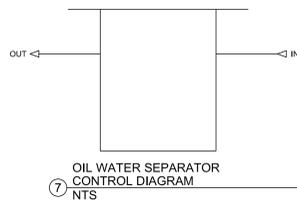


SEQUENCE OF OPERATIONS SUMP PUMP (SP-X)

General Description
There are two (2) separate sump pumps. One sump pump lifts fluid out of the elevator pit during a leak and discharges to an oil water separator. The other lifts storm water from the foundation and discharges on grade.

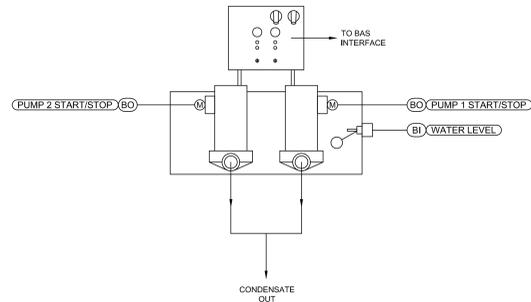
| POINTS LIST - SUMP PUMP | | | | | | | | | | | | |
|---|-----------------|----|----|----|-----------------|----|------|-------|-------|-------|------------------|---------|
| POINT NAME | HARDWARE POINTS | | | | SOFTWARE POINTS | | | | | | SHOWN ON GRAPHIC | |
| | AI | AO | BI | BO | AV | BV | LOOP | SCHED | TREND | ALARM | | |
| PUMPS | | | | | | | | | | | | |
| SP-1 | | | | | | | | | | | | |
| SP-2 | | | | | | | | | | | | |
| ALARMS | | | | | | | | | | | | |
| FAILURE | | | | | | | | | | X | | 10 MIN. |
| IN HAND | | | | | | | | | | X | | 10 MIN. |
| START | | | | | | | | | | X | | 10 MIN. |
| NOTES: 1 SEE STANDARD TRENDDING POINTS LIST SCHEDULE ON SHEET M-701 FOR APPLICABLE TREND INTERVALS. | | | | | | | | | | | | |



SEQUENCE OF OPERATIONS OIL WATER SEPARATOR (OWS)

General Description
The oil water separator receives fluid from the elevator sump pump and discharges to the sanitary main.

| POINTS LIST - OIL WATER SEPARATOR | | | | | | | | | | | | |
|---|-----------------|----|----|----|-----------------|----|------|-------|-------|-------|------------------|---------|
| POINT NAME | HARDWARE POINTS | | | | SOFTWARE POINTS | | | | | | SHOWN ON GRAPHIC | |
| | AI | AO | BI | BO | AV | BV | LOOP | SCHED | TREND | ALARM | | |
| PUMPS | | | | | | | | | | | | |
| OWS | | | | | | | | | | | | |
| ALARMS | | | | | | | | | | | | |
| HIGH LEVEL | | | | | | | | | | X | | 10 MIN. |
| NOTES: 1 SEE STANDARD TRENDDING POINTS LIST SCHEDULE ON SHEET M-701 FOR APPLICABLE TREND INTERVALS. | | | | | | | | | | | | |



SEQUENCE OF OPERATIONS STEAM CONDENSATE PUMP (CP-X) TYPICAL CONTROL DIAGRAM

| POINTS LIST SCHEDULE (CP-X) | | | | | | | | | | | | |
|---|-----------------|----|----|----|-----------------|----|------|-------|-------|-------|------------------|---------|
| POINT NAME | HARDWARE POINTS | | | | SOFTWARE POINTS | | | | | | SHOWN ON GRAPHIC | |
| | AI | AO | BI | BO | AV | BV | LOOP | SCHED | TREND | ALARM | | |
| PUMPS | | | | | | | | | | | | |
| PUMP 1 START/STOP | | | | X | | | | | | X | | X |
| PUMP 2 START/STOP | | | X | | | | | | | X | | X |
| RECEIVER | | | | | | | | | | | | |
| WATER LEVEL | | | X | | | | | | | X | | X |
| ALARMS | | | | | | | | | | | | |
| COMMON ALARM | | | | | | | | | | X | | 10 MIN. |
| HIGH WATER LEVEL ALARM | | | | | | | | | | X | | 5 MIN. |
| CONDENSATE PUMP START/STOP | | | | | | | | | | X | | 10 MIN. |
| NOTES: 1 SEE STANDARD TRENDDING POINTS LIST SCHEDULE ON SHEET M-701 FOR APPLICABLE TREND INTERVALS. | | | | | | | | | | | | |

SEQUENCE OF OPERATIONS STEAM CONDENSATE PUMP (CP-X) REPLACEMENT WAREHOUSE GENERAL DESCRIPTION

The duplex steam condensate pump with condensate storage tank and manufacturer provided control panel provides steam condensate removal from the steam supply system as shown on the drawings.

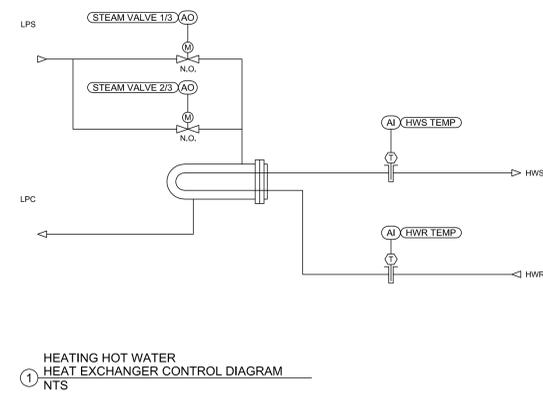
COMPONENT CONTROLS

PUMP 1

The pump shall be activated (subject to the unit manufacturer's standard unitary safeties and controls) upon receiving a water level status.

PUMP 2

Upon failure of Pump 1, Pump 2 shall be activated (subject to the unit manufacturer's standard safeties and controls) upon receiving a water level status.



HEATING HOT WATER HEAT EXCHANGER CONTROL DIAGRAM

| POINTS LIST - HEAT EXCHANGER (HX-X) | | | | | | | | | | | | |
|---|-----------------|----|----|----|-----------------|----|----|------|-------|-------|------------------|---------|
| POINT NAME | HARDWARE POINTS | | | | SOFTWARE POINTS | | | | | | SHOWN ON GRAPHIC | |
| | AI | AO | BI | BO | SETPOINT | AV | BV | LOOP | SCHED | TREND | | ALARM |
| STEAM SIDE | | | | | | | | | | | | |
| STEAM VALVE 1/3 | | X | | | | | | | | | | X |
| STEAM VALVE 2/3 | | X | | | | | | | | | | X |
| WATER SIDE | | | | | | | | | | | | |
| HWS TEMPERATURE | | X | | | | | | | | | X | X |
| HWR TEMPERATURE | | X | | | | | | | | | X | X |
| SETPOINTS | | | | | | | | | | | | |
| OUTSIDE AIR TEMPERATURE | | | | | SEE SEQ. | X | | | | | | X |
| HWS TEMPERATURE SETPOINT | | | | | 160 F | X | | | | | | X |
| HWR TEMPERATURE SETPOINT | | | | | 140 F | X | | | | | | X |
| ALARMS | | | | | | | | | | | | |
| HIGH HWS TEMPERATURE | | | | | | | | | | | X | 10 MIN. |
| LOW HWS TEMPERATURE | | | | | | | | | | | X | 10 MIN. |
| NOTES: 1 SEE STANDARD TRENDDING POINTS LIST SCHEDULE ON SHEET M-701 FOR APPLICABLE TREND INTERVALS. | | | | | | | | | | | | |

SEQUENCE OF OPERATIONS STEAM TO HOT WATER HEAT EXCHANGER (HX-X)

General Description
The steam to hot water shell and tube heat exchanger is used to heat water for the heating hot water system and its components as shown on the drawings.

Run Conditions

The heat exchanger system shall be enabled to run whenever a definable number of hot water coils need heating and outside air temperature is less than 65°F (adj.). To prevent short cycling, the heat exchanger shall run for and be off for minimum adjustable times (both user definable). The heat exchanger system shall also run for freeze protection whenever outside air temperature is less than 38°F (adj.).

Hot Water Supply Temperature Setpoint

The hot water supply temperature setpoint shall be a fixed setpoint of 160°F (adj.).

Heat Exchanger 1/3 - 2/3 Steam Valves - Hot Water Control

The controller shall measure the hot water supply temperature and modulate the two steam valves in sequence to maintain its setpoint. The steam valves shall be enabled whenever the heat exchanger is called to run AND hot water supply temperature is below its setpoint.

The steam valves shall open to 100% (adj.) whenever the heat exchanger is in freeze protection due to low outside air temperature. The steam valves shall close whenever the hot water supply temperature rises from 160°F to 180°F (adj.).

SEQUENCE OF OPERATIONS DOMESTIC ELECTRIC WATER HEATER (WH-1)

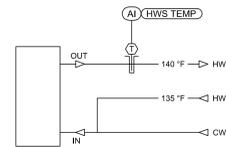
GENERAL DESCRIPTION
The domestic hot water system consists of an electric water heater and recirculating pumps. Point-of-use mixing valves will provide anti-scald protection at their respective fixtures. A hot water recirculation pump will serve the hot water heater. The water heaters are used to heat water for Building 165 domestic hot water system as shown on the drawings.

Run Conditions

The domestic electric water heater shall operate continuously.

Hot Water Supply Temperature Setpoint

The hot water supply temperature setpoint shall be a fixed setpoint of 140°F (adj.).



DOMESTIC ELECTRIC WATER HEATER CONTROL DIAGRAM NOT TO SCALE

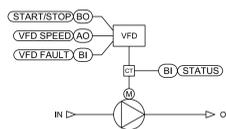
| POINTS LIST - DOMESTIC STEAM TO WATER HEATER (WH-1) | | | | | | | | | | | | |
|---|-----------------|----|----|----|-----------------|----|----|------|-------|-------|------------------|---------|
| POINT NAME | HARDWARE POINTS | | | | SOFTWARE POINTS | | | | | | SHOWN ON GRAPHIC | |
| | AI | AO | BI | BO | SETPOINT | AV | BV | LOOP | SCHED | TREND | | ALARM |
| WATER SIDE | | | | | | | | | | | | |
| WH-1 HWS TEMPERATURE | | X | | | | | | | | | X | X |
| SETPOINTS | | | | | | | | | | | | |
| WH-1 HWS TEMPERATURE SETPOINT | | | | | 140 F | X | | | | | X | X |
| ALARMS | | | | | | | | | | | | |
| WH-1 HIGH HWS TEMPERATURE | | | | | | | | | | | X | 10 MIN. |
| WH-1 LOW HWS TEMPERATURE | | | | | | | | | | | X | 10 MIN. |

SEQUENCE OF OPERATIONS HOT/COLD WATER RECIRCULATION PUMPS (RP-X)

General Description
The inline recirculating pumps are used to recirculate the associated hot or cold water back to the domestic water heater and the service entrance as shown on the drawings.

Run Conditions

The hot/cold water recirculation pumps shall operate continuously.



RECIRCULATING PUMP CONTROL DIAGRAM NTS

| POINTS LIST SCHEDULE - RECIRCULATION PUMP (RP-X) | | | | | | | | | | | | |
|--|-----------------|----|----|----|-----------------|----|------|-------|-------|-------|------------------|---------|
| POINT NAME | HARDWARE POINTS | | | | SOFTWARE POINTS | | | | | | SHOWN ON GRAPHIC | |
| | AI | AO | BI | BO | AV | BV | LOOP | SCHED | TREND | ALARM | | |
| PUMPS | | | | | | | | | | | | |
| CWR PUMP STATUS | | | X | | | | | | | X | X | X |
| HWR PUMP STATUS | | | X | | | | | | | X | X | X |
| CWR PUMP START/STOP | | | | X | | | | | | X | | X |
| HWR PUMP START/STOP | | | | X | | | | | | X | | X |
| CWR PUMP FLOW RATE | | | X | | | | | | | X | X | X |
| HWR PUMP FLOW RATE | | | X | | | | | | | X | X | X |
| CWR PUMP FLOW RATE | | X | | | | | | | | X | X | X |
| HWR PUMP FLOW RATE | | X | | | | | | | | X | X | X |
| HWR/CWR TEMPERATURE | | | | | | | | | | X | X | X |
| ALARMS | | | | | | | | | | | | |
| CWR PUMP FAILURE | | | | | | | | | | | X | 10 MIN. |
| CWR PUMP IN HAND | | | | | | | | | | | X | 10 MIN. |
| CWR PUMP RUNTIME EXCEEDED | | | | | | | | | | | X | 10 MIN. |
| CWR PUMP HIGH/LOW FLOW RATE | | | | | | | | | | | X | 10 MIN. |
| HWR PUMP FAILURE | | | | | | | | | | | X | 10 MIN. |
| HWR PUMP IN HAND | | | | | | | | | | | X | 10 MIN. |
| HWR PUMP RUNTIME EXCEEDED | | | | | | | | | | | X | 10 MIN. |
| HWR PUMP HIGH/LOW FLOW RATE | | | | | | | | | | | X | 5 MIN. |
| LOW HWR / CWR TEMPERATURE | | | | | | | | | | | X | 5 MIN. |

1
SHEET REVISED AND REISSUED.

CONSULTANT INFORMATION

STRUCTURAL / CIVIL ENGINEER
H2B, INC.
1225 N. LOOP WEST, SUITE 800
HOUSTON, TX 77008
(713) 864-2900

COMMISSIONING
GLHN ARCHITECTS & ENGINEERS, INC.
2939 E. BROADWAY BLVD
TUCSON, AZ 85716
(520) 881-4546

MECH. / ELEC. / PLUMB. / TECH ENGINEER
SPUR DESIGN
11020 KING STREET, SUITE 350
OVERLAND PARK, KS 66210
(402) 842-6100

FIRE PROTECTION ENGINEER
POOLE FIRE PROTECTION, INC.
18910 W. 161ST STREET
OLATHE, KS 66062
(913) 824-8859

LANDSCAPE ARCHITECT
ARC STUDIOS INC.
3117 E. FLOWER STREET
TUCSON, AZ 85716
(520) 852-9555

ARCHITECT

SPUR DESIGN

311 SW 25th Street
Oklahoma City, OK 73109
spur-design.com

11020 King Street, Suite 350
Overland Park, KS 66210
spur-design.com

Office of Construction and Facilities Management

VA U.S. Department of Veteran Affairs

SHEET TITLE MECHANICAL CONTROLS VI

APPROVED: PROJECT DIRECTOR

PROJECT PHASE BID DOCUMENTS

FULLY SPRINKLERED

PROJECT TITLE CONSTRUCT REPLACEMENT WAREHOUSE

PROJECT LOCATION
500 AZ-89, PRESCOTT, AZ 86301

DATE
04/23/2019

CHECKED BY
JES

DRAWN BY
JAD

VA PROJECT NUMBER
649-414

BUILDING NUMBER
165

DRAWING NUMBER
165-M-706

Dwg. 116 OF 145