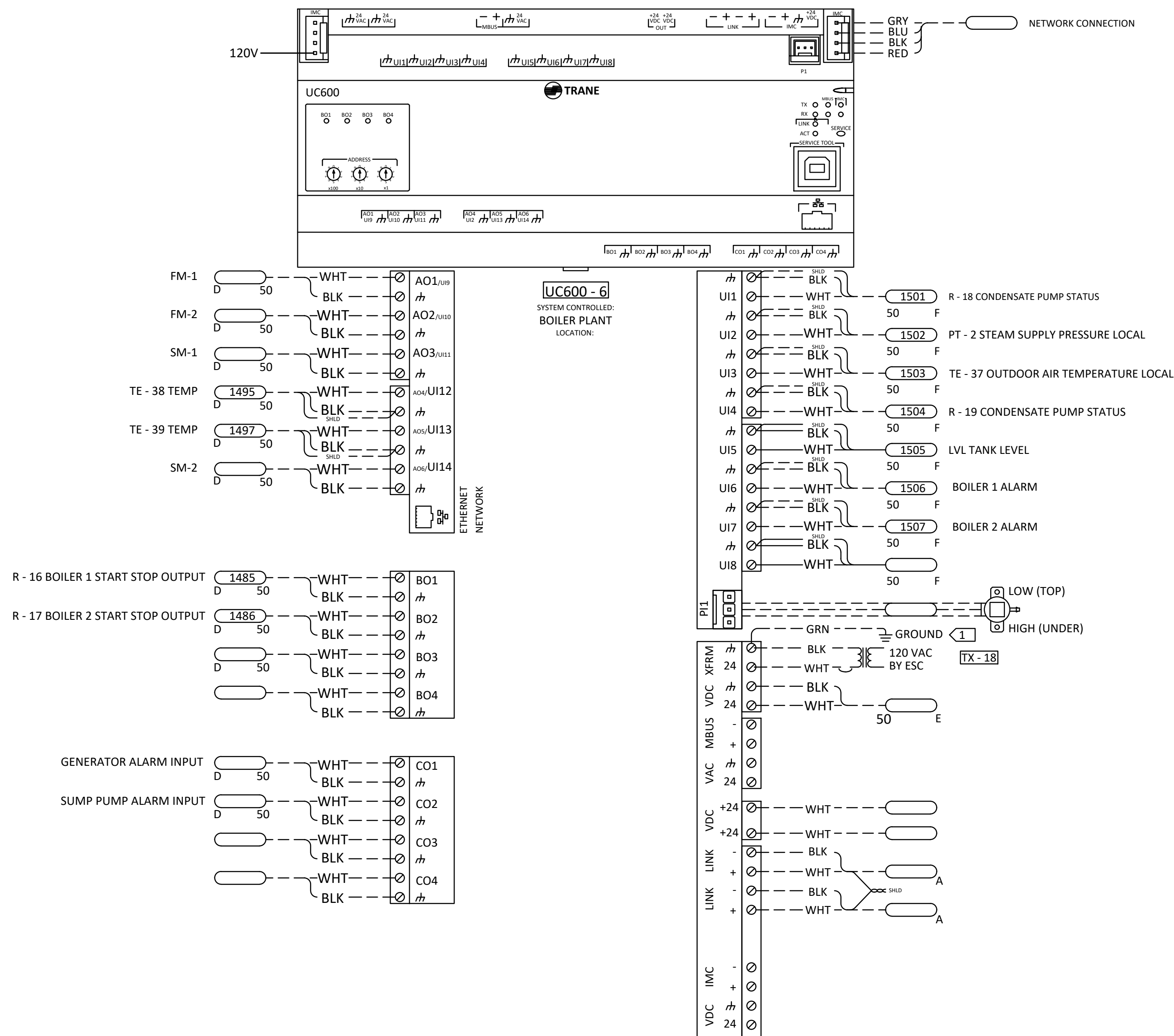


1 MOUNT OUTDOOR AIR TEMP SENSOR ON NORTHERN EXPOSURE USING A NON-CONDENSATING CONDUIT CONNECTION. MOUNT AWAY FROM EXHAUST VENTS AND OTHER HEAT SOURCES. CONSULT WITH CLIENT AGENCY BEFORE MOUNTING.

1 BOILER PLANT FLOW DIAGRAM  
H-13 SCALE: NOT TO SCALE



1 DEVICE MUST BE GROUNDED WITH FACTORY PROVIDED GROUND WIRE AS DETAILED IN THE DEVICE INSTALLATION LITERATURE.

1 BOILER PLANT CONTROLLER  
H-13 SCALE: NOT TO SCALE

#### SEQUENCE OF OPERATIONS GENERAL:

- THIS SHEET INCLUDES CONTROL POINTS TO A LOCAL DDC USED TO CONTROL AND OPERATE THE BOILERS, AND FEEDWATER, CONDENSATE RETURN, AUXILIARY EQUIPMENT VIA (2) OTHER LOCAL PUMP SKID CONTROLLERS.
- ANY DISCREPANCIES THAT MAY OCCUR BETWEEN THE PLANS, SCHEDULES, AND SPECIFICATIONS, THE MOST STRINGENT SHALL APPLY.
- THE CONTROL AND EQUIPMENT SHALL BE INSTALLED TO ENSURE THAT THE MECHANICAL EQUIPMENT OPERATE AS ORIGINALLY INTENDED. THE MECHANICAL CONTRACTOR SHALL PROVIDE ALL NECESSARY FITTINGS, CONTROLLERS, RELAYS, PIPES, ELECTRICALLY OPERATED CONTROL VALVES, WIRING, AND AUXILIARY EQUIPMENT AND DEVICES REQUIRED TO PROVIDE A FULLY OPERATIONAL INSTALLATION TO MEET THE DESIGN INTENT.
- INSTALL NEW CONTROL/LOW VOLTAGE POWER WIRING FROM THE DEVICES TO THE INDIVIDUAL CONTROLS AND FROM THE INDIVIDUAL CONTROLLERS TO THE BOILER MAIN DDC.

#### DESCRIPTION:

THESE UNITS SERVICE THE ENTIRE CAMPUS STEAM AND HOT WATER LOADS. THE STEAM SYSTEM CONSISTS OF TWO STEAM BOILERS. THE BUILDING AUTOMATION SYSTEM (BAS) CONTROLLER WILL PROVIDE STAND-ALONE CONTROL OR BAS WORKSTATION CONTROL OF THE STEAM PRESSURE (ADJ.) BY CONTROLLING THE BOILER'S ENABLE/DISABLE BOILER SIGNAL. THE OPTIONAL BAS CONTROLLER WILL BE EQUIPPED WITH A HUMAN-INTERFACE PANEL THAT IS PASSWORD PROTECTED TO PREVENT UNAUTHORIZED ACCESS.

#### BOILER CONTROL:

THE BOILER LEAD/LAG SEQUENCE WILL BE BASED ON A WEEKLY SCHEDULE. FROM THE BAS CONTROLLER HUMAN-INTERFACE PANEL OR A BAS WORKSTATION, AN OPERATOR WILL BE ABLE TO MANUALLY CHANGE THE LEAD/LAG SEQUENCE.

IF THE STEAM SUPPLY PRESSURE FALLS MORE THAN 5.0 PSIG (ADJ.) BELOW SETPOINT FOR A PERIOD LONGER THAN 15 MINUTES (ADJ.), OR IF AN ACTIVE BOILER SIGNALS A FAILURE ALARM, THE BAS CONTROLLER WILL ENABLE THE LAG BOILER AND DISABLE THE LEAD BOILER. IN ADDITION, THE BAS CONTROLLER WILL SEND AN ALARM TO THE BAS WORKSTATION. WHEN A BOILER FAILURE EXISTS, LEAD/LAG AUTOMATION WILL BE DISABLED AND ONLY THE CURRENTLY RUNNING BOILER BECOMES THE LEAD BOILER. ONCE THE PROBLEM IS CORRECTED, THE OPERATOR WILL BE ABLE TO CLEAR THE ALARM FAILURE FROM THE BAS CONTROLLER OR BAS WORKSTATION. THIS ACTION WILL RE-ENABLE THE LEAD/LAG SEQUENCE.

#### BOILER FEEDWATER CONTROL

BOILER FEEDWATER VALVE OPENS FULLY BASED ON A DEMAND CALL FOR STEAM AND A LOW LEVEL BOILER READING AT THE BOILER DDC.

#### DEAERATOR TANK CONTROL

LEVEL IS MONITORED AT THE BOILER FEEDWATER SYSTEM DDC.  
PUMP STATUS IS MONITORED AT THE BOILER FEEDWATER SYSTEM DDC.  
NORMAL AND EMERGENCY MAKE-UP WATER VALVES ARE CONTROLLED BASED ON DEAERATOR TANK LEVEL.  
PUMP RUN STATUS IS MONITORED AT THE BOILER FEEDWATER SYSTEM DDC.  
BOILER FEEDWATER SYSTEM DDC COMMUNICATES DIRECTLY WITH THE BOILER MASTER DDC.

#### CONDENSATE RETURN PUMP CONTROL

PUMP STATUS IS MONITORED AT THE CONDENSATE RETURN SYSTEM DDC.  
PUMP RUN STATUS IS MONITORED AT THE CONDENSATE RETURN SYSTEM DDC.

#### MISCELLANEOUS CONTROL

PRESSURE MONITORING AT BOILER STEAM SUPPLY VIA THE BOILER DDC.  
DEAERATOR TANK TEMPERATURE MONITORING AT THE FEEDWATER PUMP SKID CONTROLLER.

#### SUPPLY FAN CONTROL

SUPPLY FANS SHALL UTILIZE THE SAME BOILER LEAD/LAG SEQUENCE NOTED ABOVE AND BE INTERLOCKED WITH EACH RESPECTIVE BOILER (SF-1-B-1 & SF-2-B-2). SUPPLY FANS SHALL ACTIVATE PRIOR TO ENABLING THE BOILER (5 MIN., ADJ.) AND CONTINUE TO OPERATE. UPON DEACTIVATION OF THE BOILER, THE SUPPLY FAN SHALL CONTINUE TO OPERATE POST-PURGE. AFTER A SET PERIOD OF TIME (5 MIN., ADJ.) THE SUPPLY FAN SHALL DEACTIVATE.

BOILER POINTS LIST										
POINT NAME	HARDWARE POINTS				SOFTWARE POINTS				SHOW ON GRAPHIC	
	AI	AO	DI	DO	AV	BV	LOOP	SCHED	TREND	ALARM
STEAM FLOW	X								X	X
STEAM FLOW TOTALIZER	X									X
GAS FLOW (METER)	X									X
GAS FLOW TOTALIZER (RECORDER)	X									X
STACK TEMPERATURE	X								X	X
BOILER FIRING RATE	X									X
COMBUSTION O2 TRIM	X									X
STEAM HEADER PRESSURE	X								X	X
STEAM FLOW TOTALIZER	X									X
DA TEMPERATURE	X								X	X
DA LEVEL (GALLONS)	X								X	X
SURGE TANK TEMPERATURE	X								X	X
SURGE TANK LEVEL (GALLONS)	X								X	X
FEEDWATER PRESSURE	X								X	X
FEEDWATER FLOW	X								X	X
FEEDWATER TEMPERATURE	X								X	X

REBID SUBMISSION  
FEBRUARY 26, 2024

RECORD REVISIONS	
ARRIS ENGINEERING GROUP, LTD. 667 SOUTH RIVER STREET PLAINS, PENNSYLVANIA	
COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF GENERAL SERVICES HARRISBURG, PENNSYLVANIA	
D.G.S. PROJECT No. C-0304-0015 PHASE 2 ELIZABETHTOWN TRAINING ACADEMY - RENOVATE BOILER PLANT AND DOMESTIC / FIRE PROTECTION PIPING DEPARTMENT OF CORRECTIONS ELIZABETHTOWN, LANCASTER COUNTY, PA	
MECHANICAL SEQUENCE OF OPERATIONS AND FLOW DIAGRAMS	
DRAWN BY MTD DATE FEB 2023 DRAWING No. H-13	

VERIFY SCALE	
BAR IS ONE (1) INCH LONG ON ORIGINAL DRAWING: 0 1 IF BAR IS NOT ONE (1) INCH LONG, ADJUST SCALE ACCORDINGLY	
CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS. VARIANCE FROM CONTRACT DOCUMENTS NOT PERMITTED WITHOUT PROFESSIONAL & BUREAU OF CONSTRUCTION APPROVAL.	