

INPUT/OUTPUT SUMMARY FOR AIR HANDLING UNITS AH-01 & AH-02

SYSTEM, APPARATUS, OR AREA POINT DESCRIPTION	INPUTS										OUTPUTS					SYSTEM FEATURES						GENERAL	SUPPLEMENTARY NOTES										
	ANALOG					BINARY	DIGITAL		ANALOG			ALARMS			PROGRAMS																		
	MEASURED		CALCULATED				OFF-ON	OFF-AUTO-ON	OFF-HI-LO	OPEN-CLOSE	MULTI-STAGE	DAMPER POSITION	VALVE POSITION	SET POINT ADJUSTMENT	VALVE POSITION	SCR CONTROL	HI ANALOG	LOW ANALOG	HI BINARY	LOW BINARY	PROOF			TIME SCHEDULING	DEMAND LIMITING	DUTY CYCLE	START/STOP OPTION	ENTHALPY OPTION	SMOKE CNT	TREND	ALARM INSTRUCT	MAINT WK ORD	COLOR GRAPHIC
OUTSIDE TEMPERATURE	●																															EACH AH-1 & 2	
OUTSIDE RELATIVE HUMIDITY (H)		●																													EACH AH-1 & 2		
PREHEAT COIL, HC-07																																	
PREHEAT COIL, HC-08																																	
AIR FILTER, AF-01 (TYP 2)																															2 SENSORS		
AIR FILTER, AF-02 (TYP 2)																															2 SENSORS		
MIXING AIR DAMPER 01																																	
MIXING AIR DAMPER 02																																	
MIXING AIR DAMPER 03																																	
MIXING AIR DAMPER 04																																	
COOLING COIL, CC-01																																	
COOLING COIL, CC-02																																	
COOLING COIL, CC-03																																	
COOLING COIL, CC-04																																	
SUPPLY FAN, SF-01																																STATUS WITH CURRENT SWITCH	
SUPPLY FAN, SF-02																																STATUS WITH CURRENT SWITCH	
SUPPLY FAN, SF-03																																STATUS WITH CURRENT SWITCH	
SUPPLY FAN, SF-04																																STATUS WITH CURRENT SWITCH	
SUPPLY AIR TEMP																																	
SUPPLY AIR RELATIVE HUMIDITY																																	
ROOM TEMPERATURE (TYPICAL 6 ZONES)																																	
SPACE AVERAGE RELATIVE HUMIDITY (LVEA)																																	EACH AH-1 & 2
ZONE DUCT HEATERS (TYPICAL 5 ZONES), LVEA																																	FOR LVEA
ZONE DUCT HEATERS, MECH ROOM																																	FOR MECHANICAL ROOM
SMOKE DETECTOR (SD-01)																																	EACH AH-1 & 2
MIXING AIR TEMP																																	
AIR COMPRESSORS (TYP 2)																																	
ROOM PRESSURE (LVEA)																																	2 RECD. -SEE PLANS FOR LOCATION
AIR FLOW DIAGRAM																																	LOCATED IN THE SUPPLY AIR PLENUM
HEPA FILTER																																	
RETURN & OUTSIDE AIR DAMPERS (TYP 5)																																	
FLOOR PLANS																																	

NOTES:

- FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES SEE SHEETS LA-H-001 AND LA-H-002.
- SMOKE DETECTORS SHALL BE HARD WIRED TO THE SUPPLY FANS SF-01 & SF-02 MOTOR STARTER TO STOP FANS WHEN SMOKE IS DETECTED IN THE RETURN AIR STREAM. ALSO SMOKE DETECTORS WILL BE SOFTWARE CONNECTED TO DDC CONTROL PANEL AND THE FACILITY CONTROL ROOM.
- CONTROL SYSTEM SHALL BE STAND ALONE TYPE AND CONNECTED TO THE MAIN CONTROL AND MONITORING SYSTEM AT THE FACILITY CONTROL ROOM IN THE CORNER STATION BUILDING.
- LVEA ROOM SHALL BE PROVIDED WITH MULTIPLE TEMPERATURE SENSORS TO CONTROL THE RESPECTIVE DUCT HEATER. SYSTEM MAY AVERAGE THE READING OF THE ROOM TEMPERATURE SENSORS OR SELECT ANY SENSOR TO CONTROL THE DUCT HEATER. SEE FLOOR PLANS FOR LOCATION AND NUMBER OF SENSORS FOR EACH ZONE.

SEQUENCE OF OPERATION:

- CHILLED WATER PLANT:
 - UPON A SIGNAL FROM THE CENTRAL CONTROL SYSTEM THE PACKAGED CONTROLS PROVIDED WITH THE WATER CHILLER WILL PERFORM THE FOLLOWING:
 - THE LEAD CHILLED WATER PUMPS (WP-01 & WP-02) WILL START TO ESTABLISH STEADY WATER FLOW THROUGH THE SYSTEM.
 - UPON PROOF OF ESTABLISHED WATER FLOW THE LEAD CHILLERS (CH-01 & CH-02) WILL START TO MAINTAIN THE LEAVING CHILLED WATER TEMPERATURE SETPOINT (42°F).
 - THE PACKAGED DDC CONTROLS ON THE WATER CHILLERS WILL CYCLE THE REFRIGERATION COMPRESSORS IN SEQUENCE TO MATCH THE SYSTEM THERMAL LOAD.
 - WHEN THE THERMAL LOAD DROPS BELOW THE MINIMUM OPERATING CAPACITY OF THE WATER CHILLER, THE PACKAGED CONTROL WILL ACTIVATE THE HOT GAS BYPASS CYCLE.
 - PACKAGED CONTROLS WILL RUN SELF DIAGNOSTICS TEST BEFORE STARTING THE REFRIGERATION COMPRESSORS TO PROVE THAT ALL OPERATING CONDITIONS ARE WITHIN THE NORMAL LIMITS.
 - PACKAGED CONTROLS WILL CONTINUOUSLY MONITOR THE CHILLER OPERATION AND REPORT ANY OPERATIONAL OR SAFETY ALARMS TO THE OPERATOR CONSOLE IN THE FACILITY CONTROL ROOM. PACKAGED CONTROLS WILL AUTOMATICALLY STOP THE MALFUNCTIONING WATER CHILLER AND START THE STANDBY CHILLER (CH-03).
 - CENTRAL CONTROL SYSTEM WILL ALTERNATE THE LEAD AND STANDBY WATER CHILLERS TO MAINTAIN EQUAL OPERATING PERIODS ON ALL WATER CHILLERS.
- AIR HANDLING SYSTEM OF LVEA (AH-01 & AH-02):
 - UPON A SIGNAL FROM THE CENTRAL CONTROL SYSTEM THE SUPPLY AIR FANS (SF-01, SF-02, SF-03, SF-04) WILL START TO ESTABLISH A STEADY AIR FLOW THROUGH THE SYSTEM. THE DDC CONTROLS WILL PERFORM THE FOLLOWING:
 - MODULATE THE CONTROLLABLE PITCH VANES ON THE SUPPLY AIR FANS TO MAINTAIN CONSTANT AIR VOLUME FLOW RATE REGARDLESS OF THE SYSTEM STATIC PRESSURE.
 - THE TEMPERATURE SENSORS DOWNSTREAM OF OUTSIDE AIR PREHEAT COILS SHALL BE USED TO CONTROL THE CAPACITY OF THE DUCT ELECTRIC HEATERS (HC-07 & HC-08) TO MAINTAIN THE OUTSIDE AIR TEMPERATURE AT 50°F.
 - THE TEMPERATURE SENSORS DOWNSTREAM OF THE COOLING COILS (CC-01, CC-02, CC-03, & CC-04) SHALL BE USED TO MODULATE THE 3-WAY CONTROL VALVE ON THE CHILLED WATER LOOP TO MAINTAIN THE LEAVING AIR TEMPERATURE AT THE SETPOINT (50°F).
 - THE DDC CONTROLS SHALL COMPARE THE SPACE ROOM TEMPERATURES AND MODULATE THE FACE AND BYPASS DAMPERS TO SATISFY THE MOST DEMANDING ZONE.
 - THE ROOM TEMPERATURE SENSORS OF LVEA ZONES (TOTAL FIVE) SHALL BE USED TO MODULATE THE SCR CONTROLS ON THE RESPECTIVE ELECTRIC DUCT HEATERS TO MAINTAIN THE ROOM TEMPERATURE SETPOINT (72°F).
 - THE ROOM TEMPERATURE SENSOR FOR THE MECHANICAL ROOM SHALL BE USED TO MODULATE ITS RESPECTIVE DUCT HEATER TO MAINTAIN THE ROOM TEMPERATURE BETWEEN 80 TO 65°F.
 - WHEN THE ROOM TEMPERATURE RISES 5°F ABOVE THE SETPOINT, THE CONTROL SYSTEM SHALL REPORT AN ALARM SIGNAL TO THE FACILITY CONTROL ROOM.
 - THE RELATIVE HUMIDITY SENSOR LOCATED IN THE LVEA ROOM SHALL BE USED TO MONITOR THE SPACE RELATIVE HUMIDITY.
- AIR HANDLING SYSTEM OF OSB(AH-03):
 - UPON A SIGNAL FROM THE CENTRAL CONTROL SYSTEM THE SUPPLY AIR FANS (SF-05 & SF-06) SHALL START TO ESTABLISH A STEADY AIR FLOW THROUGH THE SYSTEM. THE DDC CONTROLS WILL PERFORM THE FOLLOWING:
 - MODULATE THE CONTROLLABLE PITCH VANES ON THE SUPPLY AIR FANS TO MAINTAIN CONSTANT AIR VOLUME FLOW RATE REGARDLESS OF THE SYSTEM STATIC PRESSURE.
 - THE TEMPERATURE SENSORS DOWNSTREAM OF OUTSIDE AIR PREHEAT COILS WILL BE USED TO CONTROL THE CAPACITY OF THE DUCT ELECTRIC HEATERS TO MAINTAIN THE OUTSIDE AIR TEMPERATURE AT 50°F.
 - THE TEMPERATURE SENSORS DOWNSTREAM OF THE COOLING COILS (CC-05 & CC-06) WILL BE USED TO MODULATE THE 3-WAY CONTROL VALVE ON THE CHILLED WATER LOOP TO MAINTAIN THE LEAVING AIR TEMPERATURE AT THE SETPOINT (50°F).
 - THE TEMPERATURE SENSORS DOWNSTREAM OF THE HEATING COILS (HC-09 & HC-10) WILL BE USED TO SEQUENCE THE CAPACITY CONTROL STAGES OF THE ELECTRIC HEATERS TO MAINTAIN THE LEAVING AIR TEMPERATURE AT THE SETPOINT.

THE LEAVING WARM AIR TEMPERATURE SET POINT WILL BE PROPORTIONAL TO THE OUTSIDE TEMPERATURE AS FOLLOWS:

OUTSIDE TEMPERATURE	WARM AIR TEMPERATURE SETPOINT
0 TO 20	80
21 TO 30	85
31 TO 40	80
41 TO 50	75
51 TO 60	70
ABOVE 60	RECIRCULATED

INPUT/OUTPUT SUMMARY FOR WATER CHILLERS CH-01, CH-02, & CH-03

SYSTEM, APPARATUS, OR AREA POINT DESCRIPTION	INPUTS										OUTPUTS					SYSTEM FEATURES						GENERAL	SUPPLEMENTARY NOTES										
	ANALOG					BINARY	DIGITAL		ANALOG			ALARMS			PROGRAMS																		
	MEASURED		CALCULATED				OFF-ON	OFF-AUTO-ON	OFF-HI-LO	OPEN-CLOSE	MULTI-STAGE	DAMPER POSITION	VALVE POSITION	SET POINT ADJUSTMENT	VALVE POSITION	SCR CONTROL	HI ANALOG	LOW ANALOG	HI BINARY	LOW BINARY	PROOF			TIME SCHEDULING	DEMAND LIMITING	DUTY CYCLE	START/STOP OPTION	ENTHALPY OPTION	SMOKE CNT	TREND	ALARM INSTRUCT	MAINT WK ORD	COLOR GRAPHIC
WATER CHILLER, CH-01																																	
WATER CHILLER, CH-02																																	
WATER CHILLER, CH-03																																	
CHILLED WATER PUMP, WP-01																																	
CHILLED WATER PUMP, WP-02																																	
CHILLED WATER PUMP, WP-03																																	
CHILLED WATER RETURN TEMP																																	
CHILLED WATER SUPPLY TEMP																																	
CHILLED WATER FLOW DIAGRAM																																	
FLOOR PLANS																																	
CHILLED WATER BOOSTER PUMP																																	PUMP BY VE CONTRACTOR

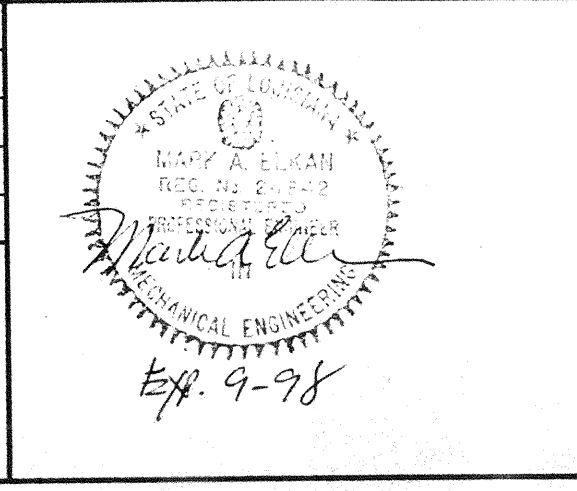
FLOOR PLAN GRAPHICS WILL SHOW ALL EQUIPMENT LOCATION, CONTROL PANELS AND CONTROL COMPONENTS SUCH AS DAMPER, VALVES, TEMPERATURE SENSOR, PRESSURE SENSORS, ... ETC.

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LASER INTERFEROMETER
 GRAVITATIONAL-WAVE OBSERVATORY
 SITE NO. 2 - LIVINGSTON, LOUISIANA

TITLE	HVAC CORNER STATION SEQUENCES OF OPERATION & I/O SUMMARY SHEET 1
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PROJECT NUMBER	8094
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