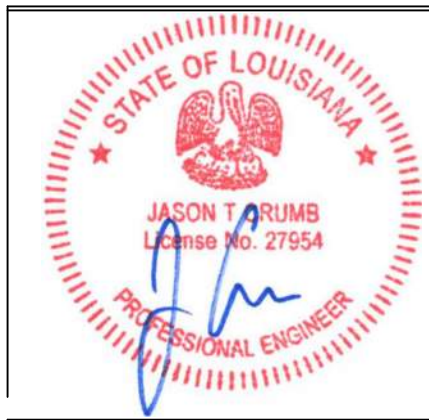
| ELECTRICAL |                                      | LEGEND |
|------------|--------------------------------------|--------|
| SYMBOL     | DESCRIPTION                          |        |
|            | DISCONNECT SWITCH W/VISIBLE BLADES   |        |
|            | STARTER/ DISCONNECT                  |        |
|            | JUNCTION BOX                         |        |
|            | ELECT. MOTOR W/APPROVED DISC. SWITCH |        |
| —          | CONDUIT / WIRING                     |        |



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ME2.0