

**Texas State Technical College
ACT Building
Waco, Texas
Chiller, Boiler, and Air Handling Unit (AHU) Replacement
Work Scope Narrative**

GENERAL INFORMATION

Work Scope

The project consists of replacing a 100-ton Carrier chiller with a nominal 125-ton Trane chiller presently stored in the main mechanical room. Additionally, the existing 1,230,000 BTH steam boiler system will be replaced with a comparable heating water, condensing boiler system. The three air handling units (AHUs) located on the mezzanine above the chillers and boilers will also be replaced with new comparable sized VAV AHUs having hydronic (chilled and heating water) cooling and heating, along with all factory mounted end devices (temp sensors, airflow measurement, freeze protection, damp actuators, etc. wired to a “BACnet/Lon” factory mounted programmable controller). The replacement of the two existing chilled water pumps and two condenser water pumps will be included as an alternate scope of work.

The Carrier chiller to be removed consist of four separate components. The two compressors and evaporator barrel each sit on their own equipment pads. The condenser barrel is suspended from the structure above. These 4 components will be removed and their associated water piping temporarily capped for future reuse. All refrigerant piping between the compressors, evaporator barrel, and condenser barrel will be removed completely. The new Trane chiller will be installed where the Carrier chiller was located. It will be connected to the existing condenser water piping and chilled water piping using pipe extensions and fittings. Both the chilled water and condenser water branch piping will be outfitted with a pair of isolation valves, pair of mercury stem thermometers, pair of liquid filled pressure gauges with gauge ports and quarter turn ball valves, balance valve, automated isolation valve, and pair of remote temperature sensors with thermal wells. The existing McQuay chiller adjacent to the Carrier chiller will remain in service. Also, the existing cooling tower serving the chillers will be reused.

The existing steam boiler will be removed along with its associated condensate receiver, feed pump, steam piping, condensate piping, and blowdown piping. The 2" natural gas piping will be removed back 4 feet from the steam boiler and be reused to serve the new heating water, condensing boiler. Likewise, the 12" dia. flue pipe will be removed back 4 feet from the steam boiler and reused to serve the new boiler. The new heating water, condensing boiler will be installed along with its two in-line heating water pumps and 4" heating water supply and return piping to the 3 AHUs. Additionally, the heating water supply and return will be outfitted with a pair of isolation valves, pair of mercury stem thermometers, pair of liquid filled pressure gauges with gauge ports and quarter turn ball valves, balance valve, and pair of remote temperature sensors with thermal wells.

The 3 AHUs on the mezzanine will be removed by disconnecting them from their supply, return, and outdoor air ducts along with their chilled water, steam, and condensate return piping. Their steam and condensate return piping will be removed back to the existing steam boiler. Their chilled water piping will be removed back to where the piping penetrates the floor and temporarily capped for future reuse by the new AHUs. The new AHUs will be installed in the same location as the demo-ed AHUs. Duct transitions and extensions will be used to connect the new AHUs to the existing supply, return, and outdoor air ductwork. New heating water piping will be routed from the new boiler to the 3 AHUs. Chilled water piping will be extended from the existing chilled water stub-ups to the new AHUs. 3-way

control valves will be installed on each AHU for both chilled water and heating water modulation. Each AHU will have a pair of isolation valves, pair of temperature/pressure Pete's plugs, 3-way control valve (with bypass isolation valve), and pressure independent circuit setter for chilled water and heating water service.

The replacement of the chilled water and condenser water pumps will be an alternate scope of work. The chilled water pumps consist of one horizontal-mounted, split-case pump and one vertical-mounted, split-case pump having the same capacity. Likewise, the condenser water pumps consist of one horizontal-mounted, split-case pump and one vertical-mounted, split-case pump having the same capacity. Each of the 4 pumps will be outfitted with a pair of isolation butterfly valves, 6" inlet Y-strainer, 6" outlet swing check valve, and a pair of liquid filled pressure gauges with gauge ports and quarter turn ball valves.

Refer to the attached mechanical drawing for the general equipment layout, pipe routing, and demo/new work requirements. Also, refer the mechanical specifications outlined below for material and workmanship requirements.

Refer to the attached electrical drawing and the electrical specifications outlined below for the electrical scope of work and workmanship requirements. The controls contractor will perform electrical (signal) connection to the control devices, program the control system software, and commission the control system. The electrical contractor will install the wiring and conduit between the new equipment and the control panel(s).

Official sealed and signed drawings will be provide the successful contractor for permitting and construction prior to commencing any work.

Trane Supplied Equipment

- 1) Trane RTWA125 Water-Cooled Rotary Chiller - 109.2 tons, CHW EWT = 54 deg F, CHW LWT = 44 deg F, CHW Flow Rate = 262 GPM, CW EWT = 85 deg F, CW LWT = 95 deg F, CW Flow Rate = 327.6 GPM, 460V/3 Ph/225 MHP
- 2) Trane AHU-East - 18,000 CFM indoor, hydronic VAV air handling unit with VFD and onboard DDC controls (see manufacturer's submittal for unit configuration & 460V/3 Ph power requirement)
- 3) Trane AHU-West - 12,000 CFM indoor, hydronic VAV air handling unit with VFD and onboard DDC controls (see manufacturer's submittal for unit configuration & 460V/3 Ph power requirement)
- 4) Trane AHU-Center - 5,000 CFM indoor, hydronic VAV air handling unit with VFD and onboard DDC controls (see manufacturer's submittal for unit configuration & 460V/3 Ph power requirement)
- 5) Heating Water Boiler - 1,500,000 BTH input, gas-fired condensing boiler, 460V/3 Ph
- 6) Heating Water Pumps (Qty-2) - in-line pump, 131 GPM @ 65 FT, 460V/3 Ph, 7.5 HP
- 7) Chilled Water Pumps (Qty-2) - split case, double suction pump, 262 GPM @ 85 FT, 460V/3 Ph, 15 HP **[alternate workscope; one horizontal mount & one vertical mount]**
- 8) Condenser Water Pumps (Qty-2) - split case, double suction pump, 328 GPM @ 45 FT, 460V/3 Ph, 10 HP **[alternate workscope; one horizontal mount & one vertical mount]**
- 9) Motorized operators for control dampers and valves(12 VDC or 24 VAC)
- 10) Trane Tracer Summit control hardware and software programming

Contractor Supplied Equipment

- 1) Ductwork, duct accessories, piping, and fittings.

MECHANICAL SPECIFICATIONS AND REQUIREMENTS

- 1) Contractor shall follow all SMACNA guidelines when installing ductwork. Ductwork shall be externally insulated using 2" thick foil-backed fiberglass blanket insulation in concealed spaces and 1.5" thick foil-backed fiberglass board insulation in exposed areas.
- 2) Manual and automated control dampers shall be of the parallel-blade type with locking position handles. Minimum rating of 2.5" w.c. and 1,500 FPM.
- 3) Chilled and heating piping above grade shall be: 2" and smaller – Type L copper having 1.5" thick fiberglass pipe insulation (sized for pipe diameter) with reinforced kraft paper cover and Propress or sweat fittings, 2.5" and larger – schedule 40 steel having 2" thick fiberglass pipe insulation (sized for pipe diameter) with reinforced kraft paper cover and welded or flange fittings.
- 4) Chilled and heating water isolation valves shall be ball valves for 2" and smaller pipe, and butterfly valves with quarter turn latching handles for 2.5" and larger pipe.
- 5) Check valves shall be self-closing swing type with shock absorbing seat.
- 6) Support piping in buildings using clevis hangers or trapeze hangers at maximum 10 foot spacing. Size hanger for insulated pipe diameter.
- 7) Contractor shall follow all applicable state and local codes when performing work on the project.
- 8) Contractor shall follow all OSHA regulations when performing work on the project.
- 9) Contractor shall follow manufacturer's guidelines when performing equipment installation.
- 10) Contractor shall dispose of all equipment and material debris in a state licensed landfill when performing demolition and new work on the project.
- 11) Contractor shall use AABC or NEBB certified test and balance company when performing air balance work.
- 12) Contractor shall schedule and coordinate all work with the college facilities department. Provide the college with five (5) workday notice for any utility or mechanical system outage.

ELECTRICAL SPECIFICATIONS AND REQUIREMENTS

- 1) Conductors for power service (120V and above) to equipment shall be solid strand copper wire with THHN jacket.
- 2) Raceways shall be rigid metal conduit or EMT. Flexible metal conduit may be used within four (4) feet of the connection point to mechanical equipment.
- 3) Conductors and raceways shall be sized in accordance with the applicable version of the National Electric Code.
- 4) Electrical circuits and their appurtenances installed outdoors shall be in weatherproof raceways and enclosures.
- 5) Mount disconnect switches, motor starters, and variable frequency drives on solid wall surface or 2-1/4" x 1-1/2" Unistrut frame.
- 6) Contractor shall follow all applicable state and local codes when performing work on the project.
- 7) Contractor shall follow all OSHA regulations when performing work on the project.
- 8) Contractor shall follow manufacturer's guidelines when performing equipment installation.
- 9) Contractor shall coordinate with the mechanical contractor to provide the correct electrical service to all electrically-powered mechanical equipment.
- 10) Contractor shall dispose of all equipment and material debris in a state licensed landfill when performing demolition and new work on the project.

- 11) Contractor shall schedule and coordinate all work with the college facilities department.
Provide the college with 5 workday notice for any utility or electrical system outage.

TRANE TRACER BUILDING AUTOMATION SYSTEM SPECIFICATIONS AND REQUIREMENTS

- 1) Contractor shall be responsible for all control sequencing, programming and optimization of equipment installed, including but not limited to Chillers, AHUs, Boilers, Cooling Tower(s), all component and building pumps, VFDs, mixing valves, and other items that might require Tracer control.

GENERAL SPECIFICATIONS AND REQUIREMENTS

- 1) All work to be completed between December 12, 2014 and January 15, 2015 (Christmas break).
- 2) Includes 1 year Warranty.
- 3) All Warranty and Service to be provided by Contractor.