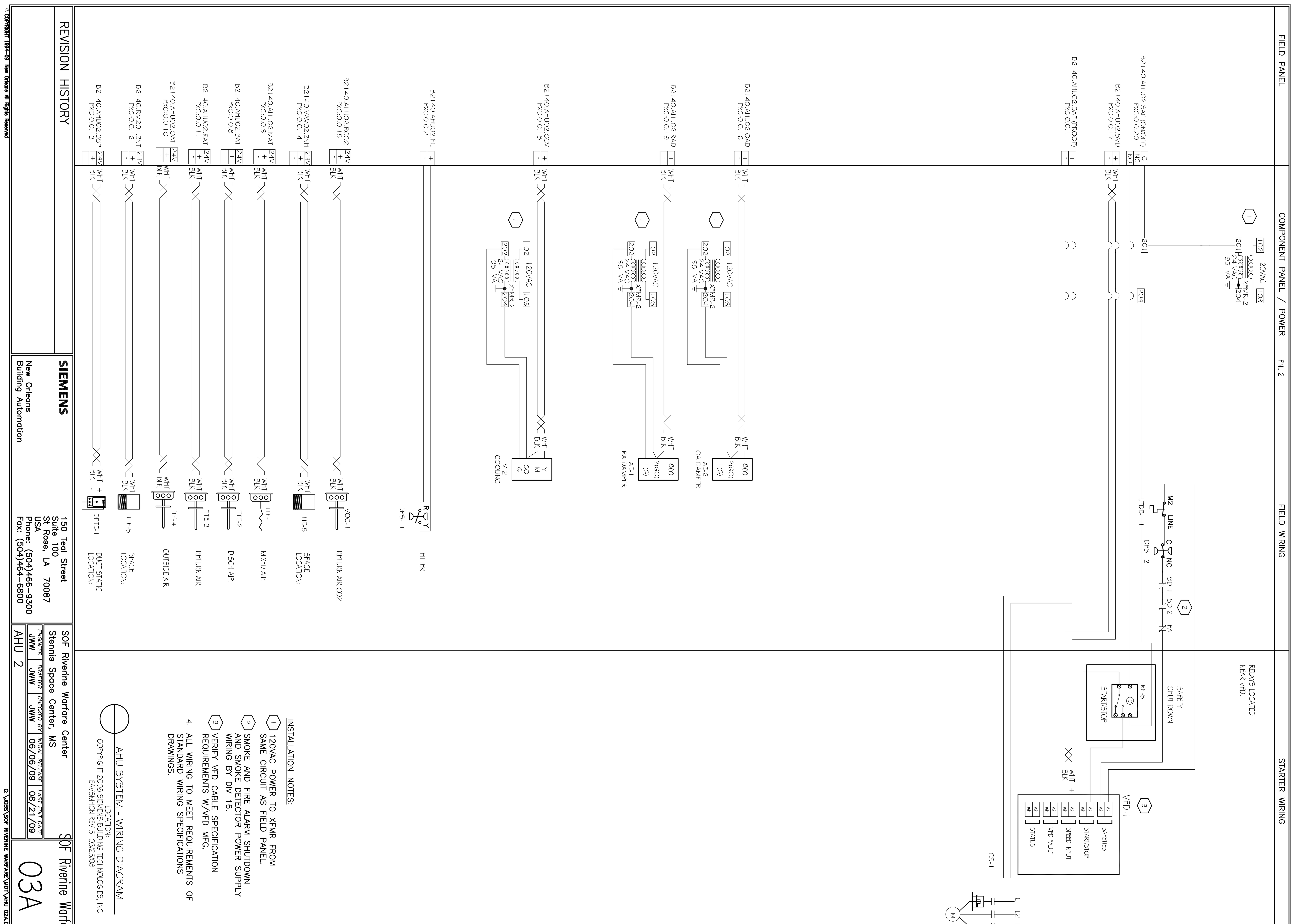

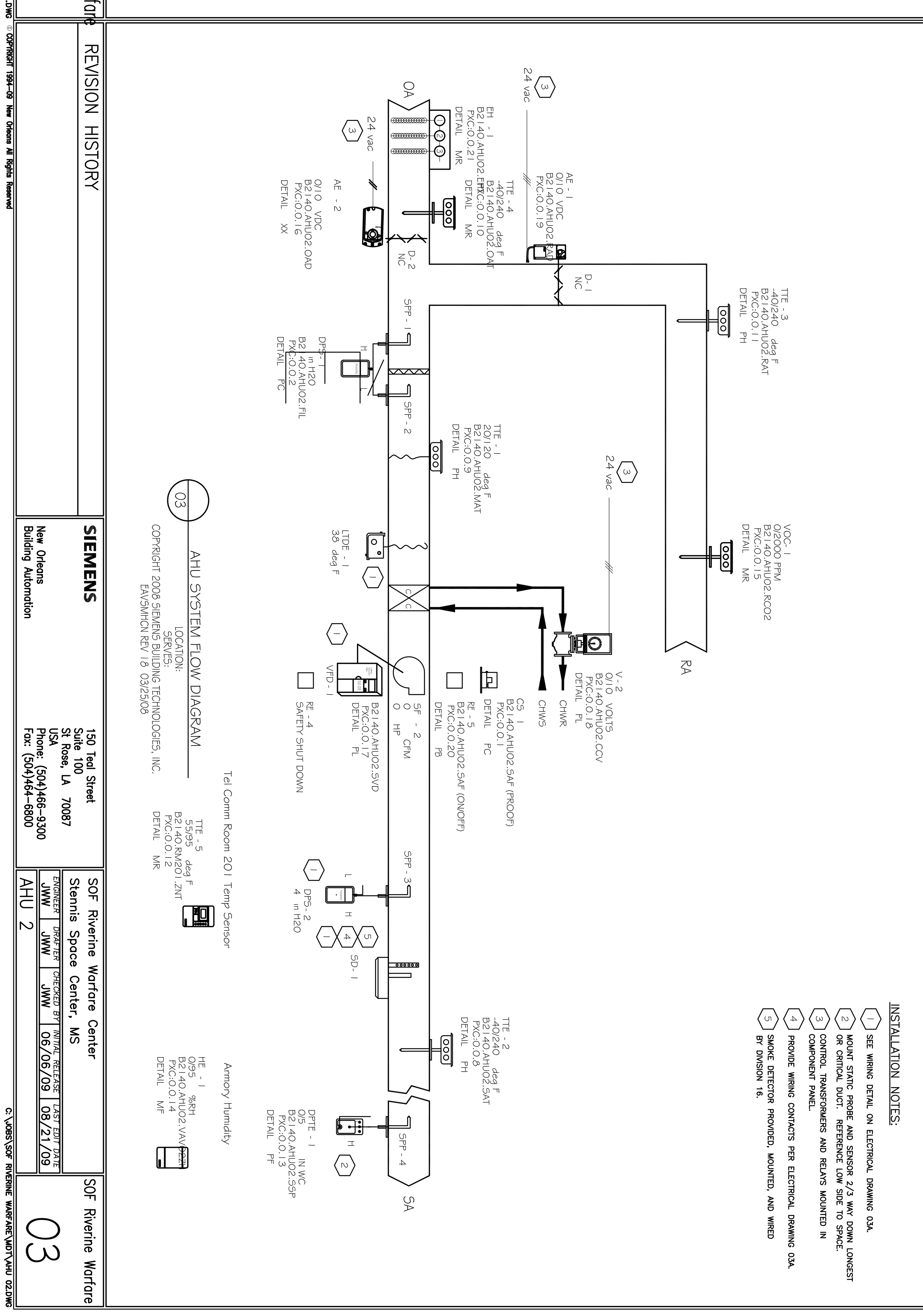

Air Handler 2 Sequence of Operations

The variable volume air handling unit consists of a mixed air section with outdoor air and return air dampers, pre-filter, electric heating coil, chilled water cooling coil, and supply fan with variable frequency drive. The unit is DDC controlled using electric actuation.

The air handling unit is scheduled for automatic operation 24 hours per day.

Occupied
The fan starts or continues to run and the unit is controlled as follows:

When the outside air dry bulb temperature is below the economizer changeover value, the heating coil valve, cooling coil valve and mixed air dampers modulate in sequence without overlap to maintain the supply air temperature set point with a low limit of 48 degrees F (9 degrees C) at the mixed air sensor. The mixing dampers ramp open slowly to minimize overshooting.

The supply air temperature set point is reset by the VAV requiring the most cooling, based upon the following reset schedule:

Maximum Cooling Required	SAT Set Point
100% Cooling	55 Deg F
50% Cooling	58.5 Deg F
0% Cooling	62 Deg F

The humidity level in the Armory will override the above schedule. When the dehumidification control loop requires more cooling than the VAV Zone requiring the most cooling, it will reset the SAT Set Point to back to 55 Deg F to maintain 55% relative humidity in the Armory.

The cooling coil valve modulates to maintain the supply air temperature set point.

The electric heating coil is staged off and on to maintain the mixed air temperature of 45 degrees (adjustable).

The outside air damper and return air damper modulates in sequence to maintain the return CO2 level between 700 and 1000 PPM, with a low limit set point of 48 degrees as sensed by the outside air temperature sensor.

Static Pressure Control
The supply fan variable frequency drive modulates to maintain a constant duct static pressure of 1.5 inches of water as sensed at least two-thirds of the way downstream of the supply fan in the longest or most critical duct. Upon initial startup of the air handling system, the supply fan speed slowly ramps to the desired static pressure set point. Upon shutdown of the air handling system, the supply fan variable frequency drive stops and the speed signal goes to zero speed.

Unoccupied (Normal Off)
The supply fan stops, the cooling coil valve closes and the mixing dampers close to the outdoor air.

Safety
Discharge high static cutout and a smoke detector in the supply air stream de-energize the supply fan upon activation. All dampers and valves position to their normal position after the fan is de-energized.

A low temperature detector in the mixed air plenum de-energizes the supply fan when temperatures below 38 degrees F (3 degrees C) are sensed. The cooling coil valve opens. All dampers position to their normal position after the fan is de-energized.

An HVAC Emergency Shutdown Switch located in the Lobby de-energizes the supply fan when activated, and also generates an alarm to the DDC System. The cooling coil valve closes. All dampers position to their normal position after the fan is de-energized.

A current switch is installed on the load side of the supply fan VFD. The DDC system uses the switch to confirm the fan is in the desired state (i.e. on or off) and generates an alarm if status deviates from DDC start/stop control.

Chilled Water System Sequence of Operations

The chilled water system consists of a packaged air-cooled chiller with primary and back-up chilled water pumps. The system is DDC controlled with electric actuation.

The system operates as follows (All suggested set points and settings are adjustable.):

Pump Alternation
Pumps alternate to equalize runtime. Selection of the lead pump is evaluated on a weekly basis. The pump with the least runtime is the lead pump.

Chiller Control
The chilled water system enable point is controlled either manually by the operator or by a program function (i.e., Time-Of-Day). If the chilled water system enable point is on and there is a call for cooling (indicated by one or more selected cooling coil valves being open more than 35%) and the outside air temperature is above 55 degrees F (13 degrees C) the chiller and lead pump are started.

After flow is proven, the chiller operates under its operating and safety controls.

The chilled water system continues to operate until either the chilled water system enable point is off or cooling is no longer required (indicated by all AHUs being off or all cooling coil valves being closed for a 30 minute time interval). When the chilled water system shuts down, the chiller and pump go through a chiller stop sequence.

The chiller stop sequence first stops the chiller. After time delay, the chilled water pumps are stopped.

The DDC system uses current switches to confirm the pumps are in the desired state (i.e. on or off) and generates an alarm if status deviates from DDC start/stop control. If the lead pump goes into alarm, the second pump starts.

The DDC system monitors the chiller alarm point. Upon receipt of a chiller alarm the chiller and pump go through a chiller stop sequence.

The operating status of the chiller is determined by monitoring the start/stop point, chiller alarm point and the chilled water supply temperature.

Chilled Water Flow Control
The chilled water pump variable speed drive is modulated to maintain the differential pressure set point as sensed by the differential pressure transmitter located across AHU 2 cooling coil valve.

The chilled water bypass valve modulates to maintain minimum flow for the chiller, as sensed by flow meter 1.

Freeze Protection
If the outside air temperature falls below 38 degrees F, both chilled water pumps shall energize and run at 50% speed. The chiller will remain off, and AHU chilled water valves shall open 100% to the cooling coils.

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SYM	DESCRIPTION	DATE	APPR
	RECORD DRAWING	06/10/2010	DWS
1	AS-BUILT	06/10/2010	DWS

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SEPT 4, 2009

SEAL

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SOF RIVERINE AND COMBATANT CRAFT OPERATIONS FACILITY - PRE-FINAL

ENLARGED PLANS AND DETAILS

CODE ID. NO. N4412 SIZE D
SCALE: AS SHOWN
MAXIMO NO. #####
STA. PROJ. NO. P-210
WORK ORDER NO. 510247
CONSTR. CONTR. NO. N62467-05-D-0096
NAVFAC DRAWING NO. 15026739
SHEET 92 OF 132
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