



FORT HAYS STATE UNIVERSITY

Addendum

Date: February 13, 2024
RFP Number: 24018
Addendum: 1

ISSUED FOR ARCHITECT/ENGINEER:

Brack & Associates Consulting Engineers P.A.
3501 SW Gage Blvd
Topeka, Kansas 66614
Contact: Dave Lane
Phone Number: 785-271-6644
Fax Number: 785-271-5666
E-Mail: djlane@brackengin.com

NOTICE ALL BIDDERS FOR THE:
Fort Hays State University
Akers Energy Center
Tank Replacement
Hays, Kansas

You are instructed to read and to note the following described changes, corrections, clarifications, omissions, deletions, additions, approvals and statements pertinent to the Contract Bid and Construction Documents.

The Addendum No. 1 is a part of the Contract Bid and Construction Documents and shall govern in the performance of the Work.

Article 2-1, Site Visit Prior to February 16, 2024

- A. Contractor's optional site visit should happen before 4:30 p.m. on Friday, February 16, 2024, at Akers Energy Center. For any questions regarding the site visit, contact Troy Steiner at 785-628-4437, tjsteiner@fhsu.edu.

Article 2-2, Drawings ME1 Mechanical Improvement Plan.

Clarifications

- a. Provide aluminum insulation jacket at tank.
- b. Provide PVC covers at all new pipe insulation fittings
- c. Contractor shall provide recalibration of differential level controls and water control systems.
- d. Replace black steel soft water piping at surge tank with copper piping and fittings.

A signed copy of this Addendum must be submitted with your bid. If your bid response has been returned, submit this Addendum by the closing date indicated above.

I (We) have read and understand this addendum and agree it is a part of my (our) bid response.

NAME OF COMPANY OR FIRM: _____

SIGNED BY: _____

TITLE: _____ DATE: _____



FORT HAYS STATE UNIVERSITY

REQUEST FOR QUOTE #: 24018

Date Emailed: February 13, 2024

Optional Site Visit by: February 16, 2024, at 4:30 p.m.

Questions Deadline: February 20, 2024, by 12:00 p.m.

Closing Date: Thursday, February 22, 2024, 4:30 p.m.

RETURNED SIGNED QUOTE TO:

Fort Hays State University (FHSU)

Purchasing Office

601 Park Street Sheridan Hall Room 318

Hays, KS 67601

It shall be the bidder's responsibility to monitor this website on a regular basis for any changes/addenda, <http://www.fhsu.edu/purchasing/bids>.

Purchasing Office Contact Information:

Telephone: 785-628-4251

Fax: 785-628-4046

Email: purchasing@fhsu.edu

INSTRUCTIONS TO BIDDERS:

1. The FHSU Purchasing Office is the only point of contact for this RFQ. When communicating, always refer to the quotation number.
2. To be considered, one copy of this quotation, with your bid properly filled in, must be signed and returned to the FHSU Purchasing Office by the specified closing date. E-mail and late bids cannot be considered.
3. **Submit bid response through FHSU's bid solicitation site, Vendor Registry:** <https://fhsu.edu/purchasing/bids/index.html>.
4. Bid must be in U.S. Dollars (\$US) excluding Federal Excise/State Sales Taxes.
5. All prices and conditions must be shown. Additions or conditions not shown on this bid will not be allowed.
6. Bid for comparable merchandise will be considered, unless the specifications indicate "no substitution".
7. Bidder must specify exceptions to any requirement or specification in the bid.
8. Bid must include complete specifications and/or descriptive literature to facilitate consideration.
9. Please browse our web-site for similar pending requests.
10. **THIS IS NOT AN ORDER.**

Item No.	Description of Item(s)	Total Amount
	<p>Fort Hays University seeks proposals from qualified mechanical contractors to remove and replace the existing surge tank, associated piping and materials at Akers Energy Center as noted in the attached contract documents. Project to be performed and completed during the 2-week shutdown between May 13, 2024 and May 24, 2024. All Shop Drawings to be submitted to the Project Engineer with Brack & Associates for prior approval.</p> <p>We will require a Performance and Bid Bond.</p> <p>Optional Site Visit Prior to February 16, 2024, at 4:30 p.m. at Akers Energy Center. For any questions regarding the site visit, contact Troy Steiner at 785-628-4437, tjsteiner@fhsu.edu.</p> <p>Contact Dave Lane, Brack & Associates, at 785-271-6644 or djlane@brackengin.com for any technical questions related to design for the project. Question deadline will be Tuesday, February 20, 2024, by 12:00 p.m.</p> <p>The supplier will also present Certificates of Insurance to the FHSU Purchasing Office evidencing the following coverage during the performance of the Services:</p> <p>(a) Worker's Compensation with statutory limits;</p> <p>(b) Employers Liability, with a minimum \$1,000,000 limit of liability per occurrence;</p> <p>(c) Commercial General Liability, including Contractual Liability coverage, with the following minimum limits of liability: \$1,000,000 per occurrence for Bodily Injury and Property Damage, and \$3,000,000 General Aggregate.</p> <p>Total project cost for materials and labor \$_____</p>	

Proof of Insurance, Bid Guaranty, and Performance Bond are required:

Proof of Insurance: Upon request, the vendor shall present Certificates of Insurance to the FHSU Purchasing Office evidencing the following coverage during the performance of the Services:

- (a) Worker’s Compensation with statutory limits;
- (b) Employers Liability, with a minimum \$1,000,000 limit of liability per occurrence;
- (c) Commercial General Liability, including Contractual Liability coverage, with the following minimum limits of liability: \$1,000,000 per occurrence for Bodily Injury and Property Damage, and \$3,000,000 General Aggregate; and
- (d) Professional Liability in the minimum amount of \$1,000,000 per claim.

Bid Guaranty: The FHSU Purchasing Office requires that a bid guaranty in the amount of five percent (5%) of the total bid be submitted by all bidders to ensure faithful performance with the conditions of this RFP by Wednesday, February 21, 2024. A bid guaranty must be one of the following: 1) certified check, cashier check, or certificate of deposit payable to Fort Hays State University; or 2) a properly executed bid bond payable to Fort Hays State University.

All checks or certificates of deposit submitted as a bid guaranty shall be returned after contract award unless the guaranty shall serve as a performance guaranty for the successful bidder. Bonds will not be returned. If the successful bidder fails to enter into a written contract, FHSU shall retain the bid guaranty as liquidated damages.

Performance Bond: The Successful Bidder shall file with the FHSU Director of Purchases a Performance Bond in an amount equal to one hundred percent (100%) of the price bid as security for the faithful performance of this contract and as security for the payment of all persons performing labor and furnishing materials in connection with this solicitation.

The guaranty shall be returned to the Contractor upon the completion of this contract subject to total or partial forfeiture for failure to perform adequately the terms of this contract. If damages exceed the amount of the guaranty, Fort Hays State University may seek additional damages.

Bond form will be furnished by the FHSU Purchasing Office and can be completed by any General Insurance Agent. Bond shall be issued by a Surety Company licensed to do business in the State of Kansas.

NOTE: Vendors must register through Vendor Registry to access this bid document on FHSU Purchasing website, <https://fhsu.edu/purchasing/bids/index.html>. Submit your bid response through Vendor Registry.

TO BE CONSIDERED, THE FOLLOWING INFORMATION MUST BE PROVIDED BY THE BIDDER:

DATE _____
 TERMS _____
 DELIVERY WILL BE MADE _____ DAYS A.R.O.
 F.O.B. DEST. Fort Hays State University, Hays, KS 67601
 F.E.I.N. OR S.S.N. _____
 NAME _____
 ADDRESS _____
 CITY _____ ST _____ ZIP _____

SIGNED BY _____
 PRINT OR TYPE NAME _____
 TITLE _____
 TELEPHONE # _____
 FAX # _____
 E-MAIL ADDRESS _____
 CHECK IF APPLICABLE
 Small Business _____ Woman-Owned _____ Minority-Owned _____

State Credit Card: Presently, FHSU uses a State of Kansas Procurement Card (Visa) in lieu of a state warrant to pay for some of its purchases. State of Kansas Law does not allow retailers to charge a credit fee for using their cards. *(Refusal will not be a determining factor in award of this contract.)* Will the credit card be allowed for purchases? Yes _____ No _____

Specifications

SECTION 01 1000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Work covered by Contract Documents.
 - 2. Access to site.
 - 3. Coordination with occupants.
 - 4. Work restrictions.
 - 5. Specification and drawing conventions.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of the following:
 - 1. Replace boiler plant surge tank receiver with new stainless steel receiver set on the existing frame and make connections to the existing condensate pumps and associated piping and accessories.
- B. Type of Contract:
 - 1. Project will be constructed under a single prime contract.

1.4 ACCESS TO SITE

- A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- B. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Driveways, Walkways and Entrances: Keep driveways loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

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1.5 COORDINATION WITH OCCUPANTS

- A. Full Owner Occupancy: Owner will occupy site and adjacent building(s) during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.
1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
 2. Notify Owner in advance of activities that will affect Owner's operations. Refer to Construction Documents for required advance notification.

1.6 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
1. Contractor shall coordinate with owner for work to completed during the annual two week plant shutdown during the weeks of May 13 through May 24, 2024.
- C. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
1. Obtain Engineer's and Owner's written permission before proceeding with disruptive operations.
- D. Smoking is prohibited on all construction sites, including all interior spaces and fenced exterior construction site. Smokeless tobacco is prohibited in all buildings.
- E. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.

1.7 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

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- B. Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
 - 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 - 2. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 1000

SUMMARY

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SECTION 22 1116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. "Basic Mechanical Requirements."
 - 2. "Basic Mechanical Materials and Methods."
 - 3. "Meters and Gages" for thermometers, pressure gages, and fittings.
 - 4. "Plumbing Specialties" for water distribution piping specialties.

1.2 SUMMARY

- A. This Section includes domestic water piping from locations indicated to fixtures and equipment inside the building.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing domestic water piping systems with the following minimum working-pressure ratings, unless otherwise indicated:
 - 1. Domestic Water Distribution Piping: 125 psig (860 kPa).

1.4 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 23 Section "Basic Mechanical Requirements."
- B. Product Data: For pipe, tube, fittings, and couplings.
- C. Water Samples: Specified in "Cleaning" Article in Part 3.
- D. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.5 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 61, "Drinking Water System Components-Health Effects; Sections 1 through 9," for potable domestic water piping and components.

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PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.
- B. Transition Couplings for Aboveground Pressure Piping: Coupling or other manufactured fitting the same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

2.2 COPPER TUBING

- A. Hard Copper Tube: ASTM B 88, Types L (ASTM B 88M, Types B and C), water tube, drawn temper.
 - 1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
 - 2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
 - 3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.

2.3 VALVES

- A. Refer to Division 23 Section "Valves" for bronze and cast-iron, general-duty valves.
- B. Refer to Division 22 Section "Plumbing Specialties" for balancing and drain valves.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

- A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.
- B. Flanges may be used on aboveground piping, unless otherwise indicated.
- C. Aboveground Domestic Water Piping and Soft Water Piping: Use the following piping materials for each size range:
 - 1. NPS 1-1/2 (DN 40) and Smaller: Hard copper tube, Type L (Type B); copper pressure fittings; and soldered joints.
 - 2. NPS 2 (DN 50): Hard copper tube, Type L (Type B); copper pressure fittings; and soldered joints.
 - 3. NPS 2-1/2 to NPS 3-1/2 (DN 65 to DN 90): Hard copper tube, Type L (Type B); copper pressure fittings; and soldered joints.

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3.2 VALVE APPLICATIONS

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
1. Shutoff Duty: Use bronze ball valves for piping NPS 2 (DN 50) and smaller. Use cast-iron butterfly or gate valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger.
 2. Throttling Duty: Use bronze ball valves for piping NPS 2 (DN 50) and smaller. Use cast-iron butterfly valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger.
 3. Hot-Water-Piping, Balancing Duty: Calibrated balancing valves.
 4. Drain Duty: Hose-end drain valves.

3.3 PIPING INSTALLATION

- A. Refer to Division 23 Section "Basic Mechanical Materials and Methods" for basic piping installation.
- B. Install aboveground domestic water piping level with 0.25 percent slope downward toward drain and plumb.
- C. Fill water piping. Check components to determine that they are not air bound and that piping is full of water.
- D. Perform the following steps before operation:
1. Close drain valves, hydrants, and hose bibbs.
 2. Open shutoff valves to fully open position.
 3. Open throttling valves to proper setting.
 4. Remove plugs used during testing of piping and plugs used for temporary sealing of piping during installation.
 5. Remove and clean strainer screens. Close drain valves and replace drain plugs.
 6. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and that cartridges are clean and ready for use.
- E. Check plumbing equipment and verify proper settings, adjustments, and operation. Do not operate water heaters before filling with water.
- F. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.4 JOINT CONSTRUCTION

- A. Refer to Division 23 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.
- B. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

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3.5 VALVE INSTALLATION

- A. Install sectional valve close to water main on each branch and riser serving plumbing fixtures or equipment. Use ball valves for piping NPS 2 (DN 50) and smaller. Use butterfly valves for piping NPS 2-1/2 (DN 65) and larger.
- B. Install shutoff valve on each water supply to equipment and on each water supply to plumbing fixtures without supply stops. Use ball valves for piping NPS 2 (DN 50) and smaller. Use butterfly valves for piping NPS 2-1/2 (DN 65) and larger.
- C. Install drain valves for equipment, at base of each water riser, at low points in horizontal piping, and where required to drain water piping.
 - 1. Install hose-end drain valves at low points in water mains, risers, and branches.

3.6 HANGER AND SUPPORT INSTALLATION

- A. Refer to Division 23 Section "Hangers and Supports" for pipe hanger and support devices. Install the following:
 - 1. Vertical Piping: MSS Type 8 or Type 42, clamps.
 - 2. Individual, Straight, Horizontal Piping Runs: According to the following:
 - a. 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet (30 m): MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100 Feet (30 m), if Indicated: MSS Type 49, spring cushion rolls.
 - 3. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 - 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- B. Install supports according to Division 23 Section "Hangers and Supports."
- C. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced 1 size for double-rod hangers, to a minimum of 3/8 inch (10 mm).
- E. Install supports for vertical steel piping every 15 feet (4.5 m).
- F. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 3/4 (DN 20) and Smaller: 60 inches (1500 mm) with 3/8-inch (10-mm) rod.
 - 2. NPS 1 and NPS 1-1/4 (DN 25 and DN 32): 72 inches (1800 mm) with 3/8-inch (10-mm) rod.
 - 3. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 96 inches (2400 mm) with 3/8-inch (10-mm) rod.
 - 4. NPS 2-1/2 (DN 65): 108 inches (2700 mm) with 1/2-inch (13-mm) rod.
- G. Install supports for vertical copper tubing every 10 feet (3 m).

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- H. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.7 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment and machines to allow service and maintenance.
- C. Connect domestic water piping to service piping with shutoff valve, and extend and connect to the following:
 - 1. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 (DN 65) and larger.

3.8 FIELD QUALITY CONTROL

- A. Inspect domestic water piping as follows:
 - 1. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
 - 2. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
 - a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 - b. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
 - 3. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
 - 4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- B. Test domestic water piping as follows:
 - 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 - 2. Leave uncovered and unconcealed new, altered, extended, or replaced domestic water piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 - 3. Cap and subject piping to static water pressure of 50 psig (345 kPa) above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.

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4. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
5. Prepare reports for tests and required corrective action.

3.9 ADJUSTING

- A. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.
 1. Adjust calibrated balancing valves to flows indicated.

3.10 CLEANING

- A. Clean and disinfect potable domestic water piping as follows:
 1. Purge new piping and parts of existing domestic water piping that have been altered, extended, or repaired before using.
 2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction or, if methods are not prescribed, procedures described in either AWWA C651 or AWWA C652 or as described below:
 - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - b. Fill and isolate system according to either of the following:
 - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm (50 mg/L) of chlorine. Isolate with valves and allow to stand for 24 hours.
 - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm (200 mg/L) of chlorine. Isolate and allow to stand for three hours.
 - c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
 - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
- B. Prepare and submit reports of purging and disinfecting activities.
- C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

END OF SECTION 22 1116

DOMESTIC WATER PIPING

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SECTION 23 0400 - BASIC MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this and the other sections of Division 23.
- B. Related Sections: The following Division 23 sections contain requirements that relate to this section:
 - 1. "Basic Mechanical Materials and Methods," for materials and methods common to the remainder of Division 23, plus general related specifications including:
 - a. Access to mechanical installations.
 - b. Excavation for mechanical installations within the building boundaries, and from building to utilities connections.

1.2 SUMMARY

- A. This Section includes general administrative and procedural requirements for mechanical installations. The following administrative and procedural requirements are included in this Section to expand the requirements specified in Division 1:
 - 1. Submittals.
 - 2. Coordination drawings.
 - 3. Record documents.
 - 4. Maintenance manuals.
 - 5. Rough-ins.
 - 6. Mechanical installations.
 - 7. Cutting and patching.
 - 8. Temporary heating, ventilating and air conditioning.
 - 9. Substitutions.

1.3 QUALITY ASSURANCE

- A. Comply with IBC "International Building Code" for plumbing and mechanical materials, components, and installations as adopted by the State of Kansas.
- B. Comply with IPC "International Plumbing Code" for plumbing materials, components, and installations as adopted by the State of Kansas.
- C. Comply with IMC "International Mechanical Code" for mechanical materials, components, and installations as adopted by the State of Kansas.
- D. NFPA Compliance: Components and installation shall comply with the following where applicable:
 - 1. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

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1.4 SUBMITTALS

- A. General: Follow the procedures specified in Division 1 Section "Submittals."
- B. Increase the number of mechanical related shop drawings, product data, and samples submitted, to allow for required distribution plus one copy of each submittal required, which will be retained by the Mechanical Consulting Engineer.
- C. Additional copies may be required by individual sections of these Specifications.

1.5 RECORD DOCUMENTS

- A. Prepare record documents in accordance with the requirements in Division 1 Section "Project Closeout." In addition to the requirements specified in Division 1, indicate the following installed conditions:
 - 1. Ductwork mains and branches, size and location, for both exterior and interior; locations of dampers and other control devices; filters, boxes, and terminal units requiring periodic maintenance or repair.
 - 2. Mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, expansion compensators, tanks, etc.). Valve location diagrams, complete with valve tag chart. Indicate actual inverts and horizontal locations of underground piping.
 - 3. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
 - 4. Approved substitutions, Contract Modifications, and actual equipment and materials installed.

1.6 OPERATION AND MAINTENANCE MANUALS

- A. Prepare one (1) electronic Operation and Maintenance Manuals in accordance with Division 1 Section "Project Closeout." In addition to the requirements specified in Division 1, include the following information for equipment items:
 - 1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, complete nomenclature and commercial numbers of replacement parts and complete parts listing with part name and number.
 - 2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
 - 3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
 - 4. Servicing instructions and lubrication charts and schedules.
 - 5. Reviewed shop drawings and submittals.
 - 6. Record of spare parts provided to Owner with a signature of receipt by Owner's representative.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

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- B. Deliver products in factory-fabricated type containers or wrappings which properly protect product from damage.
- C. Store products indoors in clean, dry space in original containers. Protect products from weather, construction traffic and debris. When necessary to store outdoors, take similar precautions and store above grade and enclose with waterproof covering.
- D. Handle products carefully to prevent physical damage. Do not install damaged products; replace damaged products with new.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All equipment and material provided shall be "lead paint free" and asbestos free.

PART 3 - EXECUTION

3.1 ROUGH-IN

- A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
- B. Refer to equipment specifications in Divisions 2 through 16 for rough-in requirements.

3.2 MECHANICAL INSTALLATIONS

- A. General: Sequence, coordinate, and integrate the various elements of mechanical systems, materials, and equipment. Comply with the following requirements:
 - 1. Coordinate mechanical systems, equipment, and materials installation with other building components.
 - 2. Verify all dimensions by field measurements.
 - 3. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for mechanical installations.
 - 4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
 - 5. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
 - 6. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
 - 7. Coordinate connection of mechanical systems with exterior utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

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8. Install systems, materials, and equipment to conform with reviewed submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Engineer.
9. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
10. Install mechanical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.
11. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

3.3 EQUIPMENT ELECTRICAL CONNECTIONS

- A. Electrical: Conform to applicable requirements in Division 26 Sections.
- B. Grounding: Ground equipment. Tighten electrical connectors and terminals', including grounding connections, according to manufacturer's published torque tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- C. Provide all accessories required for complete installation of equipment provided in Division 23 Sections. Mount accessories in appropriate locations to insure access and proper operation. Accessories include equipment control panels, solenoid valves, aquastats, flow switches and similar devices.
- D. Arrange for the project electrical contractor to install all control wiring in conduit associated with any accessories provided in Division 23 Sections. Mechanical contractor is responsible for the cost of the electrical installation and for providing all equipment control wiring diagrams to the electrical contractor to insure proper connections. Control diagrams shall clearly identify factory-installed wiring and field-installed wiring. In the absence of a temperature control contractor, the mechanical contractor shall include any wiring associated with temperature control devices with the wiring to be installed by the electrical contractor.

3.4 CUTTING AND PATCHING

- A. General: Perform cutting and patching in accordance with Division 1 Section "Cutting and Patching." In addition to the requirements specified in Division 1, the following requirements apply:
 1. Perform cutting, fitting, and patching of mechanical equipment and materials required to:
 - a. Uncover Work to provide for installation of ill-timed Work.
 - b. Remove and replace defective Work.
 - c. Remove and replace Work not conforming to requirements of the Contract Documents.
 - d. Remove samples of installed Work as specified for testing.
 - e. Install equipment and materials in existing structures.
 - f. Upon written instructions from the Architect, uncover and restore Work to provide for Architect/Engineer observation of concealed Work.
 2. Cut, remove and legally dispose of selected mechanical equipment, components, and materials as indicated, including but not limited to removal of mechanical piping, heating units, plumbing fixtures and trim, and other mechanical items made obsolete by the new Work.
 3. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

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4. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.
5. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.
6. Patch existing finished surfaces and building components using new materials matching existing materials and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.

3.5 SUBSTITUTIONS

- A. General: All changes and additional work required by this Contractor or any other Contractor because of a substitution of an equivalent piece of equipment by this Contractor shall be the responsibility of this Contractor. Substitutions will only be considered when the quality of the product is maintained and it is advantageous to the Owner to consider.
- B. Requests for approval to bid equipment by a manufacturer not listed in these specifications must be received by A/E, in written form, a minimum of ten (10) calendar days prior to bid date.

3.6 CLEANING

- A. All equipment and installed materials shall be cleaned inside and outside. All construction dust and loose materials shall be removed. Any printed information attached to the equipment shall be removed and included in the Operation and Maintenance Manuals. Equipment nameplates shall NOT be removed. Any scratched paint surfaces shall be repaired with manufacturer's touch-up paint.

END OF SECTION 23 0400

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SECTION 23 0500 - BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Requirements specified in Division 23 Section "Basic Mechanical Requirements" apply to this Section.

1.2 SUMMARY

- A. This Section includes the following basic mechanical materials and methods to complement other Division 23 Sections and for application with mechanical installations.
 - 1. Piping materials and installation instructions common to most piping systems.
 - 2. Concrete equipment bases.
 - 3. Escutcheons.
 - 4. Dielectric fittings.
 - 5. Flexible connectors.
 - 6. Mechanical sleeve seals.
 - 7. Equipment nameplate data requirements.
 - 8. Mechanical identification.
 - 9. Nonshrink grout for equipment installations.
 - 10. Field-fabricated metal and wood equipment supports.
 - 11. Installation requirements common to equipment specification sections.
 - 12. Mechanical demolition.
 - 13. Cutting and patching.
 - 14. Touchup painting and finishing.
 - 15. Excavation for underground utilities and services, including underground pipes and equipment.
 - 16. Joint sealers for sealing around mechanical materials and equipment; and for sealing penetrations in fire and smoke barriers, floors, and foundation walls.
- B. Pipe and pipe fitting materials are specified in Division 23 piping system Sections.

1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

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- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- F. The following are industry abbreviations for plastic materials:
 - 1. ABS: Acrylonitrile-butadiene-styrene plastic.
 - 2. CPVC: Chlorinated polyvinyl chloride plastic.
 - 3. NP: Nylon plastic.
 - 4. PE: Polyethylene plastic.
 - 5. PVC: Polyvinyl chloride plastic.
- G. The following are industry abbreviations for rubber materials:
 - 1. CR: Chlorosulfonated polyethylene synthetic rubber.
 - 2. EPDM: Ethylene propylene diene terpolymer rubber.
- H. The following definitions apply to excavation operations:
 - 1. Subgrade: as used in this Section refers to the compacted soil immediately below the slab.
 - 2. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction from the Architect.

1.4 SUBMITTALS

- A. General: Submit the following according to the Conditions of the Contract and Division 23 Section "Basic Mechanical Requirements."
- B. Product Data: For dielectric fittings, flexible connectors, mechanical sleeve seals, and identification materials and devices.
- C. Shop Drawings: Detail fabrication and installation for metal and wood supports and anchorage for mechanical materials and equipment.
- D. Coordination Drawings: Detail major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Show space requirements for installation and access. Indicate if sequence and coordination of installations are important to efficient flow of the Work. Include the following:
 - 1. Planned piping layout, including valve and specialty locations and valve-stem movement.
 - 2. Clearances for installing and maintaining insulation.
 - 3. Clearances for servicing and maintaining equipment, accessories, and specialties, including space for disassembly required for periodic maintenance.
 - 4. Equipment and accessory service connections and support details.
 - 5. Exterior wall and foundation penetrations.

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6. Sizes and location of required concrete pads and bases.
 7. Scheduling, sequencing, movement, and positioning of large equipment into building during construction.
 8. Floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
- E. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.
- F. Schedules indicating proposed methods and sequence of operations for selective demolition prior to commencement of work. Include coordination for shut-off of services, and details for dust and noise control.

1.5 QUALITY ASSURANCE

- A. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.
- B. Equipment Selection: Equipment of higher electrical characteristics, physical dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased. Additional costs shall be approved in advance by appropriate Contract Modification for these increases. If minimum energy ratings or efficiencies of equipment are specified, equipment must meet design and commissioning requirements.
- C. Qualify welding processes and operators for structural steel according to AWS D1.1 "Structural Welding Code--Steel."
- D. Qualify welding processes and operators for piping according to ASME "Boiler and Pressure Vessel Code," Section IX, "Welding and Brazing Qualifications."
1. Comply with provisions of ASME B31 Series "Code for Pressure Piping."
 2. Certify that each welder has passed AWS qualification tests for the welding processes involved and that certification is current.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and prevent entrance of dirt, debris, and moisture.
- B. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.
- C. Protect flanges, fittings, and piping specialties from moisture and dirt.
- D. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

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1.7 SEQUENCING AND SCHEDULING

- A. Coordinate mechanical equipment installation with other building components.
- B. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.
- C. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components, as they are constructed.
- D. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work.
- E. Coordinate installation of identifying devices after completing covering and painting, if devices are applied to surfaces. Install identifying devices before installing acoustical ceilings and similar concealment.

1.8 PROJECT CONDITIONS

- A. Conditions Affecting Selective Demolition: The following project conditions apply:
 - 1. Protect adjacent materials indicated to remain. Install and maintain dust and noise barriers to keep dirt, dust, and noise from being transmitted to adjacent areas. Remove protection and barriers after demolition operations are complete.
 - 2. Locate, identify, and protect services passing through demolition area and serving other areas outside the demolition limits. Maintain services to areas outside demolition limits. When services must be interrupted, install temporary services for affected areas.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by one of the following:
 - 1. Dielectric Unions:
 - a. Capitol Manufacturing Co.
 - b. Central Plastics Co.
 - c. Eclipse, Inc.; Rockford-Eclipse Div.
 - d. Epco Sales Inc.
 - e. Hart Industries International, Inc.
 - f. Watts Industries, Inc.; Water Products Div.
 - g. Zurn Industries, Inc.; Wilkins Div.
 - 2. Dielectric Flanges:
 - a. Capitol Manufacturing Co.
 - b. Central Plastics Co.
 - c. Epco Sales Inc.
 - d. Watts Industries, Inc.; Water Products Div.

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3. Dielectric-Flange Insulating Kits:
 - a. Calpico, Inc.
 - b. Central Plastics Co.
4. Dielectric Couplings:
 - a. Calpico, Inc.
 - b. Lochinvar Corp.
5. Dielectric Nipples:
 - a. Grinnell Corp.; Grinnell Supply Sales Co.
 - b. Perfection Corp.
 - c. Victaulic Co. of America.
6. Metal, Flexible Connectors:
 - a. ANAMET Industrial, Inc.
 - b. Central Sprink, Inc.
 - c. Flexicraft Industries.
 - d. Flex-Weld, Inc.
 - e. Grinnell Corp.; Grinnell Supply Sales Co.
 - f. Hyspan Precision Products, Inc.
 - g. McWane, Inc.; Tyler Pipe; Gustin-Bacon Div.
 - h. Mercer Rubber Co.
 - i. Metraflex Co.
 - j. Proco Products, Inc.
 - k. Uniflex, Inc.

2.2 PIPE AND PIPE FITTINGS

- A. Refer to individual Division 23 piping Sections for pipe and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

- A. Refer to individual Division 23 piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8 Inch (3.2 mm) maximum thickness, unless thickness or specific material is indicated.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
 2. AWWA C110, rubber, flat face, 1/8 Inch (3.2 mm) thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
 3. ASME B16.20 for grooved, ring-joint, steel flanges.

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- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- D. Solder Filler Metals: ASTM B 32.
 - 1. Lead Free-Antimony Free: Tin (approximately 95.5 percent), copper (approximately 4 percent) and silver (approximately .5 percent).
- E. Brazing Filler Metals: AWS A5.8.
 - 1. BAg1: Silver alloy.
- F. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- G. Flanged, Ductile-Iron Pipe Gasket, Bolts, and Nuts: AWWA C110, rubber gasket, carbon-steel bolts and nuts.

2.4 DIELECTRIC FITTINGS

- A. General: Assembly or fitting with insulating material isolating joined dissimilar metals, to prevent galvanic action and stop corrosion.
- B. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld-neck end types and matching piping system materials.
- C. Insulating Material: Suitable for system fluid, pressure, and temperature.
- D. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig (1725 kPa) minimum working pressure at 180 deg F (82 deg C).
- E. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150 or 300-psig (1035 or 2070-kPa) minimum working pressure as required to suit system pressures.
- F. Dielectric-Flange Insulation Kits: Field-assembled, companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
 - 1. Provide separate companion flanges and steel bolts and nuts for 150 or 300-psig (1035 or 2070-kPa) minimum working pressure as required to suit system pressures.
- G. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).
- H. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

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2.5 FLEXIBLE CONNECTORS

- A. General: Fabricated from materials suitable for system fluid and that will provide flexible pipe connections. Include 125-psig (860-kPa) minimum working-pressure rating, unless higher working pressure is indicated, and ends according to the following:
1. 2-Inch NPS (DN50) and Smaller: Threaded.
 2. 2-½-Inch NPS (DN65) and Larger: Flanged.
 3. Option for 2-½ Inch NPS (DN65) and Larger: Grooved for use with keyed couplings.
- B. Stainless-Steel-Hose/Steel Pipe, Flexible Connectors: Corrugated, stainless-steel, inner tubing covered with stainless-steel wire braid. Include steel nipples or flanges, welded to hose.

2.6 IDENTIFYING DEVICES AND LABELS

- A. General: Manufacturer's standard products of categories and types required for each application as referenced in other Division 23 Sections. If more than one type is specified for application, selection is Installer's option, but provide one selection for each product category.
- B. Equipment Nameplates: Metal nameplate with operational data engraved or stamped; permanently fastened to equipment.
1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data.
 2. Location: Accessible and visible location.
- C. Pressure-Sensitive Pipe Markers: Manufacturer's standard preprinted, permanent adhesive, color-coded, pressure-sensitive vinyl, complying with ASME A13.1.
- D. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in mechanical identification, with corresponding designations indicated. Use numbers, lettering, and wording indicated for proper identification and operation/maintenance of mechanical systems and equipment.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. General: Install piping as described below, unless piping Sections specify otherwise. Individual Division 23 piping Sections specify unique piping installation requirements.
- B. General Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, unless deviations to layout are approved on Coordination Drawings.
- C. Install piping at indicated slope.
- D. Install components with pressure rating equal to or greater than system operating pressure.

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- E. Install piping in concealed interior and exterior locations, except in equipment rooms and service areas.
- F. Install piping free of sags and bends.
- G. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.
- H. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.
- I. Install piping to allow application of insulation plus 1-inch (25-mm) clearance around insulation.
- J. Locate groups of pipes parallel to each other, spaced to permit valve servicing.
- K. Install fittings for changes in direction and branch connections.
- L. Install couplings according to manufacturer's written instructions.
- M. Verify final equipment locations for roughing-in.
- N. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.
- O. Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping specification Sections:
 - 1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
 - 2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
 - 3. Soldered Joints: Construct joints according to CDA's "Copper Tube Handbook."
 - 4. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
 - 5. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - a. Note internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
 - b. Apply appropriate tape or thread compound to external pipe threads, unless dry seal threading is specified.
 - c. Align threads at point of assembly.
 - d. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
 - e. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
 - 6. Welded Joints: Construct joints according to AWS D10.12, "Recommended Practices and Procedures for Welding Low Carbon Steel Pipe," using qualified processes and welding operators according to "Quality Assurance" Article.
 - 7. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.

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- P. Piping Connections: Make connections according to the following, unless otherwise indicated:
1. Install unions, in piping 2-inch NPS (DN50) and smaller, adjacent to each valve and at final connection to each piece of equipment with 2-inch NPS (DN50) or smaller threaded pipe connection.
 2. Install flanges, in piping 2-½ inch NPS (DN65) and larger, adjacent to flanged valves and at final connection to each piece of equipment with flanged pipe connection.
 3. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.2 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to provide maximum possible headroom, if mounting heights are not indicated.
- B. Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to Engineer.
- C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- D. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- E. Install equipment giving right of way to piping installed at required slope.
- F. Install flexible connectors on equipment side of shutoff valves, horizontally and parallel to equipment shafts if possible.

3.3 ERECTION OF METAL SUPPORTS AND ANCHORAGE

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.
- B. Field Welding: Comply with AWS D1.1, "Structural Welding Code--Steel."

3.4 DEMOLITION

- A. Disconnect, demolish, and remove Work specified in Division 23 Sections.
- B. If pipe, ductwork, insulation, or equipment to remain is damaged or disturbed, remove damaged portions and install new products of equal capacity and quality.
- C. Accessible Work: Remove indicated exposed pipe and ductwork in its entirety.
- D. Work Abandoned in Place: Cut and remove underground pipe a minimum of 2 inches (50 mm) beyond face of adjacent construction. Cap and patch surface to match existing finish.
- E. Removal: Remove indicated equipment from Project site.

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- F. Temporary Disconnection: Remove, store, clean, reinstall, reconnect, and make operational equipment indicated for relocation.

END OF SECTION 23 0500

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SECTION 23 0523 – VALVES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Related Sections: The following Division 23 Sections contain requirements that relate to this Section.
 - 1. “Basic Mechanical Requirements.”
 - 2. “Basic Mechanical Materials and Methods.”
 - 3. Division 23 piping Sections for specialty valves applicable to those Sections only.

1.2 SUMMARY

- A. This Section includes the following general-duty valves:
 - 1. Bronze ball valves.
 - 2. Ferrous-alloy ball valves.
 - 3. Ferrous-alloy butterfly valves.
 - 4. Bronze gate valves.
 - 5. Cast-iron gate valves.
 - 6. Cast-iron globe valves.
 - 7. Bronze check valves.
 - 8. Gray-iron swing check valves.
 - 9. Spring-loaded, lift-disc check valves.
 - 10. Chainwheel actuators.

1.3 DEFINITIONS

- A. The following are standard abbreviations for valves:
 - 1. CWP: Cold working pressure.
 - 2. EPDM: Ethylene-propylene-diene terpolymer rubber.
 - 3. NBR: Acrylonitrile-butadiene rubber.
 - 4. PTFE: Polytetrafluoroethylene plastic.
 - 5. SWP: Steam working pressure.
 - 6. TFE: Tetrafluoroethylene plastic.

1.4 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 15 Section “Basic Mechanical Requirements.”

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- B. Product Data: For each type of valve indicated. Include body, seating, and trim materials; valve design; pressure and temperature classifications; end connections; arrangement; dimensions; and required clearances. Include list indicating valve and its application. Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories.

1.5 QUALITY ASSURANCE

- A. ASME Compliance: ASME B31.9 for building services piping valves.
1. Exceptions: Domestic hot- and cold-water piping valves unless referenced.
- B. ASME Compliance for Ferrous Valves: ASME B16.10 and ASME B16.34 for dimension and design criteria.
- C. NSF Compliance: NSF 61 for valve materials for potable-water service.
- D. Lead Free System: Lead Free System: Lead Free refers to the wetted surface of pipe, fittings and fixtures in potable water systems that have a weighted average lead content $\leq 0.25\%$ per the Safe Drinking Water Act (Sec. 1417) amended 1-4-2011 and other equivalent state regulations in systems delivering water for human consumption.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
1. Protect internal parts against rust and corrosion.
 2. Protect threads, flange faces, grooves, and weld ends.
 3. Set angle, gate, and globe valves closed to prevent rattling.
 4. Set ball and plug valves open to minimize exposure of functional surfaces.
 5. Set butterfly valves closed or slightly open.
 6. Block check valves in either closed or open position.
- B. Use the following precautions during storage:
1. Maintain valve end protection.
 2. Store valves indoors and maintain at higher than ambient dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.
- C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by the manufacturers specified.

VALVES

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2.2 VALVES, GENERAL

- A. Refer to Part 3 "Valve Applications" Article for applications of valves.
- B. Bronze Valves: NPS 4 (DN 100) and smaller with threaded ends, unless otherwise indicated. Full port for 2" and smaller – standard port for 2 ½" to 4"
- C. Ferrous Valves: NPS 4 (DN 100) and larger with flanged ends, unless otherwise indicated.
- D. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- E. Valve Sizes: Same as upstream pipe, unless otherwise indicated.
- F. Valve Actuators:
 - 1. Lever Handle: For quarter-turn valves NPS 4 (DN 100) and smaller, except plug valves.
- G. Extended Valve Stems: On insulated valves.
- H. Valve Grooved Ends: AWWA C606.
- I. Solder Joint: With sockets according to ASME B16.18.
 - 1. Caution: Use solder with melting point below 840 deg F (454 deg C) for check valves; below 421 deg F (216 deg C) for ball valves.
- J. Threaded: With threads according to ASME B1.20.1.
- K. Valve Bypass and Drain Connections: MSS SP-45.

2.3 BRONZE BALL VALVES

- A. Manufacturers:
 - 1. Two-Piece, Bronze Ball Valves:
 - a. Conbraco Industries, Inc.; Apollo Div.
 - b. Crane Co.; Crane Valve Group; Crane Valves.
 - c. Crane Co.; Crane Valve Group; Jenkins Valves.
 - d. Crane Co.; Crane Valve Group; Stockham Div.
 - e. Grinnell Corporation.
 - f. Milwaukee Valve Company.
 - g. NIBCO INC.
 - h. Watts Industries, Inc.; Water Products Div.
- B. Bronze Ball Valves, General: MSS SP-110.

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- C. Two-Piece, Bronze Ball Valves: Bronze body with full-port, chrome-plated brass or stainless steel ball; PTFE seats; and 600-psig (4140-kPa) minimum CWP rating. Provide with bronze or stainless steel stem, brass packing nut and PTFE packing.

2.4 FERROUS-ALLOY BALL VALVES

A. Manufacturers:

1. Conbraco Industries, Inc.; Apollo Div.
2. Cooper Cameron Corp.; Cooper Cameron Valves Div.
3. Crane Co.; Crane Valve Group; Stockham Div.
4. Milwaukee Valve Company.
5. NIBCO INC.

- B. Ferrous-Alloy Ball Valves, General: MSS SP-72, with flanged ends.

- C. Ferrous-Alloy Ball Valves: Class 150, full or regular port.

2.5 FERROUS-ALLOY BUTTERFLY VALVES

A. Manufacturers:

1. Single-Flange (Lugged Body), Ferrous-Alloy Butterfly Valves:
 - a. Crane Co.; Crane Valve Group; Center Line.
 - b. Crane Co.; Crane Valve Group; Jenkins Valves.
 - c. Crane Co.; Crane Valve Group; Stockham Div.
 - d. Grinnell Corporation.
 - e. Milwaukee Valve Company.
 - f. Mueller Steam Specialty.
 - g. NIBCO INC.

- B. Ferrous-Alloy Butterfly Valves, General: MSS SP-67, Type I, for tight shutoff, with disc and lining suitable for potable water, unless otherwise indicated.

- C. Single-Flange, 250-psig (1725-kPa) CWP Rating, Ferrous-Alloy Butterfly Valves: Wafer-lug type with one- or two-piece stem.

2.6 BRONZE CHECK VALVES

A. Manufacturers:

1. Type 1, Bronze, Horizontal Lift Check Valves with Metal Disc:
 - a. Crane Co.; Crane Valve Group; Crane Valves.
 - b. Crane Co.; Crane Valve Group; Stockham Div.

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2. Type 1, Bronze, Vertical Lift Check Valves with Metal Disc:

- a. Crane Co.; Crane Valve Group; Crane Valves.
- b. Crane Co.; Crane Valve Group; Jenkins Valves.

B. Bronze Check Valves, General: MSS SP-80.

C. Type 1, Class 150, Bronze, Horizontal Lift Check Valves: Bronze body with bronze disc and seat.

D. Type 1, Class 150, Bronze, Vertical Lift Check Valves: Bronze body with bronze disc and seat.

2.7 GRAY-IRON SWING CHECK VALVES

A. Manufacturers:

1. Type I, Gray-Iron Swing Check Valves with Metal Seats:

- a. Cincinnati Valve Co.
- b. Crane Co.; Crane Valve Group; Crane Valves.
- c. Crane Co.; Crane Valve Group; Jenkins Valves.
- d. Crane Co.; Crane Valve Group; Stockham Div.
- e. Grinnell Corporation.
- f. Hammond Valve.
- g. Kitz Corporation of America.
- h. Legend Valve & Fitting, Inc.
- i. Milwaukee Valve Company.
- j. Mueller Co.
- k. NIBCO INC.

2. Type II, Gray-Iron Swing Check Valves with Composition to Metal Seats:

- a. Crane Co.; Crane Valve Group; Crane Valves.
- b. Crane Co.; Crane Valve Group; Stockham Div.
- c. Mueller Co.
- d. Watts Industries, Inc.; Water Products Div.

B. Gray-Iron Swing Check Valves, General: MSS SP-71.

C. Type I, Class 125, gray-iron, swing check valves with metal seats.

D. Type I, Class 250, gray-iron, swing check valves with metal seats.

E. Type II, Class 125, gray-iron, swing check valves with composition to metal seats.

F. Type II, Class 250, gray-iron, swing check valves with composition to metal seats.

G. 175-psig (1207-kPa) CWP Rating, Grooved-End, Swing Check Valves: Ductile-iron body with grooved or shouldered ends.

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- a. Grinnell Corporation.
- b. Legend Valve & Fitting, Inc.
- c. Milwaukee Valve Company.
- d. Mueller Steam Specialty.
- e. NIBCO INC.

B. Lift-Disc Check Valves, General: FCI 74-1, with spring-loaded bronze or alloy disc and bronze or alloy seat.

C. Type IV, Class 125, Threaded Lift-Disc Check Valves: Threaded style with bronze shell and threaded ends.

2.9 BRONZE GATE VALVES**A. Manufacturers:****1. Type 2, Bronze, Rising-Stem, Solid-Wedge Gate Valves:**

- a. American Valve, Inc.
- b. Cincinnati Valve Co.
- c. Crane Co.; Crane Valve Group; Crane Valves.
- d. Crane Co.; Crane Valve Group; Stockham Div.
- e. Grinnell Corporation.
- f. Milwaukee Valve Company.
- g. NIBCO INC.
- h. Powell, Wm. Co.

B. Bronze Gate Valves, General: MSS SP-80, with ferrous-alloy handwheel.

C. Type 2, Class 150, Bronze Gate Valves: Bronze body with rising stem and bronze solid wedge.

D. Type 2, Class 200, Bronze Gate Valves: Bronze body with rising stem and bronze solid wedge.

E. Type 3, Class 200, Bronze Gate Valves: Bronze body with rising stem and bronze split wedge and union-ring bonnet.

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2.10 CAST-IRON GATE VALVES

A. Manufacturers:

1. Type I, Cast-Iron, Nonrising-Stem Gate Valves:

- a. Cincinnati Valve Co.
- b. Crane Co.; Crane Valve Group; Crane Valves.
- c. Crane Co.; Crane Valve Group; Stockham Div.
- d. Grinnell Corporation.
- e. Milwaukee Valve Company.
- f. [NIBCO INC.](#)
- g. Powell, Wm. Co.
- h. Watts Industries, Inc.; Water Products Div.

2. Type I, Cast-Iron, Rising-Stem Gate Valves:

- a. Cincinnati Valve Co.
- b. Crane Co.; Crane Valve Group; Crane Valves.
- c. Crane Co.; Crane Valve Group; Stockham Div.
- d. Grinnell Corporation.
- e. Milwaukee Valve Company.
- f. [NIBCO INC.](#)
- g. Powell, Wm. Co.
- h. Watts Industries, Inc.; Water Products Div.

B. Cast-Iron Gate Valves, General: MSS SP-70, Type I.

C. Class 250, NRS, All-Iron, Cast-Iron Gate Valves: Cast-iron body with cast-iron trim, nonrising stem, and solid-wedge disc.

D. Class 250, OS&Y, Bronze-Mounted, Cast-Iron Gate Valves: Cast-iron body with bronze trim, rising stem, and solid-wedge disc.

E. Class 250, OS&Y, All-Iron, Cast-Iron Gate Valves: Cast-iron body with cast-iron trim, rising stem, and solid-wedge disc.

2.11 CAST-IRON GLOBE VALVES

A. Manufacturers:

1. Type I, Cast-Iron Globe Valves with Metal Seats:

- a. Cincinnati Valve Co.
- b. Crane Co.; Crane Valve Group; Crane Valves.
- c. Crane Co.; Crane Valve Group; Stockham Div.
- d. Grinnell Corporation.
- e. Milwaukee Valve Company.
- f. [NIBCO INC.](#)
- g. Powell, Wm. Co.

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- B. Cast-Iron Globe Valves, General: MSS SP-85.
- C. Type I, Class 250, Cast-Iron Globe Valves: Gray-iron body with bronze seats.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine piping system for compliance with requirements for installation tolerances and other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- C. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- D. Examine threads on valve and mating pipe for form and cleanliness.
- E. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- F. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE APPLICATIONS

- A. Provide valves applied for shutoff or throttling duty as discrete parts of a field assembled piping system. Do not provide these valves as part of a valve package unless specifically called out in the project construction documents.
- B. Refer to piping Sections for specific valve applications. If valve applications are not indicated, use the following:
 - 1. Shutoff Service Ball or butterfly valves.
 - 2. Throttling Service: Ball, butterfly, or globe valves.
 - 3. Pump Discharge: Spring-loaded, lift-disc check valves.
- C. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP class or CWP ratings may be substituted.
- D. Domestic Water Piping: Use the following types of valves:
 - 1. Ball Valves, NPS 4 (DN 100) and Smaller: Two-piece, 600-psig CWP rating, bronze.
 - 2. Lift Check Valves, NPS 2 (DN 50) and Smaller: Type 2, Class 150, horizontal or vertical, bronze.

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- E. Low-Pressure Steam Piping: Use the following types of valves:
1. Ball Valves, NPS 2 and Smaller: Two-piece, 600-psig CWP rating, bronze.
 2. Swing Check Valves, NPS 2 and Smaller: Type 4, Class 150, bronze.
 3. Globe Valves, NPS 2 and Smaller: Type 2, Class 150, bronze.
- F. High-Pressure Steam Piping: Use the following types of valves:
1. Ball Valves, NPS 2 and Smaller: Two-piece, 600-psig CWP rating, bronze.
 2. Ball Valves, NPS 2-1/2 and Larger: Class 300, ferrous alloy.
 3. Swing Check Valves, NPS 2 and Smaller: Type 3, Class 200, bronze.
 4. Swing Check Valves, NPS 2-1/2 and Larger: Type II, Class 250, gray iron
 5. Gate Valves, NPS 2 and Smaller: Type 3, Class 200, bronze.
 6. Gate Valves, NPS 2-1/2 and Larger: Type I, Class 250, NRS bronze-mounted cast iron.
 7. Globe Valves, NPS 2 and Smaller: Type 1, Class 200, bronze.
 8. Globe Valves, NPS 2-1/2 and Larger: Type I, Class 250, bronze-mounted cast iron.
- G. Steam Condensate Piping: Use the following types of valves:
1. Ball Valves, NPS 2 and Smaller: Two-piece, 600-psig CWP rating, bronze.
 2. Ball Valves, NPS 2-1/2 and Larger: Class 300, ferrous alloy.
 3. Swing Check Valves, NPS 2 and Smaller: Type 3, Class 200, bronze.
 4. Swing Check Valves, NPS 2-1/2 and Larger: Type II, Class 250, gray iron.
 5. Gate Valves, NPS 2 and Smaller: Type 3, Class 125, bronze.
 6. Gate Valves, NPS 2-1/2 and Larger: Type I, Class 125, OS&Y, bronze-mounted cast iron.
 7. Globe Valves, NPS 2 and Smaller: Type 2, Class 200, bronze.
 8. Globe Valves, NPS 2-1/2 and Larger: Type I, Class 250 bronze-mounted cast iron.
- H. Select valves, except wafer and flangeless types, with the following end connections:
1. For Copper Tubing, NPS 4 (DN 100) and Smaller: Solder-joint or threaded ends, except provide valves with threaded ends for heating hot water.
 2. For Copper Tubing, NPS 4 (DN 100): Solder Joint or Flanged ends.
 3. For Copper Tubing, NPS 5 (DN 125) and Larger: Flanged ends.
 4. For Steel Piping, NPS 2 (DN 50) and Smaller: Threaded ends.
 5. For Steel Piping, NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Flanged ends.
 6. For Steel Piping, NPS 5 (DN 125) and Larger: Flanged ends.

3.3 VALVE INSTALLATION

- A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- C. Locate valves for easy access and provide separate support where necessary.
- D. Install valves in horizontal piping with stem at or above center of pipe.
- E. Install valves in position to allow full stem movement.

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- F. Install chainwheel operators on valves NPS 10 and larger and more than 96 inches above floor. Extend chains to 60 inches above finished floor elevation.
- G. Install check valves for proper direction of flow and as follows:
 - 1. Swing Check Valves: In horizontal position with hinge pin level.
 - 2. Lift Check Valves: With stem upright and plumb.

3.4 JOINT CONSTRUCTION

- A. Refer to Division 23 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.
- B. Grooved Joints: Assemble joints with keyed coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.
- C. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.
 - 1. Exercise the valve following the system flush and fill to verify valve operation.

3.5 ADJUSTING

- A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

END OF SECTION 23 0523

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SECTION 23 0700 - MECHANICAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Related Sections: The following Division 23 Sections contain requirements that relate to this section:
 - 1. "Basic Mechanical Requirements."
 - 2. "Basic Mechanical Materials and Methods."
 - 3. "Hangers and Supports" for pipe insulation shields and protection saddles.
 - 4. "Surge Tank".

1.2 SUMMARY

- A. This Section includes pipe, duct, and equipment insulation.

1.3 DEFINITIONS

- A. Hot Surfaces: Normal operating temperatures of 100 deg F (38 deg C) or higher.
- B. Dual-Temperature Surfaces: Normal operating temperatures that vary from hot to cold.
- C. Cold Surfaces: Normal operating temperatures less than 75 deg F (24 deg C).
- D. Thermal resistivity is designated by an r-value that represents the reciprocal of thermal conductivity (k-value). Thermal conductivity is the rate of heat flow through a homogenous material exactly 1 inch thick. Thermal resistivity (r-value) is expressed by the temperature difference in degrees Fahrenheit between the two exposed faces required to cause 1 BTU per hour to flow through 1 square foot at mean temperatures indicated.
- E. Thermal Conductivity (k-value): Measure of heat flow through a material at a given temperature difference; conductivity is expressed in units of Btu x inch/h x sq. ft. x deg F.
- F. Density: Is expressed in lb/cu. ft.

1.4 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 23 Section "Basic Mechanical Requirements."
- B. Product data for each type of mechanical insulation identifying k-value, thickness, and accessories.

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1.5 QUALITY ASSURANCE

- A. Fire Performance Characteristics: Conform to the following characteristics for insulation including facings, cements, and adhesives, when tested according to ASTM E 84, by UL or other testing or inspecting organization acceptable to the authority having jurisdiction. Label insulation with appropriate markings of testing laboratory.
1. Interior Insulation: Flame spread rating of 25 or less and a smoke developed rating of 50 or less.
 2. Exterior Insulation: Flame spread rating of 75 or less and a smoke developed rating of 150 or less.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by one of the following:
1. Glass Fiber:
 - a. CertainTeed Corporation.
 - b. Knauf Fiberglass GmbH.
 - c. Schuller International (Manville).
 - d. Owens-Corning Fiberglas Corporation.
 - e. USG Interiors, Inc. - Thermafiber Division.

2.2 GLASS FIBER

- A. Material: Inorganic glass fibers, bonded with a thermosetting resin.
- B. Jacket: All-purpose, factory-applied, laminated glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil having self-sealing lap.
- C. Preformed Pipe Insulation: ASTM C 547, Class 1, rigid pipe insulation, with all service jacket.
1. Thermal Conductivity: 0.23 average maximum at 75 deg F mean temperature.
- D. Adhesive: Produced under the UL Classification and Follow-up service.
1. Type: Non-flammable, solvent-based.
 2. Service Temperature Range: Minus 20 to 180 deg F.
- E. Vapor Barrier Coating: Waterproof coating recommended by insulation manufacturer for outside service.

2.3 INSULATING CEMENTS

- A. Mineral Fiber: ASTM C 195.
1. Thermal Conductivity: 1.0 average maximum at 500 deg F mean temperature.
 2. Compressive Strength: 10 psi at 5 percent deformation.

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- B. Expanded or Exfoliated Vermiculite: ASTM C 196.
 - 1. Thermal Conductivity: 1.10 average maximum at 500 deg F mean temperature.
 - 2. Compressive Strength: 5 psi at 5 percent deformation.
- C. Mineral Fiber, Hydraulic-Setting Insulating and Finishing Cement: ASTM C 449.
 - 1. Thermal Conductivity: 1.2 average maximum at 400 deg F mean temperature.
 - 2. Compressive Strength: 100 psi at 5 percent deformation.

2.4 ADHESIVES

- A. Lagging Adhesive: MIL-A-3316C, non-flammable adhesive in the following Classes and Grades:
 - 1. Class 1, Grade A for bonding glass cloth and tape to unfaced glass fiber insulation, sealing edges of glass fiber insulation, and bonding lagging cloth to unfaced glass fiber insulation.
 - 2. Class 2, Grade A for bonding glass fiber insulation to metal surfaces.

2.5 JACKETS

- A. General: ASTM C 921, Type 1, except as otherwise indicated.
- B. Foil and Paper Jacket: Laminated glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil.
 - 1. Water Vapor Permeance: 0.02 perm maximum, when tested according to ASTM E 96.
 - 2. Puncture Resistance: 50 beach units minimum, when tested according to ASTM D 781.
- C. PVC Jacketing: High-impact, ultra-violet-resistant PVC, 20 mils thick, roll stock ready for shop or field cutting and forming to indicated sizes.
 - 1. Adhesive: As recommended by insulation manufacturer.
- D. PVC Fitting Covers: Factory-fabricated fitting covers manufactured from 20 mil thick, high-impact, ultra-violet-resistant PVC.
 - 1. Adhesive: As recommended by insulation manufacturer.
- E. Aluminum Jacket: ASTM B 209, 3003 Alloy, H-14 temper, roll stock ready for shop or field cutting and forming to indicated sizes.
 - 1. Finish and Thickness: Smooth finish, 0.010 inch thick.
 - 2. Finish and Thickness: corrugated finish, 0.010 inch thick.
 - 3. Moisture Barrier: 1 mil, heat-bonded polyethylene and kraft paper.
 - 4. Moisture Barrier: 3 mil Dupont Surlyn.
 - 5. Elbows: Preformed 45-degree and 90-degree, short- and long-radius elbows, same material, finish, and thickness as jacket.

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2.6 ACCESSORIES AND ATTACHMENTS

- A. Glass Cloth and Tape: Woven glass fiber fabrics, plain weave, presized a minimum of 8 ounces per sq. yd.
 - 1. Tape Width: 4 inches.
 - 2. Cloth Standard: MIL-C-20079H, Type I.
 - 3. Tape Standard: MIL-C-20079H, Type II.
- B. Bands: 3/4 inch wide, in one of the following materials compatible with jacket:
 - 1. Stainless Steel: Type 304, 0.020 inch thick.
 - 2. Galvanized Steel: 0.005 inch thick.
 - 3. Aluminum: 0.007 inch thick.
 - 4. Brass: 0.01 inch thick.
 - 5. Nickel-Copper Alloy: 0.005 inch thick.
- C. Wire: 14 gage nickel copper alloy, 16 gage, soft-annealed stainless steel, or 16 gage, soft-annealed galvanized steel.
- D. Corner Angles: 28 gage, 1 inch by 1 inch aluminum, adhered to 2 inches by 2 inches kraft paper.
- E. Anchor Pins: Capable of supporting 20 pounds each. Provide anchor pins and speed washers of sizes and diameters as recommended by the manufacturer for insulation type and thickness.

2.7 SEALING COMPOUNDS

- A. Vapor Barrier Compound: Water-based, fire-resistive composition.
 - 1. Water Vapor Permeance: 0.08 perm maximum.
 - 2. Temperature Range: Minus 20 to 180 deg F.
- B. Weatherproof Sealant: Flexible-elastomer-based, vapor-barrier sealant designed to seal metal joints.
 - 1. Water Vapor Permeance: 0.02 perm maximum.
 - 2. Temperature Range: Minus 50 to 250 deg F (Minus 46 to 121 deg C).
 - 3. Color: Aluminum.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Preparation: Clean, dry, and remove foreign materials such as rust, scale, and dirt.
- B. Mix insulating cements with clean potable water. Mix insulating cements contacting stainless-steel surfaces with demineralized water.
 - 1. Follow cement manufacturer's printed instructions for mixing and portions.

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3.2 INSTALLATION, GENERAL

- A. Refer to schedules at the end of this Section for materials, forms, jackets, and thicknesses required for each mechanical system.
- B. Select accessories compatible with materials suitable for the service. Select accessories that do not corrode, soften, or otherwise attack the insulation or jacket in either the wet or dry state.
- C. Install vapor barriers on insulated pipes, ducts, and equipment having surface operating temperatures below 60 deg F.
- D. Apply insulation material, accessories, and finishes according to the manufacturer's printed instructions.
- E. Install insulation with smooth, straight, and even surfaces. The final appearance of the insulation work shall be neat, workmanlike and an attractive insulation system.
- F. Seal joints and seams to maintain vapor barrier on insulation requiring a vapor barrier.
- G. Seal penetrations for hangers, supports, anchors, and other projections in insulation requiring a vapor barrier.
- H. Apply adhesives and coatings at manufacturer's recommended coverage-per-gallon rate.
- I. Keep insulation materials dry during application and finishing. Insulation which has become wet during application shall be removed and discarded, and cost shall be incurred by contractor.
- J. Items Not Insulated: Unless otherwise indicated do not apply insulation to the following systems, materials, and equipment:
 - 1. Fibrous glass ducts.
 - 2. Metal ducts with duct liner.
 - 3. Factory-insulated flexible ducts.
 - 4. Factory-insulated plenums, casings, terminal boxes, and filter boxes and sections.
 - 5. Flexible connectors for ducts and pipes.
 - 6. Vibration control devices.
 - 7. Testing laboratory labels and stamps.
 - 8. Nameplates and data plates.
 - 9. Access panels and doors in air distribution systems.
 - 10. Fire protection piping systems.
 - 11. Sanitary drainage and vent piping.
 - 12. Drainage piping located in crawl spaces, unless indicated otherwise.
 - 13. Below grade piping.
 - 14. Chrome-plated pipes and fittings, except for plumbing fixtures for the disabled.
 - 15. Piping specialties including air chambers, unions, strainers, check valves, plug valves, and flow regulators.
- K. The Contractor shall be responsible for coordination with other building disciplines before installation is performed. Progressive testing of systems to be insulated shall have been completed, inspected, and approved before insulation is applied.

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3.3 PIPE INSULATION INSTALLATION, GENERAL

- A. Tightly butt longitudinal seams and end joints. Bond with adhesive.
- B. Stagger joints on double layers of insulation. Properly secure each insulation layer.
- C. Apply insulation continuously over fittings, valves, and specialties, except as otherwise indicated.
- D. Apply insulation with a minimum number of joints.
- E. Apply insulation with integral jackets as follows:
 - 1. Pull jacket tight and smooth.
 - 2. Cover circumferential joints with butt strips, at least 3 inches wide, and of same material as insulation jacket. Secure with adhesive and outward clinching staples along both edges of butt strip and space 4 inches on center.
 - 3. Longitudinal Seams: Overlap seams at least 1-1/2 inches. Apply insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches on center.
 - a. Exception: Do not staple longitudinal laps on insulation applied to piping systems with surface temperatures at or below 35 deg F.
 - 4. Vapor Barrier Coatings: Where vapor barriers are indicated, apply on seams and joints, over staples, and at ends butt to flanges, unions, valves, and fittings.
 - 5. At penetrations in jackets for thermometers and pressure gages, fill and seal voids with vapor barrier coating.
 - 6. Repair damaged insulation jackets, except metal jackets, by applying jacket material around damaged jacket. Adhere, staple, and seal. Extend patch at least 2 inches in both directions beyond damaged insulation jacket and around the entire circumference of the pipe.
- F. Flanges, Fittings, and Valves - Interior Exposed and Concealed: Coat pipe insulation ends with vapor barrier coating. Apply premolded, precut, or field-fabricated segments of insulation around flanges, unions, valves, and fittings. Make joints tight. Bond with adhesive.
 - 1. Use same material and thickness as adjacent pipe insulation.
 - 2. Overlap nesting insulation by 2 inches or 1-pipe diameter, which ever is greater.
 - 3. Apply materials with adhesive, fill voids with mineral fiber insulating cement. Secure with wire or tape.
 - 4. Insulate elbows and tees smaller than 3 inches pipe size with premolded insulation.
 - 5. Insulate elbows and tees 3 inches and larger with premolded insulation or insulation material segments. Use at least 3 segments for each elbow.
 - 6. Cover insulation, except for metal jacketed insulation, with PVC fitting covers and seal circumferential joints with butt strips (PVC tape).
 - 7. Cover insulation, except for metal jacketed insulation, with 2 layers of lagging adhesive to a minimum thickness of 1/16 inch. Install glass cloth between layers. Overlap adjacent insulation by 2 inches in both directions from joint with glass cloth and lagging adhesive.

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- G. Hangers and Anchors: Apply insulation continuously through hangers and around anchor attachments. Install saddles, shields, and inserts as specified in Division 23 Section "Hangers and Supports." For cold surface piping, extend insulation on anchor legs a minimum of 12 inches and taper and seal insulation ends.
 - 1. Inserts and Shields: Cover hanger inserts and shields with jacket material matching adjacent pipe insulation.

3.4 GLASS FIBER PIPE INSULATION INSTALLATION

- A. Bond insulation to pipe with lagging adhesive.
- B. Seal exposed ends with lagging adhesive.
- C. Seal seams and joints with vapor barrier compound.

3.5 EQUIPMENT INSULATION INSTALLATION, GENERAL

- A. Install board and block materials with a minimum dimension of 12 inches and a maximum dimension of 48 inches.
- B. Groove and score insulation materials as required to fit as closely as possible to the equipment and to fit contours of equipment. Stagger end joints.
- C. Insulation Thicknesses Greater than 2 Inches: Install insulation in multiple layers with staggered joints.
- D. Bevel insulation edges for cylindrical surfaces for tight joint.
- E. Secure sections of insulation in place with wire or bands spaced at 9 inches centers, except for flexible elastomeric cellular insulation.
- F. Protect exposed corners with corner angles under wires and bands.
- G. Manholes, Handholes, and Information Plates: Bevel and seal insulation ends around manholes, handholes, ASME stamps, and nameplates.
- H. Removable Insulation: Install insulation on components that require periodic inspecting, cleaning, and repairing for easy removal and replacement without damage to adjacent insulation.
- I. Finishing: Except for flexible elastomeric cellular insulation, apply 2 coats of vapor barrier compound to a minimum thickness of 1/16 inch. Install a layer of glass cloth embedded between layers.
- J. Refer to equipment specification sections for additional requirements.

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3.6 JACKETS

- A. Foil and Paper Jackets (FP): Install jackets drawn tight. Install lap or butt strips at joints with material same as jacket. Secure with adhesive. Install jackets with 1-1/2 inches laps at longitudinal joints and 3 inch wide butt strips at end joints.
 - 1. Seal openings, punctures, and breaks in vapor barrier jackets and exposed insulation with vapor barrier compound.
- B. Install the PVC jacket with 1 inch overlap at longitudinal and butt joints and seal with adhesive.
- C. Interior Exposed Tank Insulation: Install continuous aluminum jacket.
- D. Install glass cloth jacket directly over insulation. On insulation with a factory applied jacket, install the glass cloth jacket over the factory applied jacket. Install jacket drawn smooth and tight with a 2 inch overlap at joints. Embed glass cloth between (2) 1/16 inch thick coats of lagging adhesive. Completely encapsulate the insulation with the jacket, leaving no exposed raw insulation.

3.7 APPLICATIONS

- A. General: Materials and thicknesses are specified in schedules at the end of this Section.
- B. Interior, Exposed Piping Systems: Unless otherwise indicated, insulate the following piping systems:
 - 1. Domestic cold water.
 - 2. Hydronic piping (100 to 250 deg F).
 - 3. Drainage system vent piping within 10 Feet of roof penetration.
 - 4. Condensate drains.
- C. Equipment: Unless otherwise indicated, insulate the following indoor equipment:
 - 1. Heating water equipment, tanks, 100 deg F to 250 deg F.

3.8 PIPE INSULATION SCHEDULES

- A. General: Abbreviations used in the following schedules include:
 - 1. Field-Applied Jackets: P - PVC, K - Foil and Paper, A - Aluminum, SS - Stainless Steel.
 - 2. Pipe Sizes: NPS - Nominal Pipe Size.

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 FHSU Akers Energy Center
 Tank Replacement

INTERIOR DOMESTIC COLD WATER

PIPE SIZES (NPS)	MATERIALS	THICKNESS IN INCHES	VAPOR BARRIER REQ'D	FIELD- APPLIED JACKET
1/2 TO 2	GLASS FIBER	1/2	YES	NONE
2-1/2 TO 4	GLASS FIBER	1	YES	NONE

3.9 EQUIPMENT INSULATION SCHEDULES

INTERIOR EXPOSED HEATING WATER EQUIP, TANKS, PUMPS, AND HEAT EXCHANGERS (100 TO 250 DEG F)

MATERIAL	FORM	THICKNESS IN INCHES	VAPOR BARRIER REQ'D	FIELD- APPLIED JACKET
GLASS FIBER	BLOCK OR BOARD	2	NO	(A)

END OF SECTION 23 0700

MECHANICAL INSULATION

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A-N/A
FHSU Akers Energy Center
Tank Replacement**SECTION 23 2213 - STEAM AND CONDENSATE HEATING PIPING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section includes pipe and fittings for LP and HP steam and condensate piping:
 - 1. Steel pipe and fittings.
 - 2. Stainless steel piping and fittings
 - 3. Joining materials.

1.3 SUBMITTALS

- A. Product Data: For each type of the following:
 - 1. Steel pipe and fitting.
 - 2. Joining material.
- B. Qualification Data: For Installer.
- C. Welding certificates.
- D. Field quality-control reports.

1.4 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Pipe Welding: Qualify procedures and operators according to the following:
 - 1. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.
 - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

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PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressures and temperatures unless otherwise indicated:
1. LP Steam Piping: 125 psig.
 2. Condensate Piping: 15 psig at 250 deg F.
 3. Makeup-Water Piping: 80 psig at 150 deg F.
 4. Blowdown-Drain Piping: Equal to pressure of the piping system to which it is attached.
 5. Air-Vent and Vacuum-Breaker Piping: Equal to pressure of the piping system to which it is attached.
 6. Safety-Valve-Inlet and -Outlet Piping: Equal to pressure of the piping system to which it is attached.

2.2 STAINLESS STEEL PIPE AND FITTINGS

- A. Stainless Steel Pipe: ASTM A312/A312M, plain ends, seamless; stainless steel of types and schedules as indicated in piping application articles.
- B. Stainless Steel Socket Weld Fittings: Stainless steel, wrought or forged, of types and classes as indicated in piping application articles.
- C. Stainless Steel Flanges and Flanged Fittings: ASME B16.5, Class 150, wrought, raised face weld neck, including gaskets, bolts, and nuts of material to match pipe.

2.3 JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch maximum thickness unless otherwise indicated.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
- B. Flange Bolts and Nuts: ASME B18.2.1, stainless steel, unless otherwise indicated.
- C. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- D. Welding Materials: Comply with Section II, Part C, of ASME Boiler and Pressure Vessel Code for welding materials appropriate for wall thickness and for chemical analysis of pipe being welded.

STEAM AND CONDENSATE HEATING PIPING

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PART 3 - EXECUTION

3.1 LP STEAM PIPING APPLICATIONS

- A. Steam Condensate piping above grade, NPS 2 and smaller, to be the following:
 - 1. Schedule 10, Type 304 stainless steel pipe; wrought or forged same type stainless steel socket weld fittings.
- B. Steam condensate piping above grade, NPS 2-1/2 and larger, to be the following:
 - 1. Schedule 10, Type 304 stainless steel pipe; same type stainless steel flanges and wrought stainless steel flanged fittings.

3.2 ANCILLARY PIPING APPLICATIONS

- A. Blowdown-Drain Piping: Same materials and joining methods as for piping specified for the service in which blowdown drain is installed.
- B. Vacuum-Breaker Piping: Outlet, same as service where installed.
- C. Safety-Valve-Inlet and -Outlet Piping: Same materials and joining methods as for piping specified for the service in which safety valve is installed.
- D. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless otherwise indicated.
- F. Install piping to permit valve servicing.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Install piping to allow application of insulation.
- J. Select system components with pressure rating equal to or greater than system operating pressure.
- K. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.
- L. Install drains, consisting of a tee fitting, NPS 3/4 full port-ball valve, and short NPS 3/4 threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.
- M. Install steam supply piping at a minimum uniform grade of 0.2 percent downward in direction of steam flow.

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- N. Install condensate return piping at a minimum uniform grade of 0.4 percent downward in direction of condensate flow.
- O. Reduce pipe sizes using eccentric reducer fitting installed with level side down.
- P. Install branch connections to mains using tee fittings in main pipe, with the branch connected to top of main pipe.
- Q. Install unions in piping, NPS 2 and smaller, adjacent to valves, at final connections of equipment, and elsewhere as indicated.
- R. Install flanges in piping, NPS 2-1/2 and larger, at final connections of equipment and elsewhere as indicated.
- S. Install shutoff valve immediately upstream of each dielectric fitting.
- T. Install strainers on the supply side of control valves, pressure-reducing valves, traps, and elsewhere as indicated. Install NPS 3/4 nipple and full port ball valve in blowdown connection of strainers NPS 2 and larger. Match size of strainer blowoff connection for strainers smaller than NPS 2.
- U. Install drip legs at low points and natural drainage points such as ends of mains, bottoms of risers, and ahead of pressure regulators, and control valves.
 - 1. On straight runs with no natural drainage points, install drip legs at intervals not exceeding 300 feet.
 - 2. Size drip legs same size as main. In steam mains NPS 6 and larger, drip leg size can be reduced, but to no less than NPS 4.

3.3 PIPE JOINT CONSTRUCTION

- A. Ream ends of pipes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- D. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.
- E. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

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3.4 TERMINAL EQUIPMENT CONNECTIONS

- A. Size for supply and return piping connections shall be the same as or larger than equipment connections.
- B. Install traps and control valves in accessible locations close to connected equipment.
- C. Install bypass piping with globe valve around control valve. If parallel control valves are installed, only one bypass is required.
- D. Install vacuum breakers downstream from control valve, close to coil inlet connection.
- E. Install a drip leg at coil outlet.

3.5 FIELD QUALITY CONTROL

- A. Prepare steam and condensate piping according to ASME B31.9, "Building Services Piping," and as follows:
 - 1. Leave joints, including welds, uninsulated and exposed for examination during test.
 - 2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
 - 3. Flush system with clean water. Clean strainers.
 - 4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
- B. Perform the following tests and inspections:
 - 1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
 - 2. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength.
 - 3. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
- C. Prepare test and inspection reports.

END OF SECTION 23 2213

STEAM AND CONDENSATE HEATING PIPING

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SECTION 23 5313 – SURGE TANK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Related Sections: The following Division 23 sections contain requirements that relate to this Section:
 - 1. “Basic Mechanical Requirements”.
 - 2. “Basic Mechanical Materials and Methods”.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Stainless Steel receiver.

1.3 DEFINITION

- A. NPSH: Net-positive suction head.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacity, temperature and NPSH required, pump performance curves with selection points clearly indicated, and furnished specialties and accessories.
- B. Shop Drawings: Include plans, elevations, sections, details, dimensions, weights, loadings, required clearances, method of field assembly, and attachments to other work.
- C. Field quality-control test reports.
- D. Operation and Maintenance Data: For feedwater equipment to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. ASME Compliance: ASME B31.1, "Power Piping," for systems more than 15 psig (104 kPa). Safety valves and pressure vessels shall bear the appropriate ASME label.

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1.6 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Shipping: Clean flanges and exposed-metal surfaces and treat with anticorrosion compound after assembly and testing. Protect flanges, pipe openings, and nozzles with wooden flange covers or with screwed-in plugs.
- B. Store units in dry location.
- C. Retain protective flange covers and machined-surface protective coatings during storage.
- D. Protect bearings and couplings against damage from sand, grit, and other foreign matter.
- E. Comply with manufacturer's written rigging instructions.

1.7 COORDINATION

- A. Coordinate size and location of pipe and accessories connections with existing surge tank stand, pumps, controls and accessories

PART 2 - PRODUCTS

2.1 SURGE TANK UNITS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Sellers
 - 2. Industrial Steam.
 - 3. U.S. Deaerator Co.
 - 4. Lockwood
 - 5. Shipco
- B. Description: Factory-assembled and -tested unit consisting of a stainless-steel receiver tank to sit on the existing steel frame base for connection to the existing, condensate pumps and controls. Refer to included drawing for the connection of following existing features and accessories:
 - 1. Industrial thermometer.
 - 2. Level controls
 - 3. Level alarms
 - 4. Pump suction.
 - 5. Makeup Water
 - 6. Pump suction
 - 7. Low pressure return
 - 8. Overflow
 - 9. Drain
 - 10. Vent
 - 11. Recirculation
 - 12. Chemical feed
 - 13. Anode
 - 14. Sample cooler

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C. Receiver:

1. Material: 304 Stainless steel – 3/16" thick
2. Material – Saddle – Carbon Steel
3. Mounting Arrangement: Set on existing floor mounted steel stand.
4. Existing Mounting Frame: Structural-steel stand to support receiver and pumps.
5. Manway
6. Lifting eyes.
7. Companion flanges.
8. Factory-Installed Pipe, NPS 2-1/2 and Smaller: Schedule 10, 304 stainless steel, ASTM 312 (seamless), with threaded joints and fittings.
9. Factory-Installed Pipe, NPS 3 and Larger: Schedule 10, 304 stainless steel, ASME B36.19, ASTM 312 (seamless), with welded joints and stainless-steel fittings and flanges.
10. Account for Field-Applied Insulation and Jacket: Minimum thickness of 2 inches for mineral-fiber pipe, tank insulation, and aluminum jacket.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Before tank installation, examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations, and piping and electrical connections to verify actual locations, sizes, and other conditions affecting feedwater unit performance, maintenance, and operations.
 1. Final feedwater unit locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.
 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install new tank on existing steel frame.
- B. Install unit to permit access for maintenance.
- C. Support piping independent of pumps.
- D. Install parts and accessories shipped loose.

3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to machine to allow service and maintenance.

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SURGE TANK

- C. Install overflow drain piping to nearest floor drain.
- D. Install vents and extend to outdoors; terminate with elbow turned down and an insect screen.

3.4 FIELD QUALITY CONTROL

- A. **Manufacturer's Field Service:** Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.
- B. **Tests and Inspections:**
 - 1. Inspect field-assembled components, equipment installation, and piping and electrical connections for compliance with manufacturer's written instructions.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 3. Check bearing lubrication.
 - 4. Verify proper motor rotation.
 - 5. Start up service.
 - 6. Report results in writing.
- C. Remove and replace malfunctioning units and retest as specified above.

3.5 ADJUSTING

- A. Set field-adjustable, makeup water controls.

3.6 CLEANING

- A. Clean equipment internally; remove coatings applied for protection during shipping and storage, foreign material, and oily residue according to manufacturer's written instructions.
- B. Clean strainers.

3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain feedwater units.

END OF SECTION 23 5313

TERMS AND CONDITIONS

1. It is the intent of Fort Hays State University (FHSU) to permit competitive bidding. It is the bidder's responsibility to advise the FHSU Purchasing Office, in writing, no later than three (3) business days before the bid closing date, if any specification or requirement described herein limits bidding to a single source.
2. Unless otherwise specified, Fort Hays State University reserves the right to accept or reject all or any part of your quotation, and to waive technicalities.
3. Offered payment discounts will NOT be considered in determining the low bid. The discount period begins on the date of delivery, or acceptance, or receipt of a correct invoice by the receiving agency, whichever is later.
4. Except as otherwise indicated, the merchandise quoted is in new condition.
5. Fort Hays State University reserves the right to award purchases by item, by group, or by lot, whichever is deemed to be in the university's best interest.
6. In the event of a tie for the low bid, the award will be made to the Kansas bidder.
7. Unit price will prevail in the event of extension error(s).
8. If awarded a purchase order, the bidder agrees to furnish the item(s) or provide the service(s) enumerated hereon at the price(s) quoted and in accordance with the conditions indicated.
9. If a bid indicates that an item quoted is functionally equivalent and it is purchased and found not to be comparable, Fort Hays State University reserves the right to return that item at the bidder's expense, and the bidder will be billed for the difference in cost between this bid and the successful bid.
10. If any portion of this bid is provided by a vendor other than the bidder, the bidder remains the prime contractor responsible for fulfilling all requirements of this bid.
11. Contracts or purchase orders resulting from this quotation may not be assigned without prior written consent of the FHSU Director of Purchasing.
12. The seller agrees to protect Fort Hays State University from all damages arising out of alleged patent infringement.
13. Partial payments will not be made, unless otherwise specified.
14. Bid results are available by written request with a check payable to Fort Hays State University for five dollars (\$5.00) per request, tax included, with a stamped, self-addressed envelope. Unless otherwise requested, your canceled check will serve as your receipt.
15. Any conviction for a criminal or civil offense that indicates a lack of business integrity or business honesty which currently, seriously and directly affects responsibility as a state contractor must be disclosed. This is to include (1) conviction of a criminal offense as an incident to obtaining or attempting to obtain a public or private contract of subcontract or in the performance of such contract of subcontract; (2) conviction under state or federal statutes of embezzlement, theft, forgery, bribery, falsification or destruction of records, receiving stolen property; (3) conviction under state or federal antitrust statutes; and (4) any other offense to be serious and compelling as to affect responsibility as a state contractor. For the purpose of this section, an individual or entity shall be presumed to have control of a company or organization if the individual or entity directly or indirectly, or action in concert with one or more individuals or entities, owns or controls twenty-five percent (25%) or more of its equity, or otherwise controls its management or policies. Failure to disclose an offense may result in disqualification of the bid or termination of the contract.
16. If any part of this contract (including any required installation) is fulfilled by any other contractor, the successful bidder remains responsible for completing all aspects of the work described herein.
17. Vendors who are new to the university should complete a vendor registration form found at: <http://www.fhsu.edu/purchasing/Vendor-Registration-Form>. A copy of the vendor's W-9 should also be submitted with your bid: <http://www.irs.gov/pub/irs-pdf/fw9.pdf?portlet=3>.

TAX CLEARANCE

Fort Hays State University strongly supports the State of Kansas Tax Clearance Process. Vendors submitting bids or proposals which exceed \$25,000 over the term of the contract shall include a copy of a Tax Clearance Certification Form with their submittal. Failure to provide this information may be cause for rejection of vendor's bid or proposal.

A "Tax Clearance" is a comprehensive tax account review to determine and ensure that the account is compliant with all primary Kansas Tax Laws administered by the Kansas Department of Revenue (KDOR) Director of Taxation. Information pertaining to a Tax Clearance is subject to change(s), which may arise as a result of a State Tax Audit, Federal Revenue Agent Report, or other lawful adjustment(s).

To obtain a Tax Clearance Certificate, you must:

- Go to <https://www.kdor.ks.gov/apps/taxclearance/Default.aspx> to request a Tax Clearance Certificate
- Return to the website the following working day to see if KDOR will issue the certificate
- If issued an official certificate, print it and attach it to your bid response
- If denied a certificate, engage KDOR in a discussion about why a certificate wasn't issued

Bidders (and their subcontractors) are expected to submit a current Tax Clearance Certificate with every event response.

Please Note: Individual and business applications are available. For applications entered prior to 5:00 PM Monday through Friday, results typically will be available the following business day. Tax clearance requests may be denied if the request includes incomplete or incorrect information.

Please Note: You will need to sign back into the KDOR website to view and print the official tax clearance certificate.

A copy of the Certification of Tax Clearance form received from the Kansas Department of Revenue should be sent along with the bid response(s) to:

Fort Hays State University
Purchasing Office
601 Park Street, Sheridan Hall 318
Hays, KS 67601

Failure to provide this information may be cause for rejection of vendor's bid or proposal.

Information about Tax Registration can be found at the following website:

<http://www.ksrevenue.org/forms-btreg.html>.

The FHSU Purchasing Office reserves the right to confirm tax status of all potential contractors and subcontractors prior to the release of a purchase order or contract award.

In the event that a current tax certificate is unavailable, the FHSU Purchasing Office reserves the right to notify a bidder (one that has submitted a timely event response) that they have to provide a current Tax Clearance Certificate within ten (10) calendar days, or FHSU may proceed with an award to the next lowest responsive bidder, whichever is determined by the Purchasing Director to be in the best interest of FHSU and the State.

**CERTIFICATION REGARDING
IMMIGRATION REFORM & CONTROL**

All Contractors are expected to comply with the Immigration and Reform Control Act of 1986 (IRCA), as may be amended from time to time. This Act, with certain limitations, requires the verification of the employment status of all individuals who were hired on or after November 6, 1986, by the Contractor as well as any subcontractor or sub-subcontractor. The usual method of verification is through the Employment Verification (I-9) Form. With the submission of this bid, the Contractor hereby certifies without exception that Contractor has complied with all federal and state laws relating to immigration and reform. Any misrepresentation in this regard or any employment of persons not authorized to work in the United States constitutes a material breach and, at the State's option, may subject the contract to termination and any applicable damages.

Contractor certifies that, should it be awarded a contract by the State, Contractor will comply with all applicable federal and state laws, standards, orders and regulations affecting a person's participation and eligibility in any program or activity undertaken by the Contractor pursuant to this contract. Contractor further certifies that it will remain in compliance throughout the term of the contract.

At the State's request, Contractor is expected to produce to the State any documentation or other such evidence to verify Contractor's compliance with any provision, duty, certification, or the like under the contract.

Contractor agrees to include this Certification in contracts between itself and any subcontractors in connection with the services performed under this contract.

Signature, Title of Contractor

Date

State of Kansas
 Fort Hays State University
 DA-146a (Rev. 12/19)

CONTRACTUAL PROVISIONS ATTACHMENT

Important: This form contains mandatory contract provisions and must be attached to or incorporated in all copies of any contractual agreement. If it is attached to the vendor/contractor's standard contract form, then that form must be altered to contain the following provision:

"The Provisions found in Contractual Provisions Attachment (Form DA-146a, Rev. 12/19), which is attached hereto, are hereby incorporated in this contract and made a part thereof."

The parties agree that the following provisions are hereby incorporated into the contract to which it is attached and made a part thereof.

1. **Controlling Provisions:** It is expressly agreed that the terms of each and every provision in this attachment shall prevail and control over the terms of any other conflicting provision in any other document relating to and a part of the contract in which this attachment is incorporated. Any terms that conflict or could be interpreted to conflict with this attachment are nullified.
2. **Disclaimer Of Liability:** No provision of this contract will be given effect that attempts to require Fort Hays State University or any of its affiliates ("University") to defend, hold harmless, or indemnify any contractor or third party for any acts or omissions. The terms, conditions, and limitations of liability of the State of Kansas, the University, and their employees are defined under the Kansas Tort Claims Act (K.S.A. 75-6101 et seq.).
3. **Termination Due To Lack Of Funding Appropriation:** If, in the judgment of the Director of Accounts and Reports, Department of Administration, sufficient funds are not appropriated to continue the function performed in this agreement and for the payment of the charges hereunder, the University may terminate this agreement at the end of its current fiscal year. The University agrees to give written notice of termination to contractor at least 30 days prior to the end of its current fiscal year, and shall give such notice for a greater period prior to the end of such fiscal year as may be provided in this contract, except that such notice shall not be required prior to 90 days before the end of such fiscal year. Contractor shall have the right, at the end of such fiscal year, to take possession of any equipment provided under the contract for which it has not been paid. The University will pay contractor all regular contractual payments incurred through the end of such fiscal year, plus contractual charges incidental to the return of any such equipment. Upon termination of the agreement under this provision, title to any such equipment shall revert to contractor at the end of the University's current fiscal year. The termination of the contract pursuant to this paragraph shall not cause any penalty to be charged to the agency or the contractor.
4. **Kansas Law and Venue:** All matters arising out of or related to this agreement shall be subject to, governed by, and construed according to the laws of the State of Kansas, and jurisdiction and venue of any suit arising out of or related to this agreement shall reside only in courts located in the State of Kansas.
5. **Required Non-Discrimination Provision:** Contractor agrees to comply with all applicable state and federal anti-discrimination laws. Contractor specifically agrees: (a) to comply with the Kansas Act Against Discrimination (K.S.A. 44-1001 et seq.) and the Kansas Age Discrimination in Employment Act (K.S.A. 44-1111 et seq.) and the applicable provisions of the Americans With Disabilities Act (42 U.S.C. 12101 et seq.) (ADA) and to not discriminate against any person because of race, religion, color, sex, disability, national origin or ancestry, or age in the admission or access to, or treatment or employment in, its programs or activities; (b) to include in all solicitations or advertisements for employees, the phrase "equal opportunity employer"; (c) to comply with the reporting requirements set out at K.S.A. 44-1031 and K.S.A. 44-1116; (d) to include those provisions in every subcontract or purchase order so that they are binding upon such subcontractor or vendor; (e) that a failure to comply with the reporting requirements of (c) above or if the contractor is found guilty of any violation of such acts by the Kansas Human Rights Commission or if it is determined that the contractor has violated applicable provisions of ADA, such violation(s) shall constitute a breach of contract and the contract may be cancelled, terminated or suspended, in whole or in part, by the University. The provisions of this paragraph (except the provisions relating to the ADA) are not applicable to a contractor who employs fewer than four employees during the term of such contract or whose contracts with the University cumulatively total \$5,000 or less during the fiscal year.

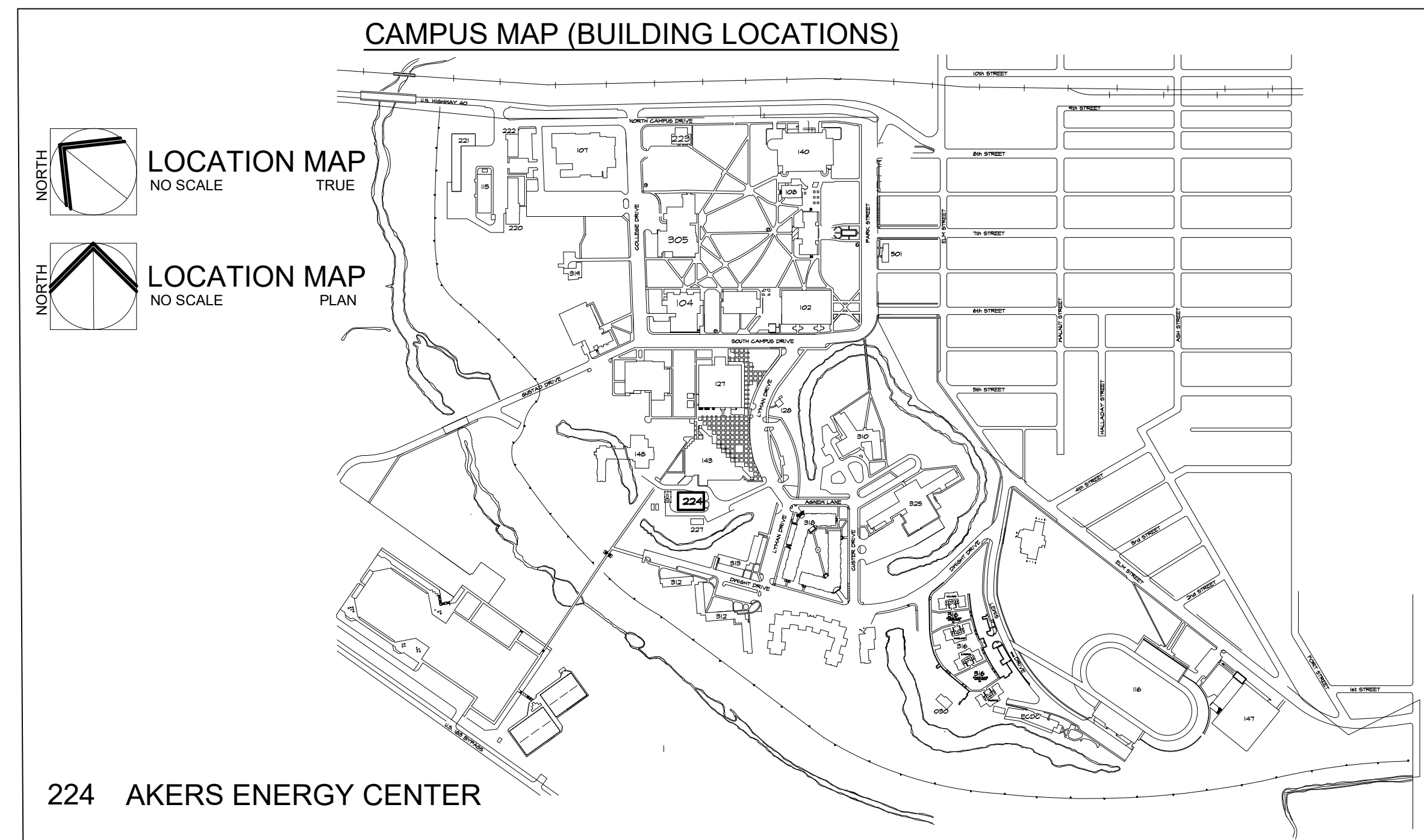
Contractor shall abide by the requirements of 41 CFR §§ 60-1.4(a), 60-300.5(a) and 60-741.5(a). These regulations prohibit discrimination against qualified individuals based on their status as protected veterans or individuals with disabilities, and prohibit discrimination against all individuals based on their race, color, religion, sex, or national origin. Moreover, these regulations require that covered prime contractors and subcontractors take affirmative action to employ and advance individuals in employment without regard to race, color, religion, sex, national origin, protected veteran status or disability.

6. **Acceptance Of Contract:** This contract shall not be considered accepted, approved or otherwise effective until the statutorily required approvals and certifications have been given.
7. **Arbitration, Damages, Warranties:** Notwithstanding any language to the contrary, no interpretation of this contract shall find that the University has agreed to binding arbitration, or the payment of damages or penalties. Further, the University does not agree to pay attorney fees, costs, or late payment charges beyond those available under the Kansas Prompt Payment Act (K.S.A. 75-6403), and no provision will be given effect that attempts to exclude, modify, disclaim or otherwise attempt to limit any damages or rights of action

available to the University at law, including but not limited to the implied warranties of merchantability and fitness for a particular purpose.

8. **Authority To Contract:** By signing this contract, the representative of the contractor thereby represents that such person is duly authorized by the contractor to execute this contract on behalf of the contractor and that the contractor agrees to be bound by the provisions thereof.
9. **Responsibility For Taxes:** The University shall not be responsible for, nor indemnify a contractor for, any federal, state or local taxes which may be imposed or levied upon the subject matter of this contract.
10. **Insurance:** The University shall not be required to purchase any insurance against loss or damage to property or any other subject matter relating to this contract, nor shall this contract require the University to establish a "self-insurance" fund to protect against any such loss or damage.
11. **Information/Confidentiality:** As a state agency, the University's contracts are generally public records. Accordingly, no provision of this contract shall restrict the University's ability to produce this contract in response to a lawful request or from otherwise complying with the Kansas Open Records Act (K.S.A. 45-215 et seq.). Moreover, no provision of this contract shall be construed as limiting the Legislative Division of Post Audit from having access to information pursuant to K.S.A. 46-1101 et seq.
12. **The Eleventh Amendment:** The Eleventh Amendment is an inherent and incumbent protection of the State of Kansas and need not be reserved, but the University here reiterates that nothing in or related to this contract shall be deemed a waiver of the Eleventh Amendment.
13. **Campaign Contributions / Lobbying:** Funds provided through a grant award or contract shall not be given or received in exchange for the making of a campaign contribution. No part of the funds provided through this contract shall be used to influence or attempt to influence an officer or employee of any State of Kansas agency or a member of the Legislature regarding any pending legislation or the awarding, extension, continuation, renewal, amendment or modification of any government contract, grant, loan, or cooperative agreement.
14. **Privacy of Student Records:** Contractor understands that the University is subject to FERPA (Family Educational Rights and Privacy Act, 20 U.S.C. § 1232g) and agrees to handle any student education records it receives pursuant to this Agreement in a manner that enables the University to be compliant with FERPA and its regulations. Contractor agrees to protect the privacy of student data and educational records in a commercially reasonable manner and shall not transmit, share, or disclose any data about a student without the student's written consent, except to other University officials who seek the information within the context of his/her professionally assigned responsibilities and used within the context of official University business. Contractor shall promptly report to the University any disclosure of University's student educational records.
15. **Boycotts of Israel Prohibited:** Kansas 2018 HB 2482 generally prohibits the University from entering into a contract with a company to acquire or dispose of services, supplies, information technology or construction, unless such company submits a written certification that such company is not currently engaged in a boycott of Israel. For the purposes of this Section, "company" means an organization, association, corporation, partnership, venture or other entity, its subsidiary or affiliate, that exists for profitmaking purposes or to otherwise secure economic advantage. Accordingly, by executing this contract, Contractor hereby certifies that it is not currently engaged in a boycott of Israel.
16. **Harassment Policy:** Fort Hays State University prohibits sexual harassment, discrimination, and retaliation. The University's applicable policies on sexual harassment, discrimination, and retaliation are available at <https://fhsu.edu/policies/documents/harassment-policy/index.pdf> and include the procedures for submitting a complaint of sexual harassment, discrimination, or retaliation, including an anonymous complaint. Contractor and its employees, officials, agents, or subcontractors shall at all times comply with the University's policies on sexual harassment, discrimination, and retaliation.

Attach DRAWINGS



FORT HAYS STATE UNIVERSITY

Hays, Kansas

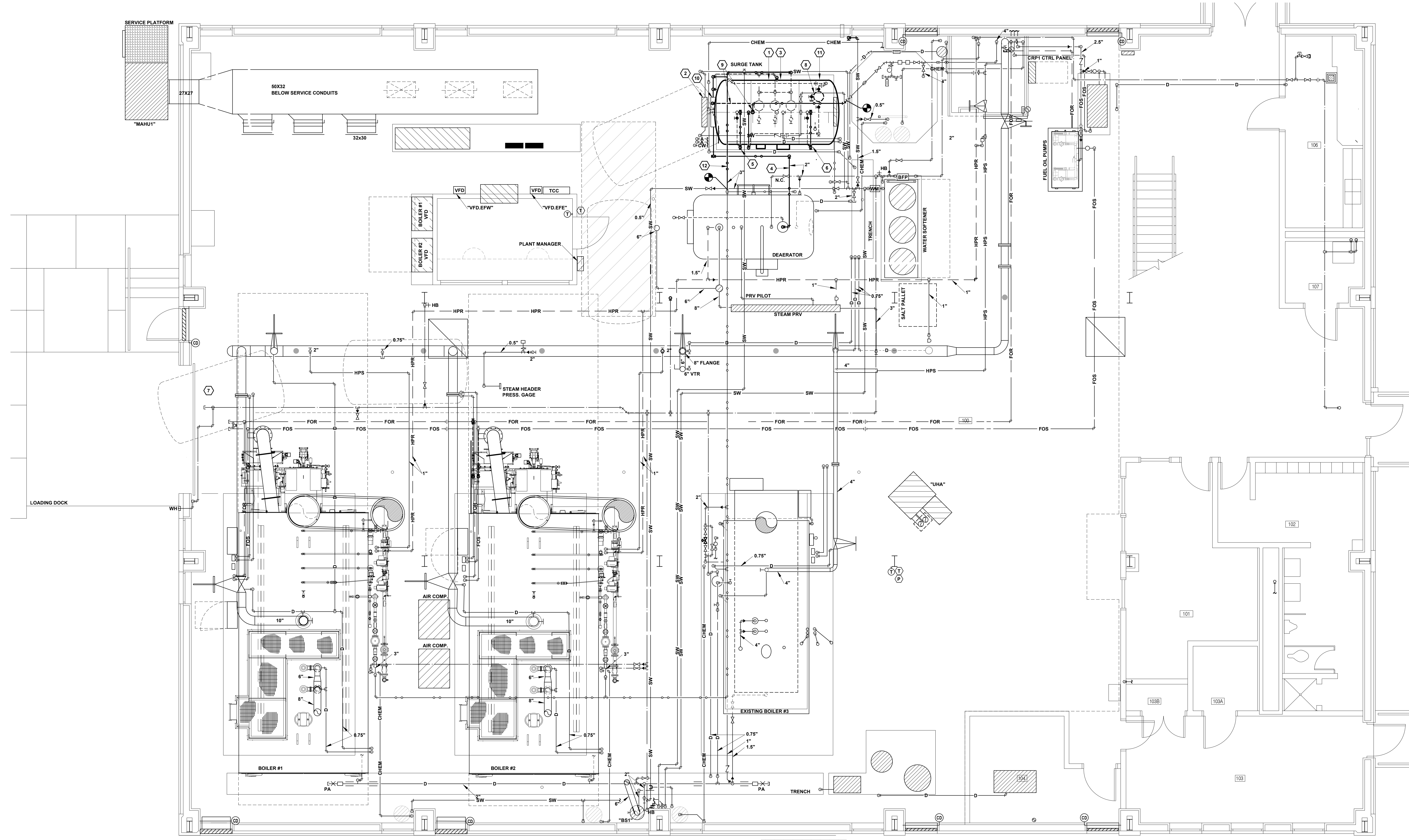
AKERS ENERGY CENTER

TANK REPLACEMENT

PROJECT NO.: A-N/A

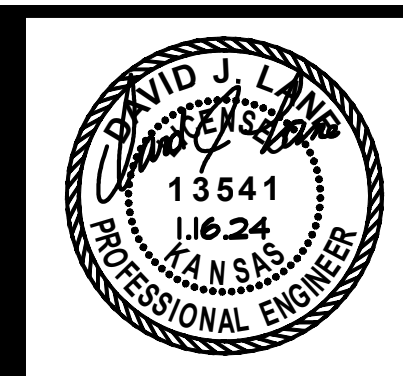
JANUARY 2024

- NOTES:**
- 1 REMOVE SURGE TANK AND ALL MOUNTED ACCESSORIES. REMOVE ALL BLACK STEEL PIPING BETWEEN TANK, PUMPS, AND ACCESSORIES. REMOVE PUMPED CONDENSATE PIPING, AIR LINES, SOFT-WATER AND CHEMICAL TUBING AS REQUIRED FOR NEW TANK INSTALLATION. THE EXISTING TANK SUPPORT FRAME AND PUMPS TO REMAIN.
 - 2 EXISTING SOFTWATER MAKE-UP WATER ASSEMBLY TO REMAIN.
 - 3 SET NEW 2000 GAL. STAINLESS STEEL TANK ON THE EXISTING TANK SUPPORT BASE. PROVIDE NEW STAINLESS STEEL PIPING FROM TANK PIPE CONNECTIONS TO PUMPS, VALVES, RE-CIRCULATION LINES, LEVEL CONTROLS, FILTER AND ACCESSORIES. REINSTALL EXISTING LEVEL, ALARMS AND CONTROLS. REFER TO EXISTING SURGE TANK SHOP DRAWING, SHEET MEZ.
 - 4 PROVIDE NEW STAINLESS STEEL CONDENSATE PIPING FROM SURGE TANK TO DEAERATOR INLET.
 - 5 REMOVE AND REINSTALL GEMS LEVEL FLOAT COLUMN.
 - 6 EXISTING LEVEL CONTROLS TO REMAIN. RECONNECT TO TANK WITH NEW STAINLESS STEEL PIPING.
 - 7 REPLACEMENT TANK PATH INTO BUILDING (TYPICAL).
 - 8 REMOVE FILTER SYSTEM AND DELIVER TO OWNER.
 - 9 REMOVE PUMPED CONDENSATE LINE TO ALLOW FOR REMOVAL OF EXISTING TANK AND INSTALLATION OF NEW TANK. PROVIDE NEW CONNECTION TO TOP OF TANK.
 - 10 EXISTING DEAERATOR MAKE-UP VALVE AND ASSEMBLY TO REMAIN. PROVIDE NEW STAINLESS STEEL PIPING.
 - 11 PROVIDE NEW FIELD APPLIED TANK INSULATION.
 - 12 REMOVE PUMPED FEEDWATER LINE TO ALLOW FOR REMOVAL OF EXISTING TANK AND INSTALLATION OF NEW TANK. PROVIDE NEW 3" STAINLESS STEEL FEEDWATER LINE.

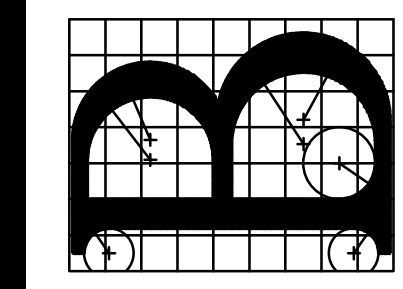


MECHANICAL IMPROVEMENT PLAN
scale: 1/4" = 1'-0"

- GENERAL NOTES:**
1. EQUIPMENT, PIPING, DUCTWORK AND ACCESSORIES SHOWN SOLID ARE INTENDED TO REMAIN. EQUIPMENT, PIPING, DUCTWORK AND ACCESSORIES SHOWN BOLD AND DASHED ARE TO BE REMOVED.
 2. THE OWNER HAS FIRST RIGHT OF REFUSAL OF ALL ITEMS INDICATED TO BE REMOVED. THE CONTRACTOR SHALL PROPERLY DISPOSE OF ALL REMAINING ITEMS AND MATERIALS.
 3. DO NOT REMOVE OR DISCONNECT ANY MAJOR MECHANICAL OR ELECTRICAL ITEMS (PIPES, DUCTS, CONDUITS, DEVICES, EQUIPMENT, ETC.) INDICATED FOR SUCH BEFORE VERIFYING THAT SERVICES TO OTHER AREAS OF THE BUILDING WILL NOT BE AFFECTED. CONSULT UNIVERSITY MAINTENANCE PERSONNEL AS NEEDED TO ASSIST IN THE DETERMINATION OF UNANTICIPATED ITEMS LOCATED DURING THE DEMOLITION PROCESS.
 4. EXISTING CONDITIONS SHOWN ON THE DRAWINGS WERE TAKEN FROM ORIGINAL DOCUMENTS AND FIELD OBSERVATIONS. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF EXISTING CONDITIONS.
 5. ALL WORK SHALL BE COMPLETED DURING THE ANNUAL TWO WEEK PLANT SHUTDOWN. THE 2024 PLANT SHUT DOWN IS SCHEDULE FROM MAY 13 - MAY 24.



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FORT HAYS STATE UNIVERSITY
AKERS ENERGY CENTER
TANK REPLACEMENT
BUILDING NUMBER(S): 24600-0024
DATE: JAN. 2024
DRAWN BY: [REDACTED]
CHECKED BY: [REDACTED]

MECHANICAL IMPROVEMENT
PLAN
A-N/A
ME1
ORIGINAL CONTRACT
DOCUMENTS

MECHANICAL SYMBOLS:

PIPING & SPECIALTIES

SW	DOMESTIC COLD WATER
FW	SOFTENED WATER
A	COMPRESSED AIR
V	VENT
LPS	LOW PRESSURE STEAM SUPPLY
LPR	LOW PRESSURE STEAM RETURN
HPS	HIGH PRESSURE STEAM SUPPLY
HPR	HIGH PRESSURE STEAM RETURN
HPR	HIGH PRESSURE STEAM RETURN
PC	PUMPED STEAM CONDENSATE RETURN
FOR	FEEDWATER PUMP DISCHARGE
FOR	FUEL OIL RETURN
FOG	FUEL OIL GAGE LINE
FOS	FUEL OIL SUPPLY
3W	THREE-WAY CONTROL VALVE
2W	TWO-WAY CONTROL VALVE
SV	SHUT-OFF VALVE
CV	CHECK VALVE
BV	BALANCING VALVE W/ PRESSURE PORTS
STR	STRAINER
TDV	TRIPLE DUTY VALVE W/ PRESSURE PORTS
RV	RELIEF VALVE
PRV	PRESSURE REDUCING VALVE
MV	MOTORIZED VALVE
TRV	TEMPERATURE REGULATING VALVE
SV	SOLENOID VALVE
PA	PIPE ANCHOR
PS	PIPE SUPPORT
PH	SPRINKLER HEAD (PENDANT)
PSH	SPRINKLER HEAD (SIDEWALL)
R	REDUCER
PG	PIPE GUIDE
SEJ	SLIDING EXPANSION JOINT
FT	FLOAT & THERMOSTATIC TRAP
BT	BUCKET TRAP
TT	THERMOSTATIC TRAP
IT	IMPULSE TRAP
FT	FLOAT TRAP
BFP	BACKFLOW PREVENTER
R	REGULATOR
PG	PRESSURE GAUGE
T	THERMOMETER
U	UNION
HB	HOSE BIBB
WH	WALL HYDRANT
CO	CLEANOUT
DS	DOWNSPOUT NOZZLE
C	CAP
FFCO	FLUSH FLOOR CLEANOUT
FGCO	FLUSH GRADE CLEANOUT
EU	ELBOW UP
ED	ELBOW DOWN
LSU	LONG SWEEP UP
LSD	LONG SWEEP DOWN
TU	TEE UP
TD	TEE DOWN
EUW	ELBOW UP WITH SHUT-OFF VALVE
EDW	ELBOW DOWN WITH SHUT-OFF VALVE
TUW	TEE UP WITH SHUT-OFF VALVE
TDW	TEE DOWN WITH SHUT-OFF VALVE
SA	SHOCK ARRESTOR
FSD	FLOOR DRINK (GRADE TOP), TYPE & SIZE
FSD	FLOOR DRAIN (GRADE TOP), TYPE & SIZE

GENERAL NOTES:

- "A" THIS SYMBOL ADJACENT TO ANY SYMBOL INDICATES DEVICE CENTERLINE TO BE MOUNTED 4" ABOVE COUNTERTOP BACKSPLASH.
- "GF" THIS DENOTATION ADJACENT TO ANY SYMBOL INDICATES GROUND FAULT INTERRUPTER.
- "HC" THIS DENOTATION ADJACENT TO ANY FIXTURE INDICATES HANDICAPPED ACCESSIBLE. REFER TO ARCHITECTURAL PLANS FOR MOUNTING HEIGHT.
- "WG" THIS DENOTATION ADJACENT TO ANY SYMBOL INDICATES DEVICE TO BE PROVIDED WITH WIRE GUARD.
- "WP" THIS DENOTATION ADJACENT TO ANY SYMBOL INDICATES WEATHER-PROOF ENCLOSURE SHALL BE PROVIDED.
- INDICATES CONNECTION TO EXISTING SYSTEM.
- DIMENSIONS ADJACENT TO ANY SYMBOL INDICATES MOUNTING HEIGHT TO CENTERLINE OF DEVICE (i.e. 80") U.O.M.

PLAN NOTES:

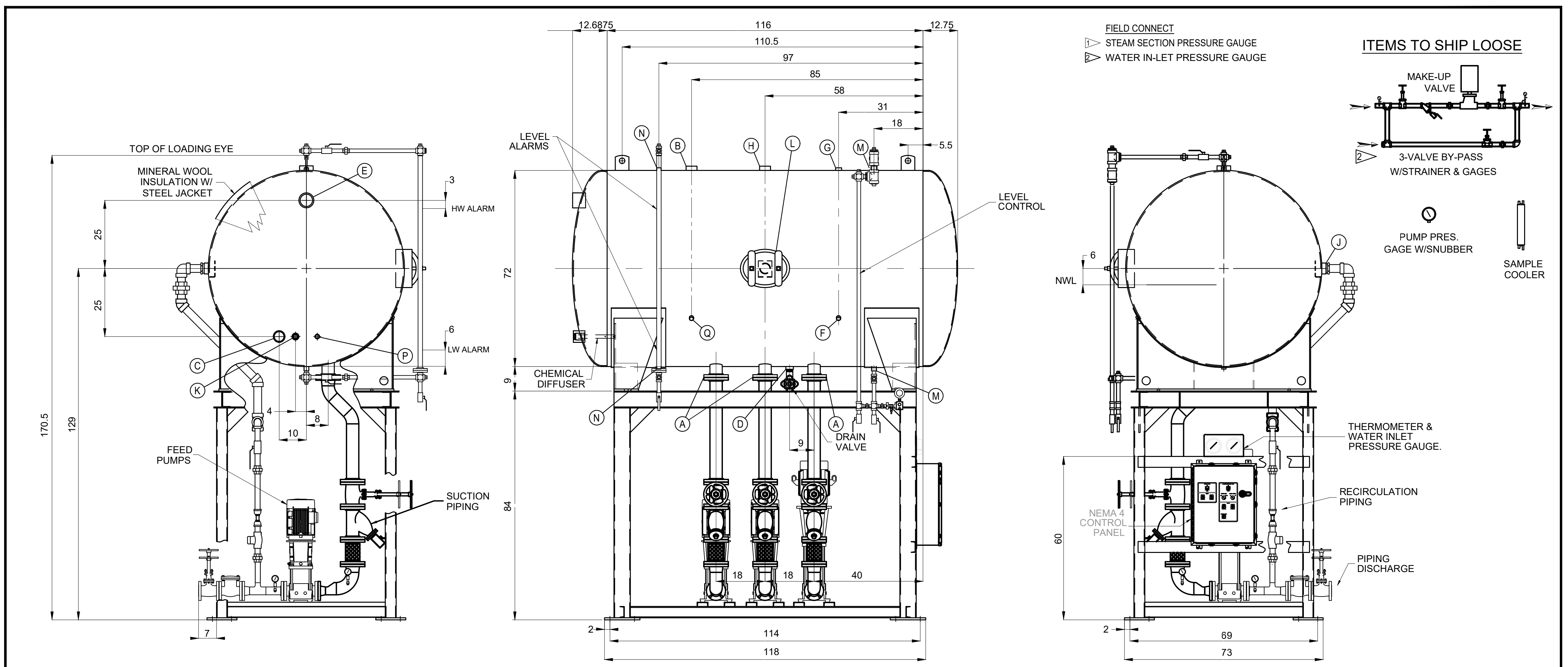
- INDICATES DIRECTION OF PLAN NORTH
- DETAIL REFERENCE:
• UPPER NUMBER INDICATES DETAIL NUMBER
• LOWER NUMBER INDICATES SHEET NUMBER
- PLAN NOTE REFERENCE

MECHANICAL SYMBOLS:

DUCTWORK, FITTINGS, & ACCESSORIES:

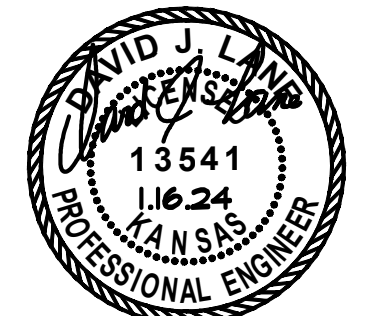
CS	Ceiling Overhead Supply Air Diffuser (Circle)
CS	Ceiling Overhead Return Air Diffuser (Circle)
LS	Linear Slot Diffuser
MS	Manual Register (Circle)
MS	Motorized Register (Circle)
MS	Manual Balancing Damper
MS	Regulator (Flexible Ductwork Maximum Length = 4 FT)
MS	Branch Ductwork with 90° and Branch Volume Control Capers
MS	Elbow with Turning Vanes
MS	Return, Exhaust, or Fresh Air Ductwork Cap
MS	Return, Exhaust, or Fresh Air Ductwork Seal
MS	Supply Air Ductwork Cap
MS	Supply Air Ductwork Seal
MS	Equipment with Flexible Ductwork Connection
MS	Register with Seal, Type A and Type B Duct Connection
MS	Register with Seal, Type A and Type B Duct Connection

FD	FIRE DAMPER
SD	SMOKE DAMPER
FDSD	COMBINATION FIRE/SMOKE DAMPER
CD	CONTROL DAMPER
MD	MOTORIZED DAMPER
BD	BACKDRAFT DAMPER
PT	PNEUMATIC THERMOSTAT
PH	PNEUMATIC HUMIDISTAT
DT	DDC TEMPERATURE SENSOR
DH	DDC HUMIDITY SENSOR
DP	DDC PRESSURE SENSOR

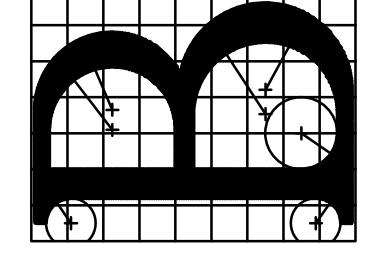


TANK CONNECTIONS (NPT UNLESS NOTED)		PUMP DATA		LEVEL CONTROL		REVISIONS	
A.	(3) PUMP SUCTION 4 FLG. IN.	MAKE GRUNDFOS	MODEL CR32-2-1K/CR32-5K	MAKE SIEMENS	MODEL 7MF44.33	LTR.	DATE
B.	(1) LO PRESS RETURN 4 IN.	DISCHARGE 2 1/2" 150#	SUCTION 2 1/2" 150#	HIGH/LOW ALARMS		A	12/19/2018
C.	(1) HI TEMP RETURN 3 IN.	CAPACITY 154/140 GPM	AT 50/150 PSIG	MAKE GEMS	MODEL MINI-SURESITE	B	1/14/2019
D.	(1) DRAIN 2 IN.	MOTOR DATA		MAKE TRERICE	MODEL V-80342-120-801-15	C	3/4/2019
E.	(1) OVERFLOW 4 IN.	H.P. 10/25	RPM 3500	THERMOMETER		D	3/12/2019
F.	(1) THERMOMETER 1 IN.	TYPE TEFC	VOLTAGE 460/60/3	MAKE FLOWERVE	MODEL GS PNEUMATIC	NOTES	
G.	(1) MAKE UP WATER 2 IN.	SHIPPING WEIGHT		MAKE WIKA	MODEL 232.34	1. ALL CONTROLS MOUNTED AS PER SPECIFICATION SHEET.	
H.	(1) VENT 4 IN.	TANK (EMPTY) 6,315 LBS.	STAND/PUMPS 4,250 LBS.	WATER INLET PRESS.		2. SPECIFICATION SHEET TAKES PRIORITY OVER DRAWING.	
J.	(1) RECIRCULATION 3 IN.	TANK (FULL) 10,570 LBS.				3. SURGE TANK DESIGN NON-CODE.	
K.	(1) CHEM. FEED 1 IN.					4. ALL DIMENSIONS ARE ±1" UNLESS OTHERWISE NOTED.	
L.	(1) MANWAY 14 X 18 IN.					5. THIS IS AN ATMOSPHERIC SURGE TANK.	
M.	(2) LEVEL CONTROLS 1 IN.					SUPERIOR BOILER WORKS, INC. HUTCHINSON, KANSAS	
N.	(2) LEVEL ALARMS 1 IN.					DRAWING NAME: SURGE TANK SYSTEM	
P.	(1) MAGNESIUM ANODE 1 IN.					MODEL NO: S 2000T	
Q.	(1) SAMPLE COOLER 1 IN.					SIZE: 2000 GALLONS	

1 EXISTING SURGE TANK SHOP DRAWING
ME2 scale: 1/2" = 1'-0"



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FORT HAYS STATE UNIVERSITY
AKERS ENERGY CENTER
TANK REPLACEMENT

MECHANICAL DETAILS
A-N/A
ME2
ORIGINAL CONTRACT DOCUMENTS