



**ADDENDUM#1**

October 16, 2023

PROPOSAL NUMBER: UCA-24-020  
OPENING DATE: October 24, 2023  
OPENING TIME: 2:00 p.m.  
PROJECT: Snow Fine Arts HVAC Upgrades

The attached addendum forms a part of the contract documents and modifies or interprets the proposal documents, as noted below.

Receipt of this addendum is required by acknowledging on Bid Form Section 004113, line item #6.

If you have any questions concerning this addendum, please contact Pam Giblet 501-450-3156.

Cordially,

*Pam Giblet*

Pam Giblet  
Construction and Contract Manager

**PROJECT: UCA Snow Fine Arts Center Renovation**

UCA Project #: UCA-24-020

Arch Project #: 21200.C

ADDENDUM NUMBER: 1

TO: PROJECT MANUAL AND DRAWINGS

FOR: University OF Central Arkansas

Conway, Arkansas

DATE: October 15, 2023

BID DATE: **October 24, 2023 2:00 P.M.**

This addendum forms a part of the Contract Documents and modifies or interprets the Project Manual and Drawings, as noted below. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject bidder to disqualification.

**ARCHITECTURAL ADDENDUM ITEMS – PROJECT MANUAL:**

- A1. REFER to Table of Contents
  - A. **ADD** spec sections:
    - 1. 00 73 43 WAGE RATE REQUIREMENTS.
    - 2. 23 07 16 HVAC EQUIPMENT INSULATION
    - 3. 23 08 00 COMMISSIONING OF HVAC SYSTEMS
    - 4. 23 21 23 HYDRONIC PUMPS
    - 5. 23 25 00 CHEMICAL WATER TREATMENT
- A2. REFER to 00 1116 INVITATION TO BID
  - A. **REPLACE** October 18<sup>th</sup>, 2023 with **October 24, 2023** and 10 am with **2 pm** for the bid date.
- A3. REFER to 00 4113 Bid Form
  - A. **Add:** 4.h. The undersigned agrees to pay prevailing hourly wage rates mandated by the Davis-Bacon Wage Rates and any other applicable federal regulations.
  - B. **REVISE** Bid Date: **October 24, 2023** and Bid Time: **2:00 p.m.**

**ARCHITECTURAL ADDENDUM ITEMS – DRAWINGS:**

- A4. REFER to Sheet A0.00
  - A. Refer to Overall Plans. Contractor responsible for security & dust protection between contractor work zones and areas inaccessible during construction that will be in use during construction.
- A5. REFER to Sheet A1.01-A1.13
  - A. Refer to Partition Type Graphics. DELETE New Partition – 2 Hour Fire Rating. No new walls are 2 hr rated.

**MECHANICAL ADDENDUM ITEMS – DRAWINGS:**

- P1. Refer to Sheet M2.2 for clarification about expansion tank sizing.
- P2. Refer to Sheet M5.1 for clarifications about HVAC Control Valves.

**END OF ADDENDUM**

**Wage Rate Requirements**  
**Section 00 73 43 / Rev: July 2017**

AR180032

A) The Contractor agrees to pay all prevailing hourly wage rates as mandated by the Davis-Bacon Wage Rates and any other applicable Federal Regulations. See attached Wage Rates.

B) The Contractor is responsible for completing and returning any reports or forms mandated by the applicable federal regulations from the U.S. Department of Labor. See attached reference.

Superseded General Decision Number: AR20220027

State: Arkansas

Construction Type: Building

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

County: Faulkner County in Arkansas.

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least \$16.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2023.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least \$12.15 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2023.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <http://www.dol.gov/whd/govcontracts>.

Modification Number	Publication Date
0	01/06/2023
1	08/25/2023

BOIL0069-002 01/01/2021

	Rates	Fringes
BOILERMAKER.....	\$ 30.49	23.13

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CARP0216-003 01/01/2022

	Rates	Fringes
MILLWRIGHT.....	\$ 29.90	11.58

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ELEC0295-010 01/01/2017

	Rates	Fringes
ELECTRICIAN (Includes Low Voltage Wiring).....	\$ 24.55	12.23

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PAIN0424-010 07/01/2021

	Rates	Fringes
PAINTER (Brush, Roller, and Spray, Excludes Drywall Finishing/Taping).....	\$ 16.25	10.42

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\* PLUM0155-016 08/01/2023

	Rates	Fringes
PIPEFITTER (Excludes HVAC Pipe Installation).....	\$ 31.58	13.36

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SHEE0036-034 06/01/2021

	Rates	Fringes
SHEET METAL WORKER (Includes HVAC Duct Installation).....	\$ 24.44	13.66

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\* SUAR2015-024 01/09/2017

	Rates	Fringes
BRICKLAYER.....	\$ 20.33	3.77

CARPENTER, Includes Acoustical Ceiling Installation, and Drywall Hanging.....	\$ 18.30	0.00
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CEMENT MASON/CONCRETE FINISHER...	\$ 19.80	3.89
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DRYWALL FINISHER/TAPER.....	\$ 15.38 **	0.00
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INSULATOR - MECHANICAL (Duct, Pipe & Mechanical System Insulation).....	\$ 17.16	4.76
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IRONWORKER, REINFORCING.....	\$ 14.00 **	0.00
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IRONWORKER, STRUCTURAL.....	\$ 19.61	0.00
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LABORER: Common or General.....	\$ 12.69 **	0.00
LABORER: Mason Tender - Brick...	\$ 12.37 **	0.00
LABORER: Pipelayer.....	\$ 14.00 **	0.00
OPERATOR:		
Backhoe/Excavator/Trackhoe.....	\$ 28.21	0.00
OPERATOR: Bulldozer.....	\$ 16.74	0.00
OPERATOR: Crane.....	\$ 17.52	0.00
OPERATOR: Grader/Blade.....	\$ 14.66 **	0.00
OPERATOR: Paver (Asphalt, Aggregate, and Concrete).....	\$ 23.75	0.00
OPERATOR: Roller.....	\$ 14.78 **	0.00
PLUMBER, Includes HVAC Pipe Installation.....	\$ 17.35	0.00
ROOFER.....	\$ 15.39 **	0.00
SPRINKLER FITTER (Fire Sprinklers).....	\$ 23.56	2.77
TRUCK DRIVER: Dump Truck.....	\$ 13.80 **	0.71

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WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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\*\* Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 (\$16.20) or 13658 (\$12.15). Please see the Note at the top of the wage determination for more information.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

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The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

#### Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

#### Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

#### Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

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WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- \* an existing published wage determination
- \* a survey underlying a wage determination
- \* a Wage and Hour Division letter setting forth a position on a wage determination matter
- \* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations  
Wage and Hour Division  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISIO"

**SECTION 23 0716  
HVAC EQUIPMENT INSULATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Equipment insulation.
- B. Covering.

**1.02 RELATED SECTIONS**

- A. Painting: Painting Insulation Covering - Section 09 9000.
- B. Identification for HVAC Piping and Equipment - Section 23 0553.
- C. HVAC Piping Insulation - Section 23 0719.

**1.03 SUBMITTALS**

- A. Submit under provisions of Section 01 30 00 and Section 23 0500.

**1.04 QUALIFICATIONS**

- A. Applicator: Company specializing in performing the work of this section with minimum three years experience.

**PART 2 PRODUCTS**

**2.01 GLASS FIBER, FLEXIBLE**

- A. Insulation: ASTM C553; flexible, noncombustible.
  - 1. ASTM C335, 0.24 at 75 degrees F.
  - 2. Maximum service temperature: 850 degrees F.
  - 3. Maximum moisture absorption: 0.2 percent by volume.
  - 4. Density: 2.0 lb/cu ft. density.
- B. Vapor Barrier Jacket
  - 1. ASTM C921, kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
  - 2. Moisture vapor transmission: ASTM E96; 0.02 perm.
- C. Vapor Barrier Lap Adhesive
  - 1. Compatible with insulation.

**2.02 GLASS FIBER, RIGID**

- A. Insulation: ASTM C612; rigid, noncombustible.
  - 1. K value: ASTM C335, 0.24 at 75 degrees F.
  - 2. Maximum service temperature: 850 degrees F.
  - 3. Maximum moisture absorption: 0.1 percent by volume.
  - 4. Density: 3.0 lb/cu ft density.

- B. Vapor Barrier Jacket:
  - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
  - 2. Moisture vapor transmission: ASTM E96; 0.02 perm.
- C. Vapor Barrier Lap Adhesive:
  - 1. Compatible with insulation.

### **2.03 JACKETS**

- A. Canvas Jacket: UL listed
  - 1. Fabric: ASTM C921, 6 oz/sq yd, plain weave cotton treated with dilute fire-retardant lagging adhesive.
  - 2. Lagging Adhesive:
    - a. Compatible with insulation.

### **2.04 APPROVED MANUFACTURERS**

- A. Glass Fiber, Flexible:
  - 1. Owens Corning.
  - 2. Architect Approved.
- B. Glass Fiber, Rigid:
  - 1. Owens Corning.
  - 2. Architect Approved.
- C. Vapor Barrier Lap Adhesive:
  - 1. Foster.
  - 2. Architect Approved.
- D. Lagging Adhesive:
  - 1. Thixotropic.
  - 2. Architect Approved.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that equipment has been tested before applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

### **3.02 INSTALLATION**

- A. Do not insulate over nameplate or ASME stamps. Bevel and seal insulation around such.
- B. Install insulation for equipment requiring access for maintenance, repair, or cleaning, in such a manner that it can be easily removed and replaced without damage.
- C. Insulate air separators and expansion tanks with 1½" thick fiberglass insulation. Finish with brush coat of white canvas or a spiral wrap of stretchable glass tape and a second coat of cement or lagging adhesive.
- D. Insulate pipe connectors and expansion joints by filling linear voids with continuous wrappings of fiberglass insulation secured in place with copper wires. Complete

assembly shall then be covered by a continuous wrap of two layers of ½" thick insulation to lap adjoining pipe insulation. The entire exposed surface shall then be continuous spiral wrapped with two separate and opposite wound layers of fiberglass fabric and sized with non-hardening vapor proof sealant.

- E. Insulate chilled water pump impeller casing with a job-built insulation box which shall sit on the pump base plate and have openings for suction and discharge piping and the pump shaft. The insulation box shall be removable for pump servicing and shall have metal clips attached with sheet metal screws to attach it rigidly to the pump base. The insulation box shall be dual wall constructed of 16-gage sheet metal with a layer of one-inch-thick fiberglass insulation board with foil reinforced Kraft facing sandwiched between the sheet metal. Seal all seams and ends of insulation. Outside sheet metal panel and mating edges of top and bottom halves of insulation shall have finish layer of 8-ounce canvas applied with lagging adhesive.

**END OF SECTION**

**SECTION 23 0800  
COMMISSIONING OF HVAC SYSTEMS**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. The work under this Section is subject to requirements of the Contract Documents including the Owner's General Conditions and articles of the Construction Manager's General Conditions.
- B. General commissioning requirements are detailed in Division 01.
- C. The commissioning process does not reduce the responsibility of the system designers or installing contractors to provide a finished and fully functioning product in accordance with the Contract Documents.
- D. This section shall in no way diminish the responsibility of the Division 23 Contractors, Subs and Suppliers in performing all aspects of work and testing as outlined in the contract documents. Any requirements outlined in this section are in addition to requirements outlined in Division 01 and 23 Specifications.

**1.02 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.
- B. The requirements in this section are in addition to those specifically outlined in:
  - 1. Section 01 91 13 – General Commissioning Requirements

**1.03 HVAC EQUIPMENT AND SYSTEMS TO BE COMMISSIONED**

- A. The following equipment and systems shall be commissioned as part of this project. All general references to equipment and systems within this document refer only to those identified below:
  - 1. Air Handling Units
  - 2. Air Terminal Boxes
  - 3. Exhaust Fans
  - 4. Boilers
  - 5. Pumps
  - 6. Unit Heaters
  - 7. Air / Dirt Separator
  - 8. Expansion Tank
  - 9. Ultraviolet (UV) Lights
  - 10. Variable Frequency Drives
  - 11. Relief Fans
  - 12. Air Distribution
  - 13. Building Automation and Control Systems

**1.04 REFERENCES**

- A. Refer to Section 01 91 13 for applicable references for work associated with this section.

## **1.05 DEFINITIONS & ABBREVIATIONS**

- A. Refer to Section 01 91 13 for definitions and abbreviations for terms in this section.

## **1.06 COMMISSIONING TEAM**

- A. Refer to Section 01 91 13 for commissioning team members.

## **1.07 COMMISSIONING SUBMITTALS**

- A. Refer to Section 01 91 13 for additional information regarding commissioning submittals.

- B. The following are the minimum submittals that the CxA will review. Additional submittals may be reviewed at the CxA's discretion:

1. 23 0515 Variable Frequency Motor Controls – Buildings & HVAC
2. 23 0516 Expansion Compensation in Heating, Ventilation and Air conditioning Systems
3. 23 0519 Meters and Gauges for HVAC
4. 23 0523 Valves
5. 23 0529 Hangers and Supports for HVAC Piping and Equipment
6. 23 0553 Identification for HVAC Piping and Equipment
7. 23 0566 UVC Emitter Ultra Violet Disinfection
8. 23 0593 Testing, Adjusting, and Balancing for Heating, Ventilating and Air Conditioning
9. 23 0713 Duct Insulation for Heating, Ventilating and Air Conditioning
10. 23 0716 HVAC Equipment Insulation
11. 23 0719 HVAC Piping Insulation
12. 23 0923 Direct Digital Control System for HVAC
13. 23 2123 Hydronic Pumps
14. 23 3300 Air Duct Accessories
15. 23 3423 HVAC Power Ventilators
16. 23 3616 Air Terminal Units – Variable Volume
17. 23 3700 Air Inlets and Outlets
18. 23 5216 Condensing Boilers
19. 23 7313 Central Station Air Handlers

- C. TAB Plan:

1. The GC/CM, with assistance from the TABC, shall develop a TAB Plan and execute TAB utilizing the following procedure.
2. Compile detailed TAB forms according to the TABC's certifying agency standard. TAB documentation shall include specific boxes or lines for recording and documenting data of each piece of equipment.
3. Submit the TAB Plan to the CxA for review and include the following at a minimum:
  - a. Table of Contents.
  - b. Detailed description of how TAB will be completed. Specifically, the TAB Plan shall identify any diversity in system designs and how the TAB process will account for this.
  - c. Schedule of TAB activities by equipment (initial TAB Plan submittal schedule shall be tentative; TAB schedule shall be updated as construction proceeds and forwarded to CxA).

- d. Separate tagged divider by system and equipment with TAB forms and documentation.
- 4. The CxA, A/E and OR reviews the TAB Plan for content and format. The CxA shall return the TAB Plan with comments to GC/CM and the GC/CM shall revise the TAB Plan based on CxA comments.
- 5. The GC/CM shall forward copies of the completed TAB Plan to CxA, A/E and OR for review. Any comments that require re-TAB are the responsibility of the GC/CM until results are acceptable.
- 6. After the completed TAB Plan is approved, the CxA will execute on-site verification of selected readings reported in the TAB Plan. The TABC must supply the technician who performed the measurements and the equipment used for verification.
- 7. Once all TAB activities are complete, the GC/CM shall submit a complete, compiled TAB Plan for review documentation. Any comments made by the CxA shall be incorporated.

## **PART 2 PRODUCTS**

### **2.01 TEST EQUIPMENT**

- A. Refer to Section 01 91 13 for additional test equipment requirements.
- B. If not otherwise specified, the following minimum requirements apply.
  - 1. Temperature sensors and digital thermometers shall have a certified accuracy of  $0.5^{\circ}\text{F}$  and a resolution of  $\pm 0.1^{\circ}\text{F}$ .
  - 2. Pressure sensors shall have an accuracy of  $\pm 2.0\%$  of the value range being measured (not full range of meter).

## **PART 3 EXECUTION**

### **3.01 COMMISSIONING PROCESS OVERVIEW**

- A. Refer to Section 01 91 13 for an overview of the commissioning process.

### **3.02 ROLES AND RESPONSIBILITIES**

- A. Refer to Section 01 91 13 for roles and responsibilities of additional team members.
- B. Controls Contractor Responsibilities
  - 1. Include costs for all commissioning requirements in contract price.
  - 2. Review and provide feedback on the FPT test procedures developed by the CxA.
    - a. Ensure all test procedures are executable with the control system as programmed. This includes overriding all points as indicated.
    - b. Verify all graphics, trend logs and alarms are programmed and active as indicated in the contract documents and FPT test procedures.
  - 3. Any tasks indicated within the FPT scripts do not override any other start-up and checkout tasks identified in Division 23. It is the CC responsibility to ensure the system is fully operational and operating in automatic mode prior to execution of FPTs.
  - 4. Provide trained and certified technician familiar with the project programming to execute the FPT test procedures at the direction of the CxA.

- C. TAB Contractor Responsibilities
  1. Include costs for all commissioning requirements in contract price.
  2. Develop the TAB Plan in coordination with the GC/CM.
  3. Make revisions to TAB work as identified by the CxA, A/E and/or OR for conformance with the contract documents.
  4. Make the certified technicians and equipment used in creating the completed TAB Plan available to the CxA for TAB Verification activities.

### **3.03 SCHEDULING AND COORDINATION**

- A. Refer to Section 01 91 13 for scheduling and coordination requirements.

### **3.04 PRE-FUNCTIONAL CHECKLISTS**

- A. Refer to Section 01 91 13 for PFC requirements.

### **3.05 START-UP AND INITIAL CHECKOUT**

- A. Refer to Section 01 91 13 for Start-Up and Checkout requirements.

### **3.06 TESTING, ADJUSTING AND BALANCING**

- A. The GC/CM shall develop the TAB Plan and submit to the CxA, A/E, and OR for approval a minimum of thirty (30) days prior to the anticipated start of TAB activities.
- B. After receiving approval of the TAB Plan, the GC/CM shall organize and lead a TAB Coordination Meeting. All CT members shall attend and provide feedback on TAB activities.
- C. The TABC shall execute TAB activities per the TAB Plan.
- D. Once the completed TAB Plan has been reviewed, the CxA will conduct on-site TAB verification.
  1. TABC shall supply the technician(s) who took the original readings and the equipment used as reported in the completed TAB Plan.
  2. The CxA will identify a sample of readings that the TABC shall reproduce. The CxA shall confirm that the equipment and techniques used to gather the measurements are correct and the readings are accurate.
  3. Any discrepancies identified will be identified as Cx Issues and tracked on the Cx Issues Log.
    - a. If issues are limited or minor in nature, the CxA will recommend only the identified issues be remedied.
    - b. If issues are numerous or the CxA that identified issues are systemic, the CxA will reject the completed TAB Plan and require the process to be repeated.
- E. The GC/CM shall notify the CxA of any changes to the TAB schedules that will affect commissioning activities. The CxA will work with the GC/CM and TABC to schedule new dates as necessary. The GC/CM shall notify the CxA a minimum of five (5) days in advance of scheduled commissioning visits if re-scheduling is required.
  1. Any time for the CxA to visit the site to execute commissioning tasks on equipment or systems that were identified as being ready by the GC/CM but



found to not be will be back charged to the GC/CM at a cost of \$2,500 plus expenses per man-day.

- F. The GC/CM shall provide the CxA with signed and dated copy of completed TAB Plan documents prior to scheduling of FPTs. Only individuals having direct knowledge that a line item task was actually performed shall complete the documentation.
- G. The TABC shall clearly list outstanding items or initial TAB tasks that are not completed successfully. Completed forms documenting any outstanding deficiencies shall be provided to CxA within two (2) working days of completion.

### **3.07 FUNCTIONAL PERFORMANCE TESTS**

- A. Refer to Section 01 91 13 for FPT requirements.

### **3.08 NON-CONFORMANCE AND COMMISSIONING ISSUES**

- A. Refer to Section 01 91 13 for information regarding Non-Conformance and Cx Issues.

### **3.09 OWNER TRAINING**

- A. The GC/CM is responsible for execution of Owner Training as outlined in section 01 79 00.

**END OF SECTION**

**SECTION 23 2123  
HYDRONIC PUMPS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Basic Requirements for Hydronic Pumps for HVAC Systems.

**1.02 RELATED SECTIONS**

- A. Section 23 0500 – Common Work Results for Heating, Ventilating and Air Conditioning.
- B. Section 23 0548 – Vibration and Seismic Controls for HVAC Piping and Equipment.
- C. Section 23 2113 – Hydronic Piping.
- D. Division 23 – All Sections.

**1.03 REFERENCES**

- A. ANSI/UL 778 - Motor Operated Water Pumps.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer: Company specializing in manufacture, assembly and field performance of pumps, whose products have been in satisfactory use in similar service.
- B. Alignment: Base mounted pumps shall be aligned by qualified millwright and alignment certified.

**1.05 SUBMITTALS**

- A. Submit shop drawings and product data under provisions of 01 33 23 and Section 23 05 00.
- B. Submit certified pump curves showing performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
- C. Submit manufacturer's installation instructions under provisions of Division 01.

**1.06 OPERATION AND MAINTENANCE DATA**

- A. Submit operation and maintenance data under provisions of Section 23 05 00.
- B. Include installation instructions, assembly views, lubrication instructions and replacement parts list.

**1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products to site under provisions of Section 23 05 00.
- B. Store and protect products under provisions of Section 23 05 00.

**1.08 EXTRA PARTS**

- A. Provide one extra set of mechanical seals for each pump.

## **PART 2 PRODUCTS**

### **2.01 GENERAL CONSTRUCTION REQUIREMENTS**

- A. Balance: Rotating parts, statically and dynamically.
- B. Pump Motors: Operate at 1750 rpm unless specified otherwise.
- C. Pump Connections: Flanged.

### **2.02 SPLIT COUPLED BASE-MOUNTED END SUCTION PUMPS**

- A. The pump shall be single, end suction type with radically split, top center-line discharge, self-venting casing. The casing-to-cover gasket shall be confined on the atmospheric side to prevent blow-out possibility.
- B. Pump construction shall be cast iron, bronze fitted and shall be fitted with a long- life, product lubricated, drip-tight mechanical seal, with O-ring seat retainer, designed for the specified maximum temperature and pressure.
- C. The casing suction and discharge connections shall be the same size and shall be provided with drilled and tapped seal vent and pressure gauge connections.
- D. Pump impeller shall be stainless steel or bronze, fully enclosed type. Impeller shall be dynamically balanced.
- E. The shaft shall be fitted with a Stainless-Steel shaft sleeve and be supported by two heavy duty ball bearings. The design shall allow Back Pull-Out servicing, enabling the complete rotating assembly to be removed without disturbing the casing piping connections.
- F. The pump shall be mounted on a rigid, single piece baseplate, with grouting hole, and connected by flexible coupling with guard, to a 460U, 3 phase, inverter duty motor of Federal approved premium, efficiency level and suitable for across-the-line starting.
- G. The housing shall be hydrostatically tested to 150% maximum working pressure.
- H. The unit shall be suitable for the conditions shown on the pump schedule.

### **2.04 SPLIT COUPLED VERTICAL IN-LINE PUMPS**

- A. Pump casing shall be cast iron, suitable for 175 psi (1206 kPa) working pressure at 140°F (60°C). Ductile iron pump casings are suitable for pressures to 250 psi (1724 kPa). The casing shall be hydrostatically tested to 150% maximum working pressure. The pump internals shall be capable of being serviced without disturbing the pipe connections. The casing suction and discharge connections shall be the same size and shall be provided with drilled and tapped seal vent and pressure gauge connections.
- B. Pump impeller shall be stainless steel or bronze, fully enclosed type. Impeller shall be dynamically balanced.

- C. A bronze shaft sleeve, extending the full length of the mechanical seal area, shall be provided.
- D. Mechanical Seal shall be single spring inside type with carbon against Ceramic faces. EPDM elastomer with stainless steel spring and hardware shall be provided. Seal vent line shall be factory installed and shall be piped from the seal area to the pump suction connection.

## **2.05 BOILER CIRCULATION PUMPS**

- A. Pump casing shall be cast iron, suitable for 125 psi (862 kPa) working pressure at 210°F (99°C). The casing shall be hydrostatically tested to 150% maximum working pressure. The pump internals shall be capable of being serviced without disturbing the pipe connections. The flanged casing suction and discharge connections shall be the same size and shall be provided with drilled and tapped seal vent and pressure gauge connections where available.
- B. Pump impeller shall be non-metallic, as part of a self-lubricating replaceable cartridge design. Impeller shall be dynamically balanced. Entire cartridge shall be able to be replaced without removing the pump body from the piping connections.
- C. A ceramic shaft bearing shall be provided.

## **2.06 APPROVED MANUFACTURERS**

- A. Armstrong
- B. Bell & Gossett
- C. Taco
- D. Engineer Approved

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install pumps in accordance with manufacturer's instructions.
- B. Provide access space around pumps for service. Provide no less than minimum as recommended by manufacturer.
- C. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.
- D. Provide drains for bases and seals, piped to and discharging into floor drains.
- E. Lubricate pumps before start-up.
- F. Install base mounted pumps on concrete inertia base, with anchor bolts, set and level.
- G. Qualified millwright shall check, align, and certify base mounted pumps prior to start-up.

**END OF SECTION**



**SECTION 23 2500  
HVAC WATER TREATMENT**

**PART 1 GENERAL**

**1.01 SCOPE**

- A. Chilled, condensing and heating water systems cleanout and preparation.
- B. Chilled, condensing and heating water systems treatment.

**1.02 RELATED WORK SPECIFIED ELSEWHERE**

- A. Basic Mechanical Requirements - Section 23 0500.
- B. Testing, Adjusting and Balancing - Section 23 0593.

**1.03 COORDINATION**

- A. All power, motor and interlock wiring required for solution pumps, timers, monitors, etc., shall be furnished, whether shown or not, at no additional cost.
- B. Coordinate exact locations and power requirements with the electrical contractor and other trades as required to avoid omissions or conflicts.
- C. Mechanical contractor shall install all equipment. Water treatment contractor shall supervise the cleaning of hydronic and steam piping systems. Provide certification for each system when cleanout is completed.

**1.04 QUALITY ASSURANCE**

- A. Chemicals, service and equipment shall be supplied by a single water treatment company for undivided responsibility.
- B. The bid for chemicals, service and equipment shall be as recommended and furnished by the water treatment company based upon a complete analysis of the water from the site.
- C. The water treatment chemical and service supplier shall be a recognized specialist, active in the field of industrial water treatment for at least five (5) years, whose major business is in the field of water treatment, and shall have regional water analysis laboratories, development facilities and service department.
- D. The necessary chemical formulations and testing shall be as directed by the supplier.
- E. Water treatment supplier shall provide cleanout of new piping and equipment and treatment of new water back to acceptable levels for conformation of existing treatment program.

**PART 2 PRODUCTS**

**2.01 CHEMICAL SHOT FEEDERS**

- A. Equal to 5-gallon, one-shot feeder, complete with isolation valves and inlet fill funnel if required.

## **2.02 IN PLANT TESTING**

- A. Provide all necessary chemical testing equipment and reagents for in-plant testing. Equipment and reagents shall be provided for each system and shall be furnished in a sturdy case labeled with system name (i.e. "CHILLED WATER").
- B. Supply all log sheets for recording of test results and treatment used. Furnish a Vinyl covered, hardback, 3-ring binder with label on spine "WATER TREATMENT TEST LOG". Include printed instructions for each type of test and tab dividers for each section.

## **2.03 APPROVED MANUFACTURERS**

- A. Coordinate with Owner's existing programs. Chem-Aqua.

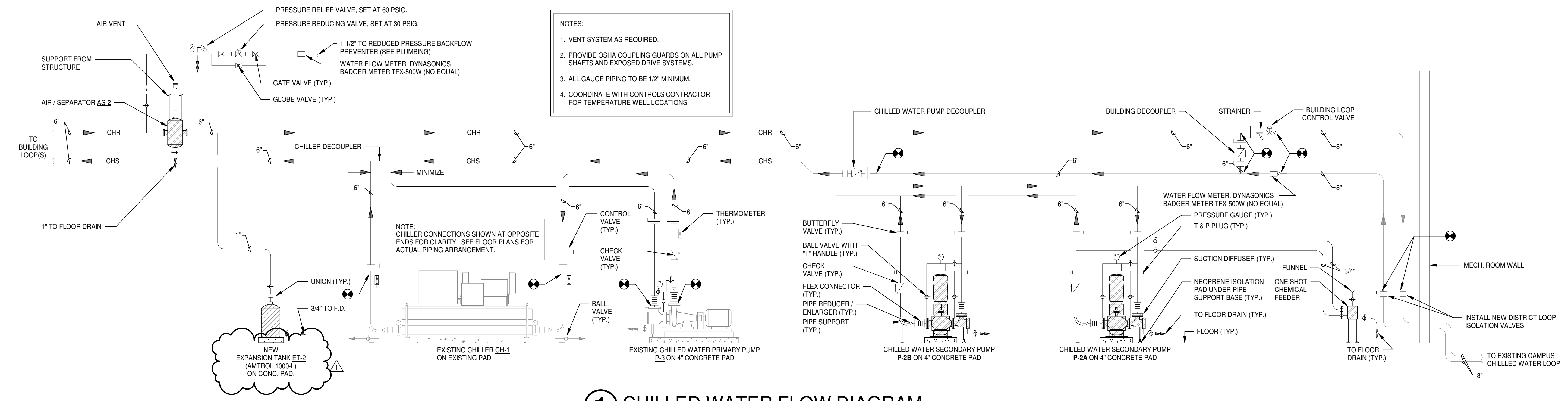
## **PART 3 EXECUTION**

- 3.01** Provide all necessary chemical testing equipment and reagents for in plant testing. Supply all log sheets for recording of test results of treatment used.

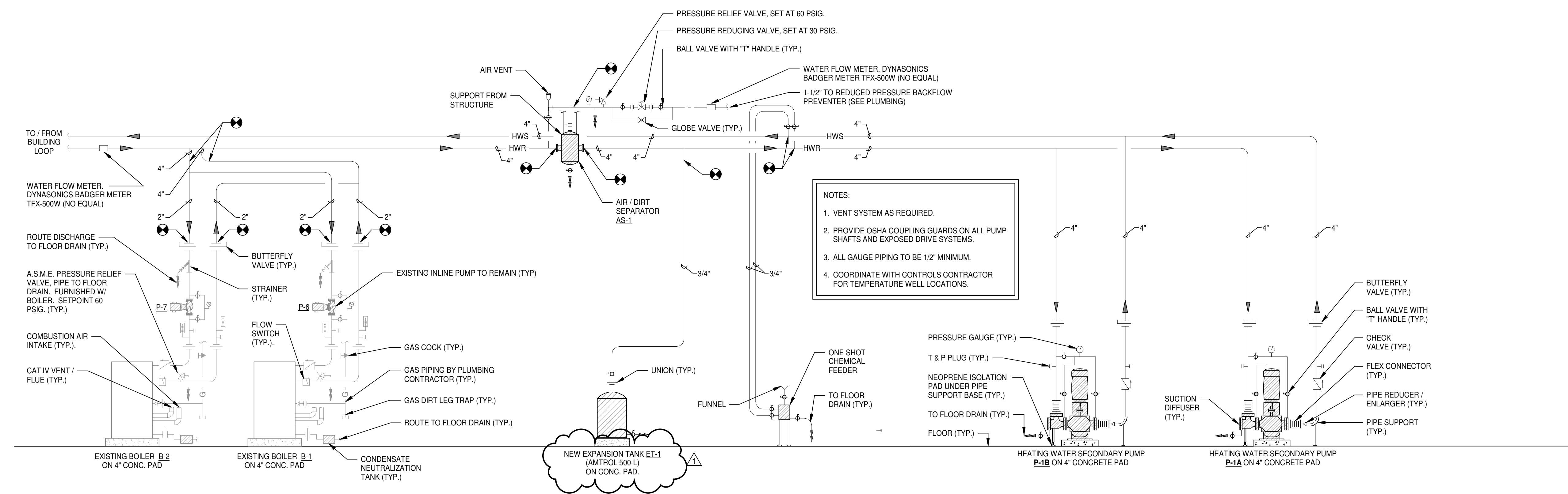
## **3.02 CHILLED, CONDENSING, AND HEATING WATER SYSTEM - TREATMENT**

- A. Install a one-shot feeder, if required, that meets the pressure requirements of the specified system.
- B. Provide automatic feed and monitoring systems as may be required based upon initial water analysis.
- C. Provide the chemical formulations required to inhibit scale and corrosion, together with written instructions for dosages, application procedures and testing.

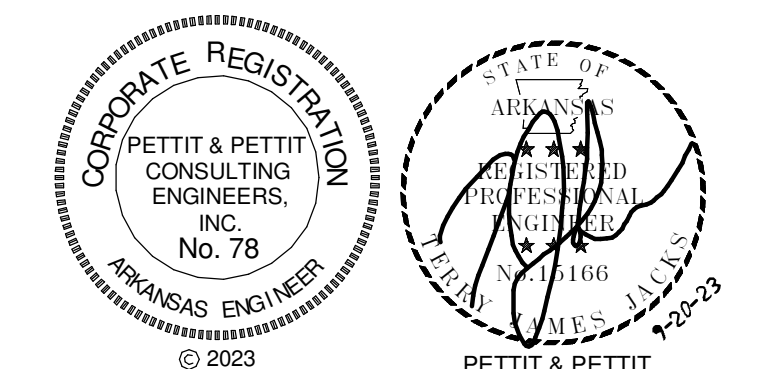
**END OF SECTION**



**1 CHILLED WATER FLOW DIAGRAM**  
N.T.S.

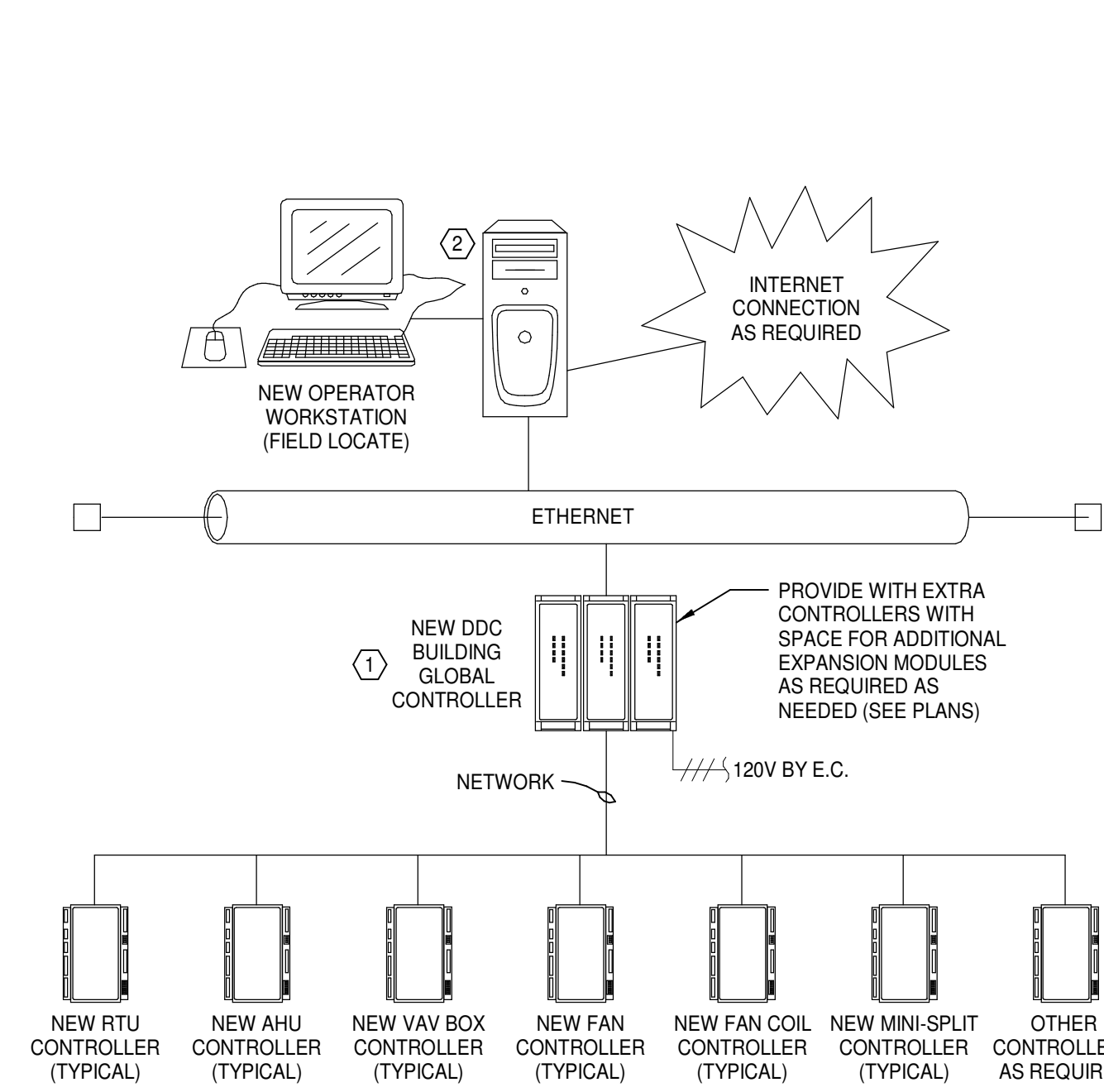


**2 HEATING HOT WATER FLOW DIAGRAM**  
N.T.S.



#	Date	Description
1	10-12-22	ADDENDUM #1
Revision History		





**1 BUILDING AUTOMATION SYSTEM (BAS) RISER DIAGRAM**

**KEYED NOTES**

- NEW ALERTON BAS CONTROLLER IN EXISTING FIRST FLOOR MECH. ROOM.
- NEW CONTROLS WORKSTATION, WITH CONTROLS HARDWARE, SOFTWARE, AND CONTROLS SYSTEM GRAPHICS.

**GENERAL BAS CONTROL SYSTEM NOTE**

- ELECTRICAL CONTRACTOR TO PROVIDE ALL WIRING, CONDUIT, JUNCTION BOXES, ETC. AS REQUIRED FOR COMPLETE CONTROLS INSTALLATION. CONTROLS CONTRACTOR TO PROVIDE ALL WORKSTATIONS, HARDWARE, SOFTWARE, FINAL TERMINATIONS, PROGRAMMING, TESTING, AND FIELD START-UP OF DDC CONTROLS SYSTEMS AS INDICATED ON PLANS TO OWNERS' / ENGINEER'S SATISFACTION.

**VAV TERMINAL SEQUENCE OF OPERATION**

**VAV TERMINALS WITH HOT WATER REHEAT**

AIR TERMINAL MODE OF OPERATION IS EITHER "OCCUPIED" OR "UNOCCUPIED" BASED UPON WEEKLY SCHEDULE OR OPERATOR COMMAND.

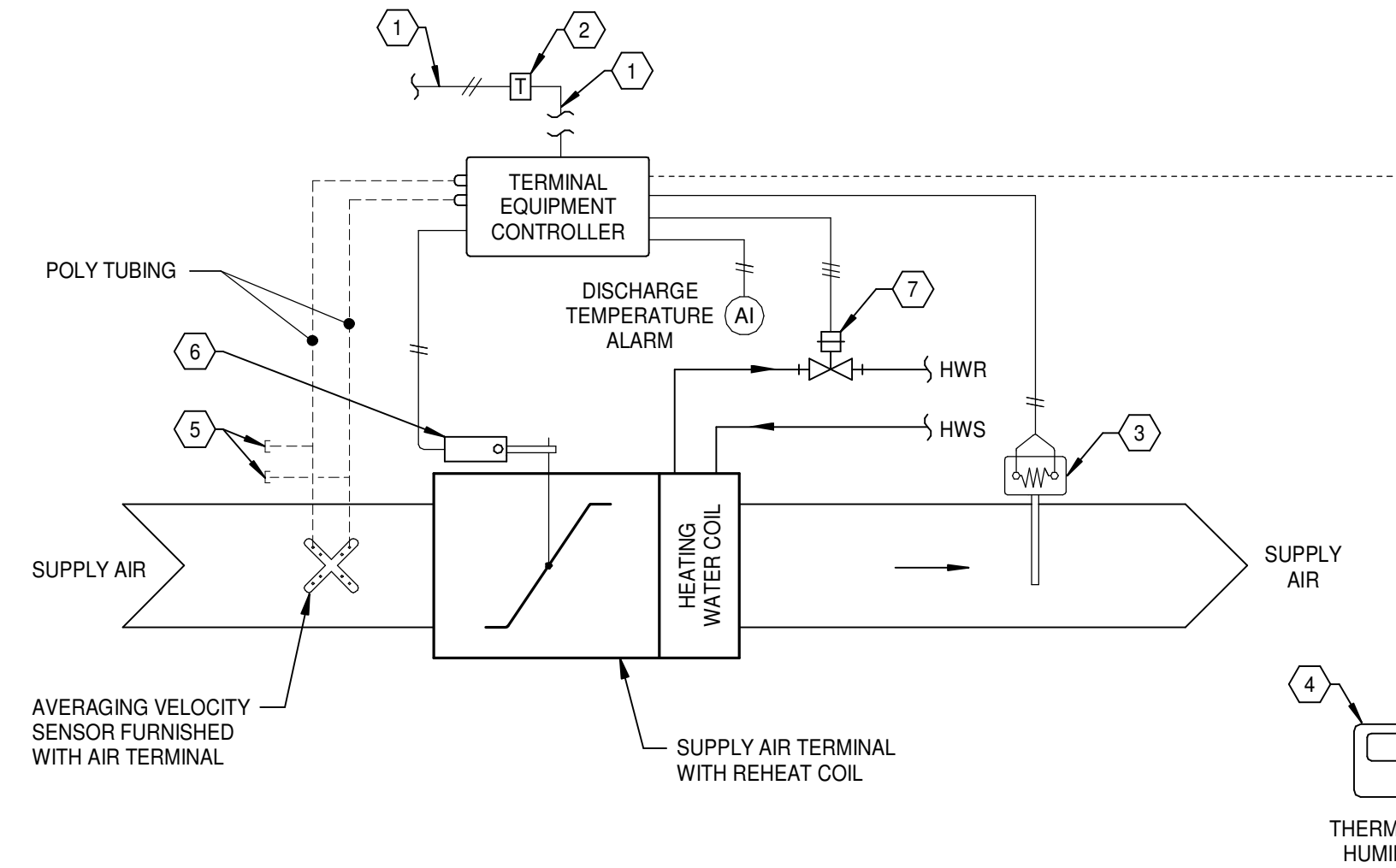
**OCCUPIED CYCLE:** DURING THE OCCUPIED MODE OF OPERATION, THE SPACE TEMPERATURE SETPOINT SHALL BE ADJUSTABLE BY THE OCCUPANT AT THE THERMOSTAT BETWEEN A MINIMUM OF 68°F (ADJ.) AND A MAXIMUM OF 75°F (ADJ.). ON A RISE IN SPACE TEMPERATURE ABOVE THE SETPOINT, THE VAV CONTROLLER WILL MODULATE THE AIR VALVE TO PROVIDE MAXIMUM CFM. AS SPACE TEMPERATURE DECREASES BELOW THE HEATING SETPOINT, THE VAV CONTROLLER WILL MODULATE THE AIR VALVE TO ITS MINIMUM POSITION. AS THE SPACE TEMPERATURE CONTINUES TO FALL BELOW THE HEATING SETPOINT WITH THE AIR VALVE AT MINIMUM POSITION, THE CONTROLLER SHALL MODULATE THE AIR VALVE TO ITS HEATING MINIMUM AIRFLOW. AT THIS POINT, THE HEATING VALVE SHALL BE MODULATED OPEN AS REQUIRED TO MAINTAIN THE SPACE TEMPERATURE AT THE HEATING SETPOINT.

**UNOCCUPIED CYCLE:** DURING THE UNOCCUPIED CYCLE, THE AIR VALVE ON THE TERMINAL UNIT SHALL DRIVE TO THE UNOCCUPIED MINIMUM CFM. THE SYSTEM FAN AND HEAT SHALL CYCLE TO MAINTAIN A REDUCED SPACE TEMPERATURE (NSB).

**UNOCCUPIED CYCLE OVERRIDE:** DURING THE UNOCCUPIED CYCLE, THE LOCAL USER SHALL BE PROVIDED WITH AN OVERRIDE FUNCTION ON EACH LOCAL THERMOSTAT. THE OVERRIDE FUNCTION SHALL FUNCTION FOR A TWO (2) HOUR PERIOD.

**FREEZE PROTECTION SEQUENCE OF OPERATION**

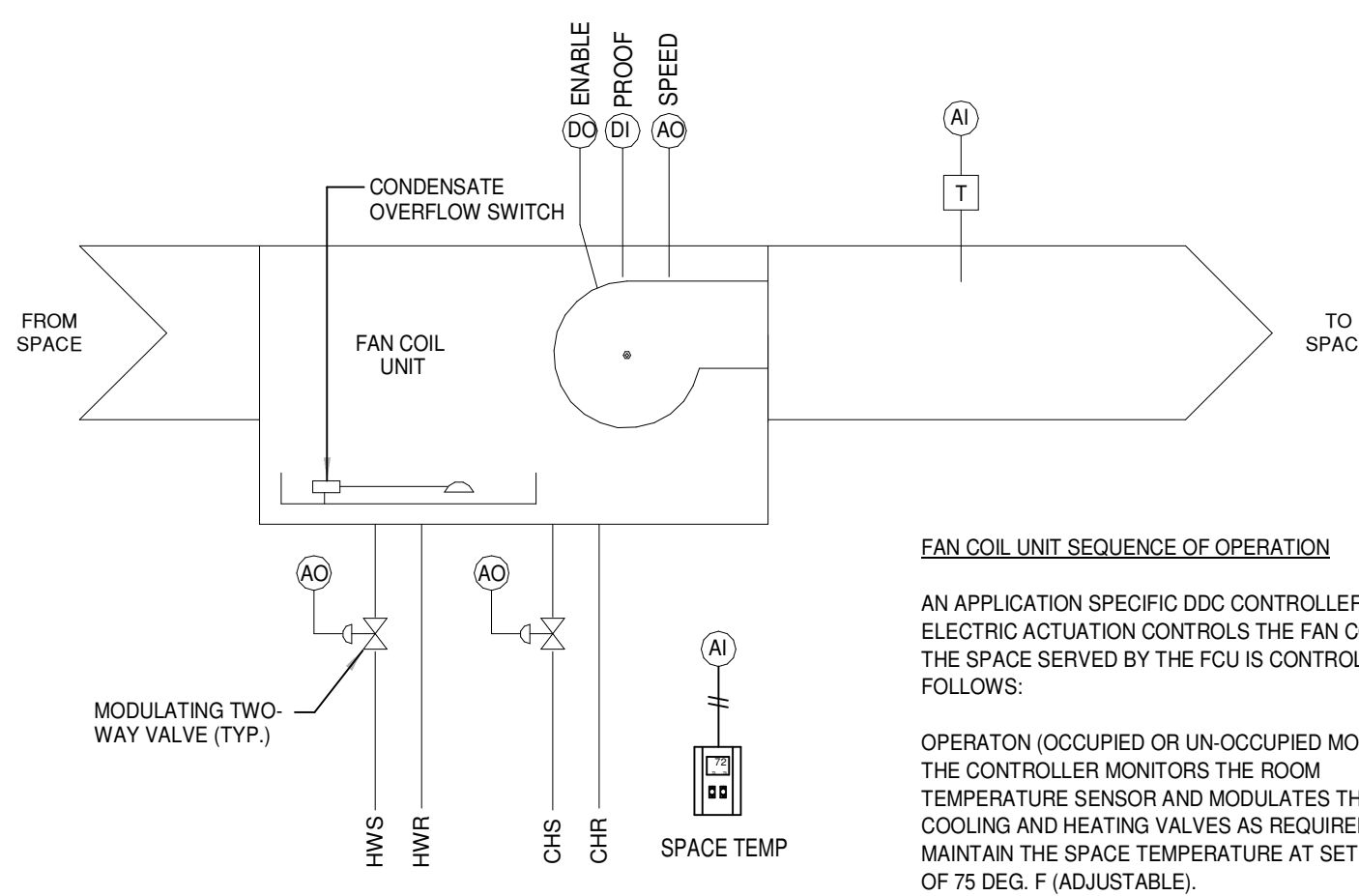
UPON ACTIVATION OF A FREEZE STAT IN ANY AIR HANDLING UNIT SERVING THIS BUILDING, ALL VAV TERMINAL BOX HEATING WATER CONTROL VALVES SHALL BE FULLY OPENED. UPON RESET OF THE ACTIVATED FREEZE STAT, THE VALVES SHALL RETURN TO NORMAL OPERATION.



**KEYED NOTES:**

- POWER WIRING
- REMOTE 24 VAC CONTROL TRANSFORMER (BY DIV. 26). SEE PLANS FOR LOCATIONS.
- TEMPERATURE SENSOR.
- ROOM THERMOSTAT / HUMIDISTAT (OR TEMP. SENSOR). SEE PLANS.
- CAPPED TEES
- ELECTRONIC MODULATING DAMPER ACTUATOR
- HEATING WATER CONTROL VALVE WITH ELECTRONIC MODULATING ACTUATOR. SELECT VALVES FOR 3 PSI WATER PRESSURE DROP AT DESIGN FLOW RATE. VERIFY DESIGN FLOW RATE FOR EACH TERMINAL.

**2 SUPPLY AIR TERMINAL W/ HOT WATER REHEAT (TYPICAL)**



**FAN COIL UNIT SEQUENCE OF OPERATION**

AN APPLICATION SPECIFIC DDC CONTROLLER USING ELECTRIC ACTUATION CONTROLS THE FAN COIL UNIT. THE SPACE SERVED BY THE FCU IS CONTROLLED AS FOLLOWS:

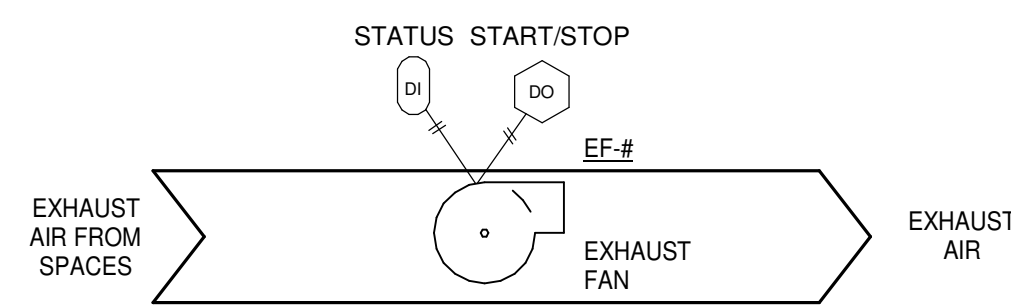
**OPERATION (OCCUPIED OR UN-OCCUPIED MODE)**  
THE CONTROLLER MONITORS THE ROOM TEMPERATURE SENSOR AND MODULATES THE FCU COOLING AND HEATING VALVES AS REQUIRED TO MAINTAIN THE SPACE TEMPERATURE AT SET POINT OF 75 DEG. F (ADJUSTABLE).

**3 4-PIPE FAN COIL UNIT CONTROL DIAGRAM**

**EXHAUST FAN - SEQUENCE OF OPERATION (TYPICAL)**

EXHAUST FANS SHALL OPERATE INTERLOCKED WITH A SIGNAL FROM THE BUILDING AUTOMATION SYSTEM.

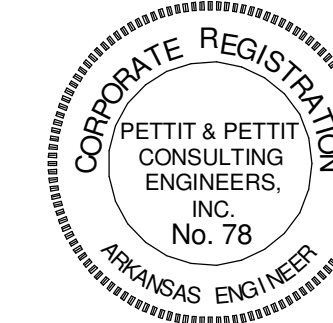
THE EXHAUST FAN SHALL SHUT DOWN UPON A SIGNAL FROM THE BUILDING FIRE ALARM SYSTEM.



**4 EXHAUST FAN (TYPICAL) CONTROL DIAGRAM**

**HVAC CONTROL VALVE NOTES**

- NEW CONTROL VALVES TO BE BELIMO (NO EQUAL). 2-10VDC, NORMALLY CLOSED OPERATION (2V CLOSED, 10V OPEN).
- NEW DISTRICT LOOP ISOLATION VALVES AND CHILLER ISOLATION VALVES TO HAVE BRAY ACTUATORS WITH STATUS OUTPUTS.



#	Date	ADDENDUM #1	Description
1	10-12-22		