

SEALS PAGE

I hereby certify that this engineering document was prepared by me or under my direct supervision. I am duly Licensed Professional Engineer under the laws of the State of Iowa.

Thomas J. Morgan, PE

January 16, 2019

Signature

Date

Iowa License No. 13690

My license renewal date is: December 31, 2019

Pages or sheets covered by this seal:

Section 33 63 13.01

END OF DOCUMENT

UNI – STEAM DISTRIBUTION REPLACEMENT – PHASE 2A
CAMPBELL HALL TO TOWERS CENTER

SECTION 33 63 13.01
PRE-ENGINEERED STEAM AND CONDENSATE PIPING

PART 1 GENERAL

1.1 DESCRIPTION

- A. Design, manufacturer, furnish, deliver, and provide field technical assistance for the pre-engineered, pre-insulated steam and condensate piping.
- B. Prepare and submit shop drawings, technical data, and installation and maintenance instruction manuals.
- C. All piping, pipe fittings, and pipe appurtenances shall be received at Owner's construction site on, or before, April 2, 2019.
- D. ALTERNATE BID: Leak detection monitoring unit(s) (See Section 2.8). All leak detection cabling shall be included in base bid.

1.2 MANUFACTURERS

- A. Product shall be Perma-Pipe Multi-Therm 750, Thermacor Duo-Therm 505, or Rovanco Insul 800.

1.3 SUBMITTALS

- A. Submit installation drawings for pre-insulated pipe indicating pipe lengths (including horizontal and vertical considerations), pipe joints, pipe fittings, pipe anchors, enlarged pipe casings to accommodate pipe thermal expansion, leak detection equipment, and other system appurtenances.
- B. Submit relevant catalog cut sheets, manufacturer's data, pipe joint installation instructions, recommended testing procedures, and listing of applicable standards for proposed materials.
- C. Pipe system stress analysis and deflection calculations, stamped by a registered Professional Engineer.

1.4 PRODUCT DELIVERY, HANDLING AND STORAGE

- A. Deliver piping, pipe fittings, and other materials wrapped to provide protection during transit and job storage.
- B. Provide temporary caps for Installing Contractor to install at each phase of construction to protect the service and casing pipe from water, dirt, debris, and other materials.

UNI – STEAM DISTRIBUTION REPLACEMENT – PHASE 2A
CAMPBELL HALL TO TOWERS CENTER

SECTION 33 63 13.01
PRE-ENGINEERED STEAM AND CONDENSATE PIPING

1.5 PRE-INSTALLATION REVIEW MEETING

- A. A representative from the pre-insulated pipe manufacturer shall attend and participate in the pre-installation review meeting (date to be determined). This pre-installation review meeting shall be held with the University's project construction manager, the General Contractor (and appropriate subcontractors), the pre-insulated pipe manufacturer's representative, the project's Design Professional, and a UNI Utilities representative.

PART 2 PRODUCTS

2.1 GENERAL

- A. Pre-engineered systems shall be provided with all straight pipe and fittings, factory pre-insulated and prefabricated to job dimensions. Field engineered systems shall be provided with factory insulated straight pipe sections and factory prefabricated fittings.
- B. Provide materials that are new, of the type and quality specified. Where Underwriters' Laboratories, Inc. has established standards for such materials, provide only materials bearing the UL label.
- C. All straight sections, fittings, anchors, and other accessories shall be factory prefabricated to job dimensions and designed to minimize the number of field welds.
- D. Each system layout shall be computer analyzed by the piping system manufacturer to determine stresses, anchor points, and anticipated movements of the service pipe.
- E. The system design shall be in strict conformance with ANSI B31.1 latest edition, and stamped by a registered professional engineer employed by the system manufacturer.
- F. Factory trained field technical assistance shall be provided for a minimum of five (5) working days during the critical periods of the installation as determined by University; i.e., unloading, field joint instruction and observation, leak detection system installation, and pressure testing. Attendance at pre-installation review meeting (See Section 1.05) may be included as 1 of 5 working days.
- G. Steam design conditions: 150 psig at 550°F.
- H. Condensate design conditions: 150 psig at 400°F.
- I. For informational purposes, the Installing Contractor will pressure test the casing per manufacturer's instructions and will hydrostatically pressure test the service pipe in accordance with ASME B31.1 - Code for Pressure Piping.

UNI – STEAM DISTRIBUTION REPLACEMENT – PHASE 2A
CAMPBELL HALL TO TOWERS CENTER

SECTION 33 63 13.01
PRE-ENGINEERED STEAM AND CONDENSATE PIPING

2.2 SERVICE PIPE

A. Internal carrier piping:

	<u>Material</u>	<u>Service</u>
1.	Carbon steel, seamless, Sch. 40, ASTM A106, Gr. B.	Steam supply.
2.	Carbon steel, seamless, Sch. 80, ASTM A106, Gr. B.	Steam condensate.

B. All joints shall be butt welded.

C. Where possible, straight pipe sections shall be supplied in 40 foot random lengths, with 6 inches of piping exposed at each end for field joint fabrication.

2.3 SUBASSEMBLIES

A. Gland seals, pipe anchors and guides shall be designed and factory prefabricated to prevent the ingress of moisture into the system.

B. Gland seals are preferred to end seals at pipe entrances to buildings and vaults.

C. All subassemblies shall be designed to allow for complete draining and drying of the conduit system.

2.4 SERVICE PIPE INSULATION

A. Insulation shall be Pyrogel XTE (Aspen Aerogel) insulation:
– 30 mm thick for steam
– 20 mm thick for condensate

B. Insulation layers shall have joints staggered by at least 6” at all locations in the system, including field joints.

C. The insulation shall be secured to the pipe by stainless steel bands.

D. Insulation thickness shall be clearly indicated on manufacturer’s shop drawings.

2.5 OUTER CONDUIT

A. The steel conduit casing shall be smooth wall, welded steel conduit of the thickness specified below:

<u>Conduit Size</u>	<u>Conduit Thickness</u>
6" - 26"	10 gauge
28" - 36"	6 gauge

UNI – STEAM DISTRIBUTION REPLACEMENT – PHASE 2A
CAMPBELL HALL TO TOWERS CENTER

SECTION 33 63 13.01
PRE-ENGINEERED STEAM AND CONDENSATE PIPING

- B. Changes in casing size, as required at oversized casing to allow for carrier pipe expansion, shall be accomplished by eccentric and/or concentric fittings and shall provide for continuous drainage.

2.6 PIPE SUPPORTS

- A. All pipes within the outer casing shall be supported at not more than 10-foot intervals.
- B. These supports shall be designed to allow for continuous airflow and drainage of the conduit in place.
- C. The straight supports shall be designed to occupy not more than 10% of the annular air space.
- D. Pipe supports, anchors, and guides shall be of the type where insulation thermally isolates the carrier pipe from the outer conduit.
- E. The surface of the insulation shall be protected at the support by a sleeve not less than 12 inches long, fitted with traverse and, where required, rotational arresters.

2.7 OUTER CONDUIT INSULATION AND JACKET

- A. Conduit insulation shall be spray applied polyurethane foam or polyisocyanurate foam, having a nominal 2 pound per cubic foot density for all straight lengths and fittings.
- B. The insulation thickness shall per manufacturer's recommendation; minimum 1 inch.
- C. Quality assurance procedures for the insulation shall include a visual check prior to jacketing for spray-applied foam, to ensure there are no insulation voids. Infrared or sonic testing is not allowed.
- D. The urethane foam shall meet ASTM C591 and have the minimum characteristic of .14 K-factor, density of 2 pcf, and a closed cell content of 90-95%.
- E. The outer jacket shall be fiberglass (FRP) or polyethylene. All straights and fittings shall be factory jacketed.
- F. Provide materials and equipment for installation of field joints by Installing Contractor. Field joints to be installed per manufacturer written requirements.

UNI – STEAM DISTRIBUTION REPLACEMENT – PHASE 2A
CAMPBELL HALL TO TOWERS CENTER

SECTION 33 63 13.01
PRE-ENGINEERED STEAM AND CONDENSATE PIPING

2.8 LEAK DETECTION AND LOCATION SYSTEM

- A. ALTERNATE BID: Monitoring Unit(s): The monitoring unit(s) shall be microprocessor based, capable of monitoring up to 2,000 feet of sensing string per cable, including sensor cable, probes and jumper cable, depending on cable type. Monitoring unit(s) shall indicate when any liquid comes in contact with the sensor cable by sounding an alarm, actuating two (2) output relays, displaying a message stating that a leak has been detected and the location of that leak on the sensing string. Monitoring unit(s) shall have LEDs on the front panel to indicate the unit is powered or an alarm condition has occurred. The monitoring unit power requirements shall be 120/240 VAC, 100 VA, 50/60 Hz, single-phase. Monitoring units shall be equipped with an RS-232 communication port and a minimum of one (1) common and one (1) per cable SPDT output relay, rated for 250 VAC, 10 A. The monitoring unit(s) shall be enclosed in a modified NEMA 4X enclosure. The ability to locate a leak shall not depend on battery backed up functions. In the event of power failure, system conditions and parameters shall be stored in nonvolatile memory allowing the unit to automatically resume monitoring, without resetting, upon restoration of power. An on-off switch shall be provided in the panel for servicing.
- B. Sensor Cable (include in BASE BID): The sensor cable installed in polyurethane foam insulation shall be a twisted-pair design consisting of two (2) insulated 1.5 mm² insulated copper wires suitable for exposure to temperatures up to 135°C. The sensor cable shall detect water-based liquids. Maximum length of ATP cable sensor string shall be 5,000 feet.

PART 3 EXECUTION

3.1 PREPARATION

- A. Data indicated on the Drawings and in these Specifications are as exact as could be secured, but their absolute accuracy is not warranted. The exact locations, distances, levels, and other conditions will be governed by actual construction conditions and the Drawings and Specifications should be used only for guidance in such regard.

3.2 FIELD SERVICES

- A. Field services shall be provided by a certified manufacturer's representative or company field service technician.
- B. A written report by the field representative, reflecting work performed and specification compliance, shall be signed by the representative and the installing Contractor, with copies to the Owner and Design Professional at the end of each day's site visit.

END OF SECTION

UNI – STEAM DISTRIBUTION REPLACEMENT – PHASE 2A
CAMPBELL HALL TO TOWERS CENTER

SECTION 33 63 13.01
PRE-ENGINEERED STEAM AND CONDENSATE PIPING

**THIS PAGE
INTENTIONALLY
LEFT BLANK**