

BASIC PLUMBING PIPING

SYMBOL	DESCRIPTION	ABBREVIATION	SYMBOL	DESCRIPTION	ABBREVIATION
	STORM DRAIN	SD		2-WAY MOTORIZED VALVE	2WMV
	SANITARY SEWER	SS		3-WAY MOTORIZED VALVE	3WMV
	VENT	V		3-WAY VALVE	3WV
	COMBINATION WASTE AND VENT	CWV		ANGLE VALVE	AV
	GREASE WASTE	GW		BALL VALVE	BV
	ACID DRAIN	AD		BUTTERFLY VALVE	BFV
	ACID VENT	AV		CHECK VALVE	CV
	DRAIN	D		CIRCUIT SETTER	CS
	VENTS FOR TANKS OR EQUIPMENT	EV		FIXED FLOW ORIFICE	FFO
	COLD WATER	CW		GAS COCK	GC
	HOT WATER	HW		GATE VALVE	GV
	HOT WATER RETURN	HWR		GLOBE VALVE	GBV
	DOMESTIC HOT WATER SUPPLY (140° F)			NEEDLE VALVE	NV
	(180° F) SANITIZING HOT WATER	180° S		PLUG VALVE	PV
	(180° F) SANITIZING HOT WATER RETURN	180° R		PRESSURE REDUCING VALVE	PRV
	CHILLED DRINKING WATER SUPPLY	DWS		SOLENOID VALVE	SD
	DISTILLED WATER	DWR		SWING CHECK VALVE	SCV
	CHILLED DRINKING WATER RETURN	DI		UNION	UN
	SUMP PUMP DISCHARGE	SPD		FLOW - IN DIRECTION OF ARROW	
	PITCH DOWN IN DIRECTION OF ARROW			CONCENTRIC REDUCER	
	ROOF DRAIN	RD		90° ELBOW	
	AUXILIARY ROOF DRAIN	ARD		45° ELBOW	
	BACKFLOW PREVENTOR	BFP		BRANCH CONNECTION OUT OF SIDE	
	PIPE ANCHOR	AN		BRANCH CONNECTION OUT OF TWO SIDES	
	PIPE GUIDE	GJ		RISER DOWN (ELBOW)	
	EXPANSION JOINT	EJ		RISER UP (ELBOW)	
	FLEXIBLE CONNECTOR (FLEX. CONN.)	FC		RISER UP (ELBOW)	
	STRAINER-WYE TYPE	STR		BRANCH CONNECTION OUT OF TOP	
	STRAINER-VERTICAL BASKET TYPE	STR		BRANCH CONNECTION OUT OF BOTTOM	
	WATER HAMMER ARRESTOR	WHA		BRANCH CONNECTION OUT OF TOP TO 90° ELBOW	
	PRESSURE GAUGE WITH GAUGE COCK	PG		BRANCH CONNECTION OUT OF BOTTOM TO 90° ELBOW	
	THERMOMETER (STRAIGHT SCALE)	TH		RISER DOWN TO 90° ELBOW	
	AUTOMATIC AIR VENT	AAV		CAP ON END OF PIPE	
	AIR CHAMBER	ACH		PLUMBING RISER NUMBER	
	HOSE BIB	HB			
	VALVE IN CAST IRON BOX	VB			
	VACUUM BREAKER (ELEVATION)	VB			
	TRAP, STEAM OR MOISTURE	T			
	SIGHT GLASS	SG			
	TEST PLUG	TP			

ABBREVIATIONS

DESCRIPTION	ABBREVIATION	DESCRIPTION	ABBREVIATION	DESCRIPTION	ABBREVIATION
ABOVE FINISH FLOOR	AFF	EXHAUST	EXH	MOUNTED	MTD
AIR FILTER	AF	EXHAUST FAN	EF	OPOSED BLADE DAMPER	OBD
AIR COMPRESSOR	AC	FEET PER MINUTE	FPM	OUTSIDE AIR	OSA
AIR COOLED CONDENSER	ACC	FLOOR CLEANOUT	FCO	PACKAGE TERMINAL AIR CONDITIONER	PTAC
AIR HANDLING UNIT	AHU	FLOOR DRAIN	FD	PLUMBING	PLBG
AMBIENT	AMB	FAN	F	POUNDS PER SQUARE INCH	PSI
AREA DRAIN	AD	FAN COIL UNIT	FCU	PLUMBING FIXTURE	P
AUTOMATIC DAMPER	ADPR	FAN	FT	POWER ROOF VENTILATION	PRV
AUXILIARY ROOF DRAIN	ARD	FIRE DAMPER	F.DPR	PRESSURE DROP	PD
BACK DRAFT DAMPER	BD	FIRE/SMOKE DAMPER (COMBINATION)	FS.DPR	REGISTER	REG
BOILER	B	FLEXIBLE CONNECTION	FLEX CONN	RELATIVE HUMIDITY	RH
BOILER FEED UNIT	BFU	FLOOR	FLR	RETURN AIR	RA
BRITISH THERMAL UNITS	BTU	FLY FAN	FF	RETURN AIR GRILLE	RAG
CAPACITY	GC	FREEZE PROOF WALL HYDRANT	FPWH	REVOLUTIONS PER MINUTE	RPM
CATCH BASIN	CB	FREEZE PROOF BOX HYDRANT	FPBH	ROOM AIR CONDITIONING UNIT	RAC
CAST IRON	CI	FORWARD CURVE	FC	ROOF DRAIN	RD
CEILING DIFFUSER	CD	FURNACE	FU	SATURATED CONDENSING TEMPERATURE	SCT
CHILLER	CH	GALLON	GAL	SATURATED SUCTION TEMPERATURE	SST
CIRCULATING PUMP	CP	GALLONS PER HOUR	GPH	SMOKE DAMPER	S.DPR
CLEAN OUT	CO	GALLONS PER MINUTE	GPM	SPLITTER DAMPER	SD
CLEAN OUT TO GRADE	COTG	GRAVITY ROOF VENTILATOR	GRV	STAINLESS STEEL	SS
CONVERTOR	C	GREASE TRAP	GT	STATIC PRESSURE	SP
CONDENSING UNIT	CU	HEAT RECLAIM WATER HEATER	HRWH	STEAM	STM
CONNECT	CONN	HEATING COIL	HC	SUPPLY AIR	SA
COOLING COIL	CC	HEATING AND VENTILATING UNIT	HV	SUPPLY FAN	SF
COOLING TOWER	CT	HEATING, VENTILATING & COOLING	HVAC	TEMPERATURE	TEMP
CARBON DIOXIDE	CO ₂	HORSE POWER	HP	THERMOSTAT	TSTAT
CUBIC FEET PER MINUTE	CFM	HOT WATER GENERATOR	HWG	THOUSAND BTU/PER HOUR	MBH
COMB. FIRE, SMOKE DAMPER	FSDPR	HOT WATER STORAGE TANK	HWT	THREE WAY MODULATING VALVE	TWMV
CONDENSATE RETURN	CR	HOSE BIB	HB	TOTAL STATIC PRESSURE	TSP
DAMPER	DPR	HOSE STATION	HS	TOTAL DYNAMIC HEAD	TDH
DESICCANT DEHUMIDIFIER	DD	HUMIDIFIER	H	UNIT COOLER	UC
DETAIL	DTL	INTAKE VENTILATOR	IV	UNIT HEATER	UH
DOOR GRILLE	DG	INVERT	INV	UNIT VENTILATOR	UV
DOWN SPOUT	DS	KILOWATTS	KW	URINAL	UR
DRY BULB	DB	LEAVING AIR TEMPERATURE	LAT	VENT THROUGH ROOF	VTR
DRINKING FOUNTAIN	DF	LEAVING DRY BULB	LDB	WATER HEATER	WH
DUCT HEATING COIL	DHC	LEAVING WATER TEMPERATURE	LWT	WALL CLEANOUT	WCO
EFFICIENT	EFF	LEAVING WET BULB	LWB	WATER CLOSET	WC
ELECTRIC HEATING COIL	EHC	LAVATORY	LAV	WATER PRESSURE DROP	WPD
ELECTRIC WATER HEATER	EWH	LINEAR DIFFUSER	LD	WATER TEMPERATURE DIFFERENCE	WTD
ENERGY EFFICIENCY RATIO	EER	MANHOLE	MH	WATER TEMPERING VALVE	WTV
ENTERING AIR TEMPERATURE	EAT	MAKE-UP AIR UNIT	MAU	WET BULB	WB
ENTERING DRY BULB	EDB	MANUAL DAMPER	MD		
ENTERING WATER TEMPERATURE	EWT	MAXIMUM	MAX		
ENTERING WET BULB	EWB	MINIMUM	MIN		
EXTERNAL STATIC PRESSURE	ESP	MOTOR OPERATED DAMPER	MOD		

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CAMBRIDGE SEVEN ASSOCIATES
INTERIOR DESIGNER: POLK STANLEY ROWLAND CURZON PORTER ARCHITECTS
GENERAL CONTRACTOR: CDI CONTRACTORS, INC.

NOTES:

HVAC PIPING

SYMBOL	DESCRIPTION	ABBREVIATION
	GAS - LOW PRESSURE	G
	GAS - MEDIUM PRESSURE	MPG
	GAS - HIGH PRESSURE	HPG
	GAS - LIQUIFIED PETROLEUM	LPG
	COMPRESSED AIR	A
	VACUUM	V
	OXYGEN	O
	HOT WATER SUPPLY, HEATING	HS
	HOT WATER RETURN, HEATING	HR
	CHILLED WATER SUPPLY	CHS
	CHILLED WATER RETURN	CHR
	HOT-CHILLED SUPPLY	HCS
	HOT CHILLED RETURN	HCR
	CONDENSER WATER SUPPLY	CWS
	CONDENSER WATER RETURN	CWR
	STEAM (NO. INDICATES PRESSURE)	S 100
	CONDENSATE RETURN (NO. INDICATES PRESSURE OF SUPPLY)	C 100
	CONDENSATE PUMP DISCHARGE	CPD
	BOILER FEED WATER	BFW
	BLOW DOWN	BD
	FUEL OIL SUPPLY	FOS
	FUEL OIL RETURN	FOR
	HEAT TRANSFER SUPPLY	HTS
	HEAT TRANSFER RETURN	HTR
	REFRIGERANT DISCHARGE	RD
	REFRIGERANT SUCTION	RS
	REFRIGERANT LIQUID	RL

HVAC DUCTWORK

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	SUPPLY UP		FIRE OR SMOKE DAMPER
	RETURN UP		SPLITTER DAMPER AT BRANCH OFF
	SUPPLY DOWN		SPLITTER DAMPER AT TEE
	RETURN DOWN		BULL HEAD TEE W/ TURNING VANES & DAMPERS
	ROUND UP		TAKE OFF W/ EXTRACTOR & MANUAL DAMPER
	ROUND DOWN		RECTANGULAR TRANSITION
	ROUND DUCT BREAK		90° BEND, ROUND DUCT
	RECTANGULAR DUCT BREAK		45° BEND, ROUND DUCT
	DOOR GRILLE		45° RECTANGULAR DUCT
	OPPOSED BLADE DAMPER		90° ELBOW W/ TURNING VANE
	PARALLEL BLADE DAMPER		SUPPLY AIR DEVICE
	MANUAL DAMPER		RETURN OR EXHAUST AIR DEVICE
	FLEXIBLE CONNECTION		
	LINED DUCT		

HVAC CONTROLS

SYMBOL	DESCRIPTION	ABBREVIATION
	THERMOSTAT	---
	HUMIDISTAT	---
	CARBON DIOXIDE SENSOR	---

SYMBOL	DESCRIPTION	ABBREVIATION
	CONNECT TO EXISTING AT THIS POINT	---
	KEYED NOTE	---
	REVISION/ADDENDUM CALL-OUT	---
	DIFFUSER CALL-OUT (SEE SCHEDULE SHEET)	---
	DIFFUSER CALL-OUT (SEE SCHEDULE SHEET)	---
	VAV CALL-OUT (SEE SCHEDULE SHEET)	---
	FIRE DAMPER CALL-OUT	F.DPR
	SMOKE DAMPER CALL-OUT	S.DPR
	COMBINATION FIRE/SMOKE DAMPER CALL-OUT	FS.DPR

NOTE: ALL SYMBOLS MAY NOT BE USED.



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2	06/19/08	ASI #16

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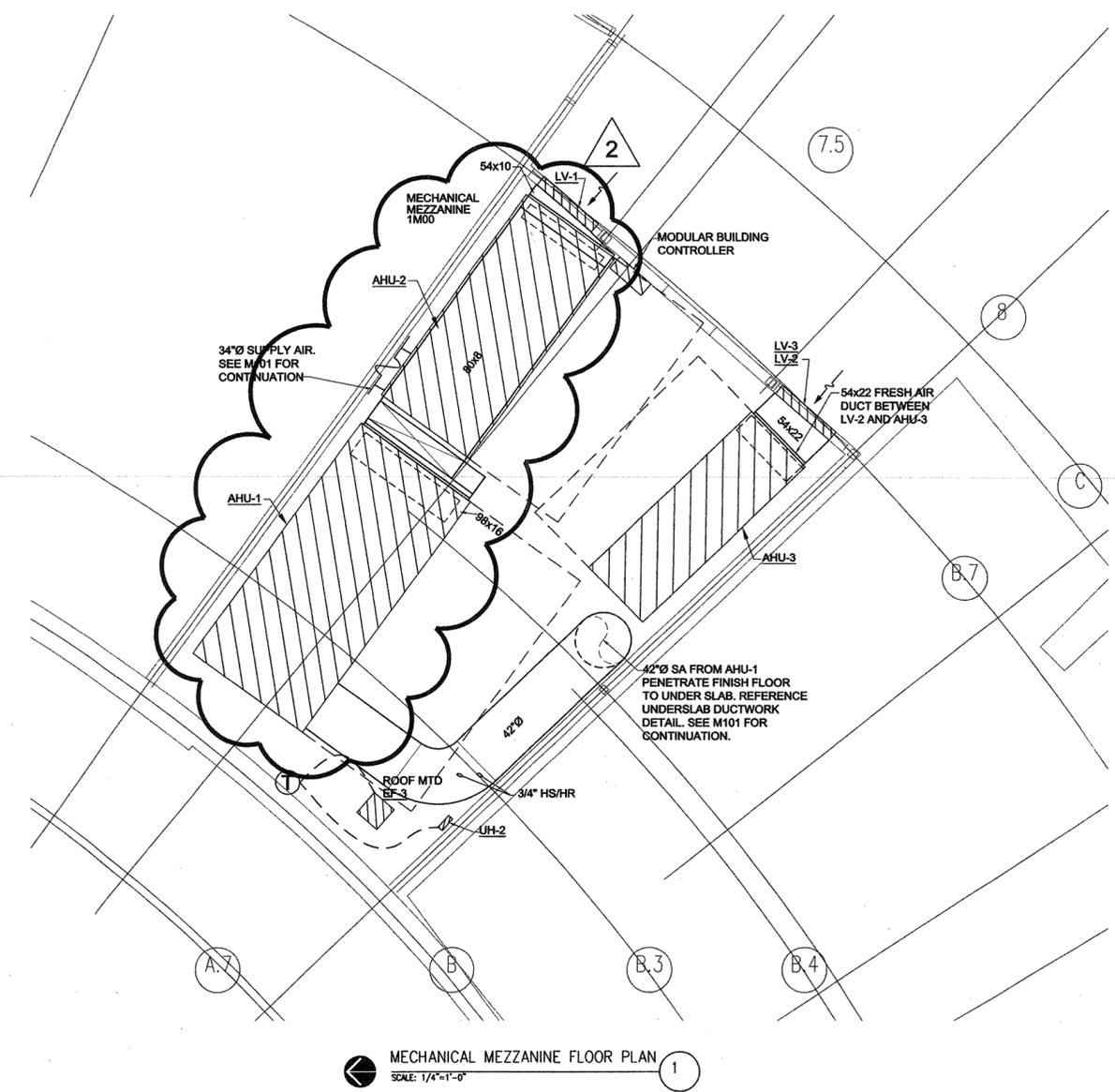
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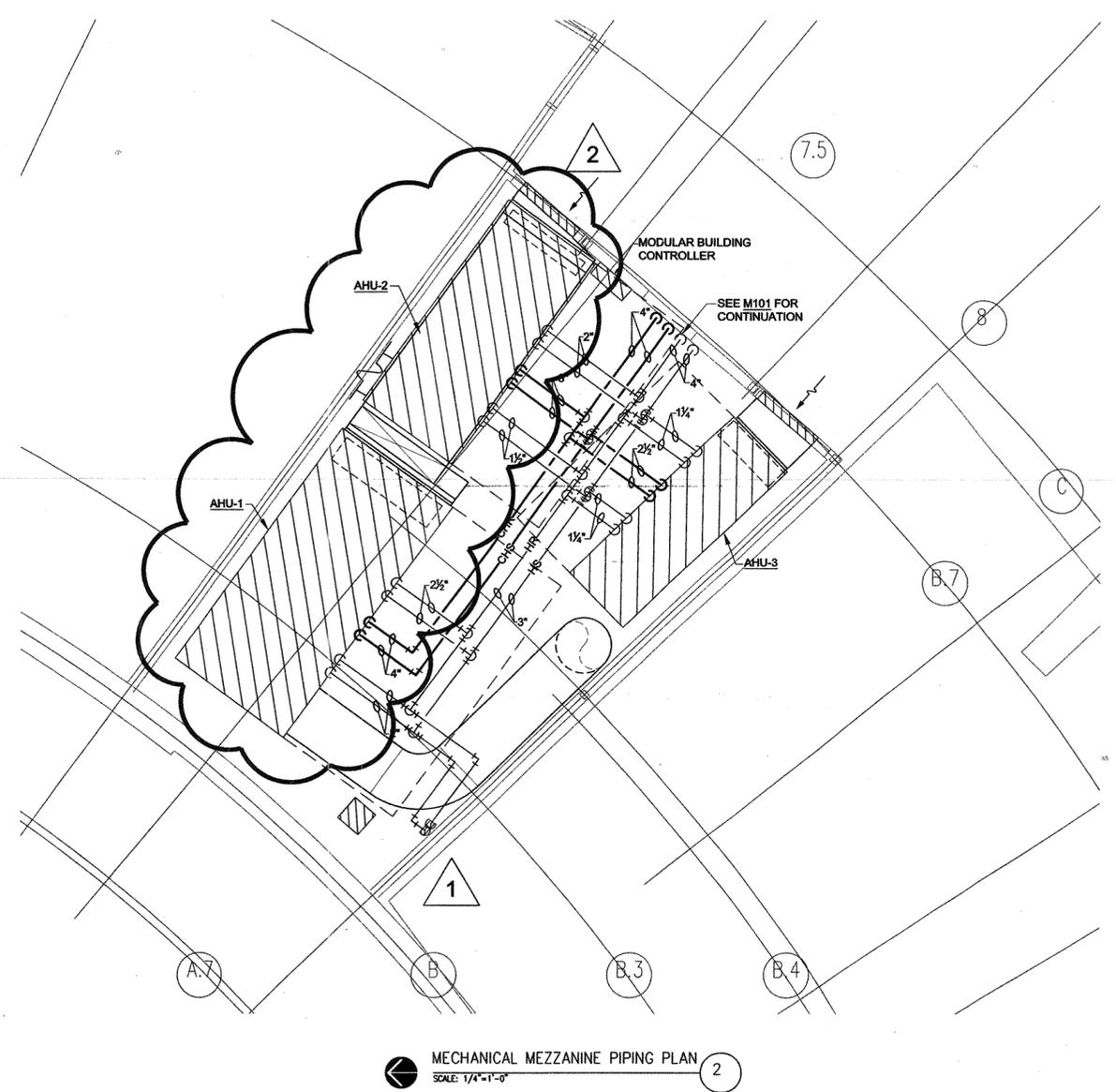
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CONTENTS:

MECHANICAL MEZZAI
FLOOR PLAN
SHEET NUMBER:

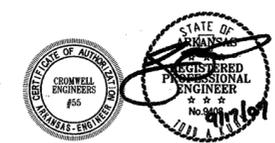
M101a



MECHANICAL MEZZANINE FLOOR PLAN
SCALE: 1/4"=1'-0" 1



MECHANICAL MEZZANINE PIPING PLAN
SCALE: 1/4"=1'-0" 2



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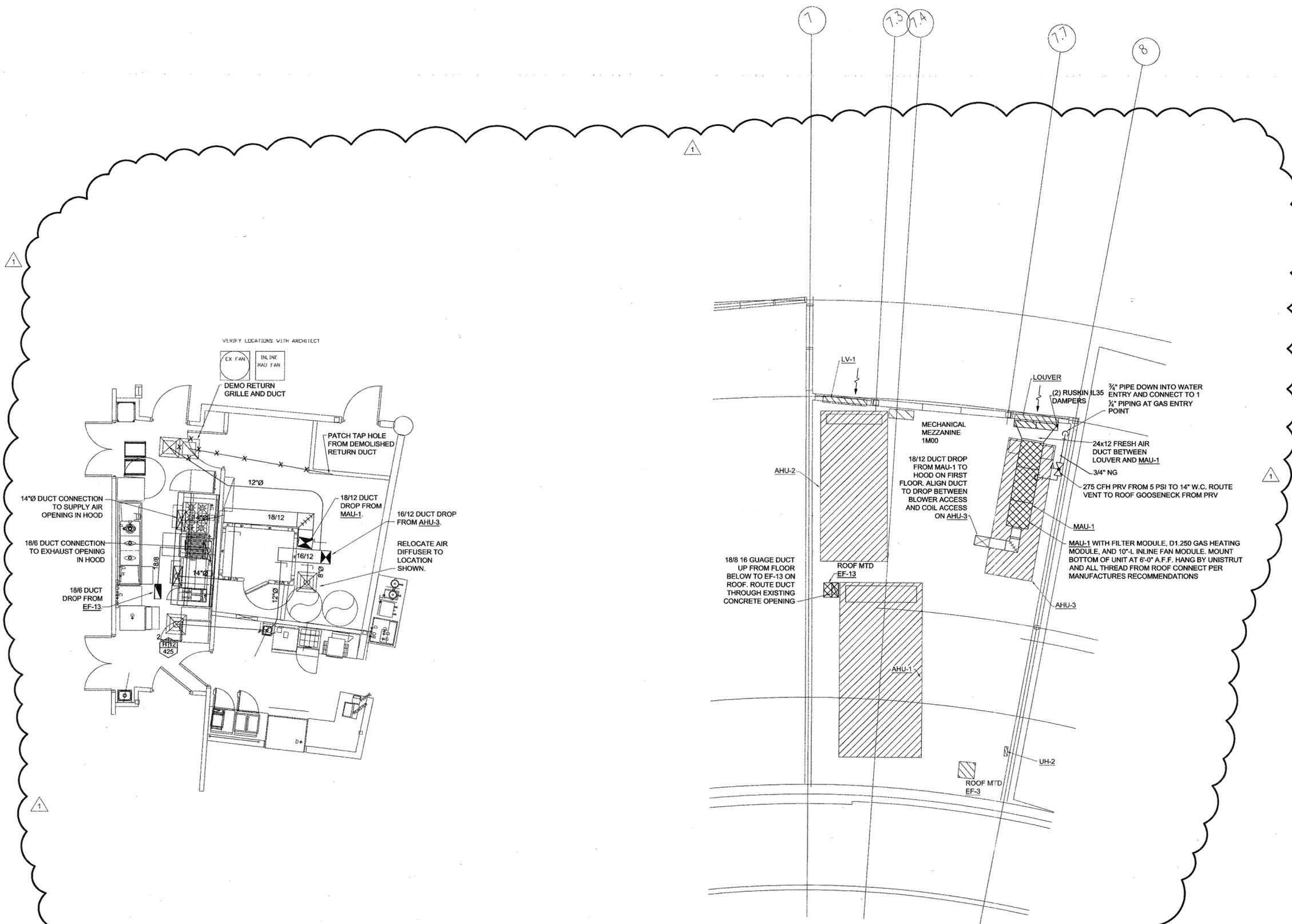
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ENLARGED PLAN

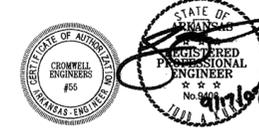
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M101K



ENLARGED KITCHEN EQUIPMENT HVAC FIRST FLOOR PLAN
SCALE: 1/4"=1'-0"

ENLARGED KITCHEN EQUIPMENT HVAC MEZZANINE FLOOR PLAN
SCALE: 1/4"=1'-0"



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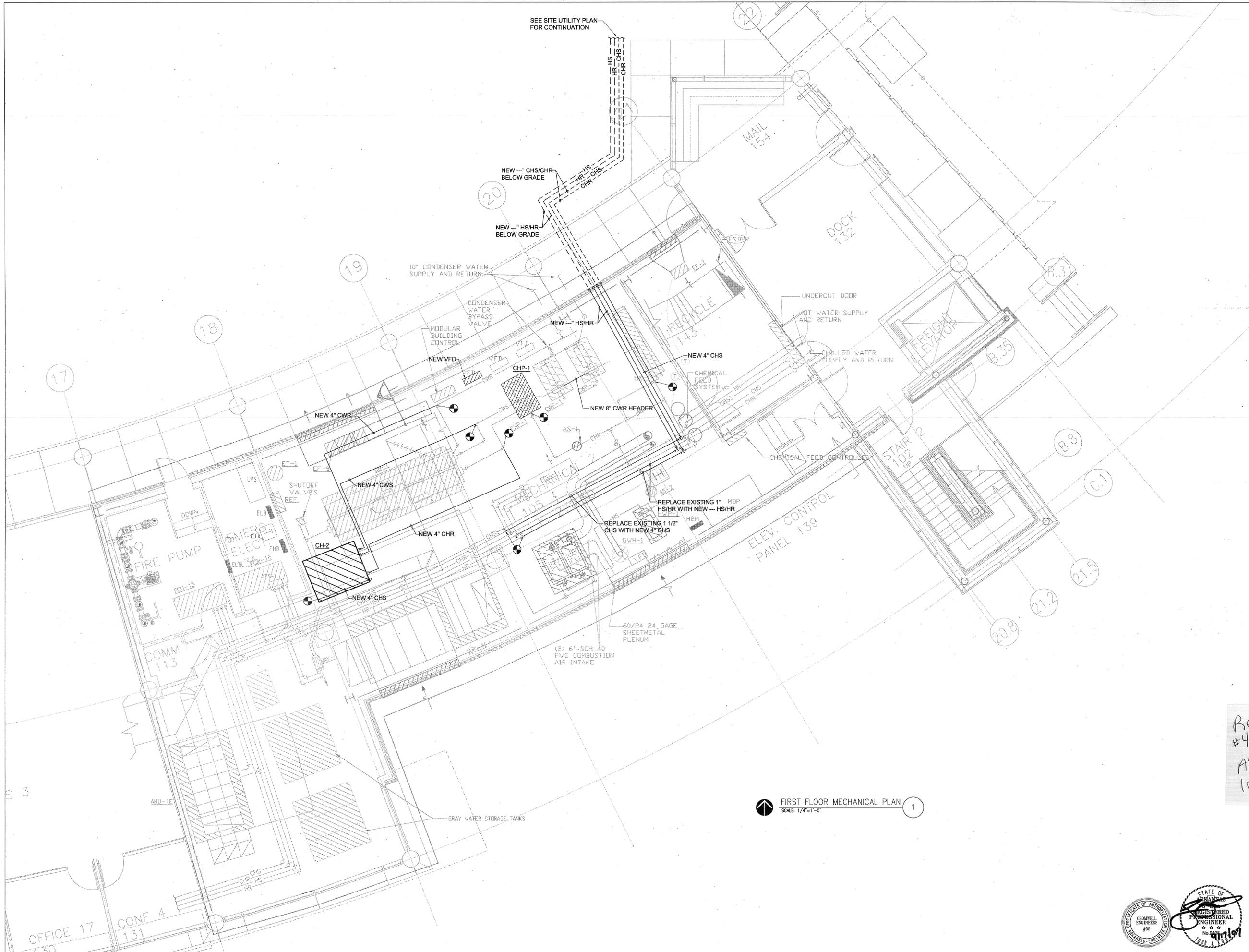
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CONTENTS:

MECHANICAL DETAILS

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M102



FIRST FLOOR MECHANICAL PLAN
SCALE: 1/4"=1'-0"



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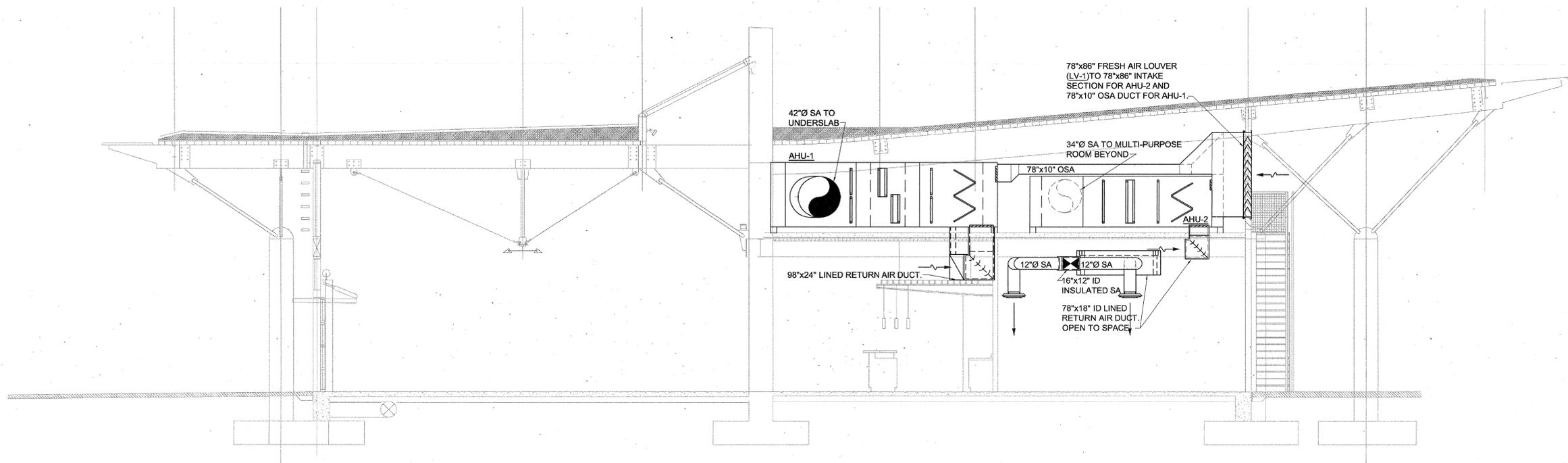
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MECHANICAL DETAILS

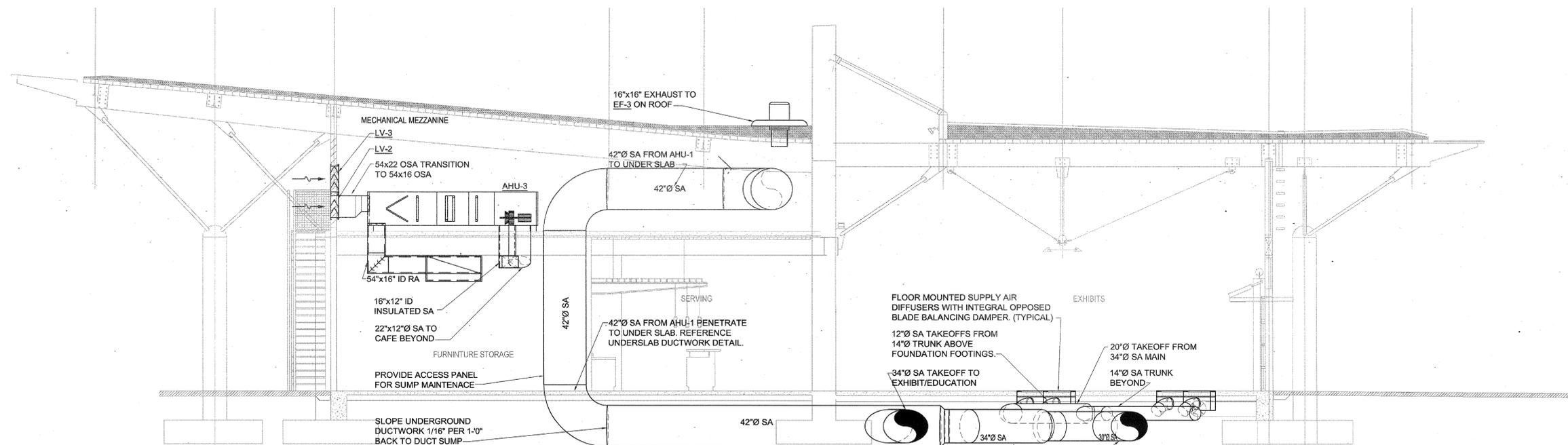
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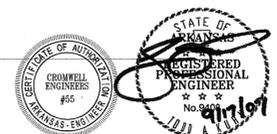
MECHANICAL SECTION THRU MEZZANINE 2

SCALE: 1/4"=1'-0"



MECHANICAL SECTION THRU MEZZANINE 1

SCALE: 1/4"=1'-0"



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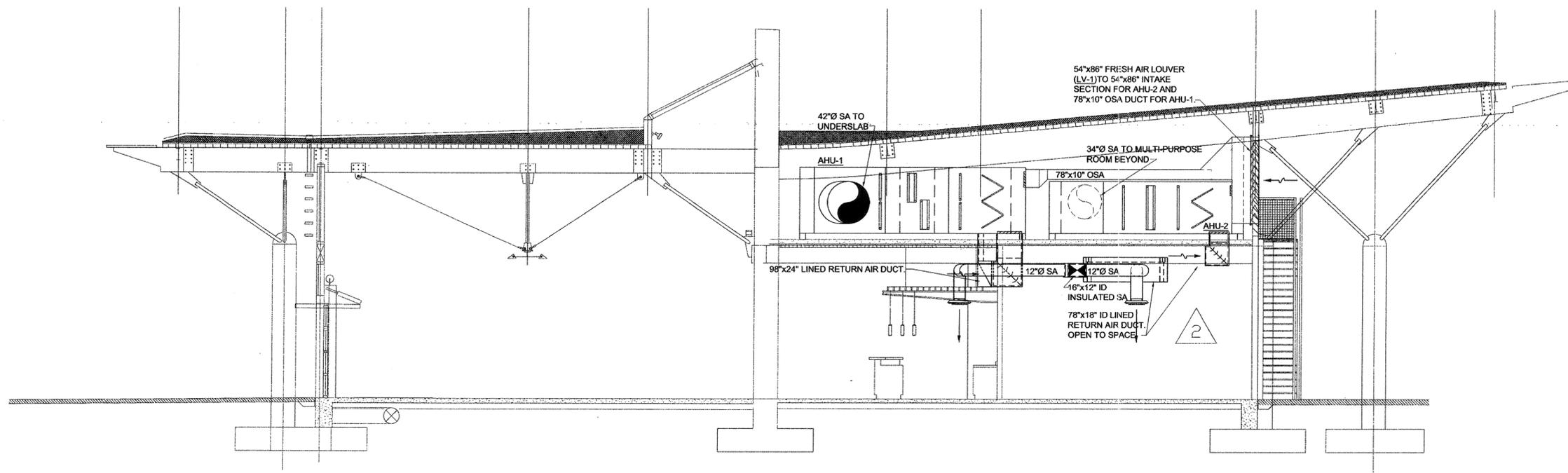
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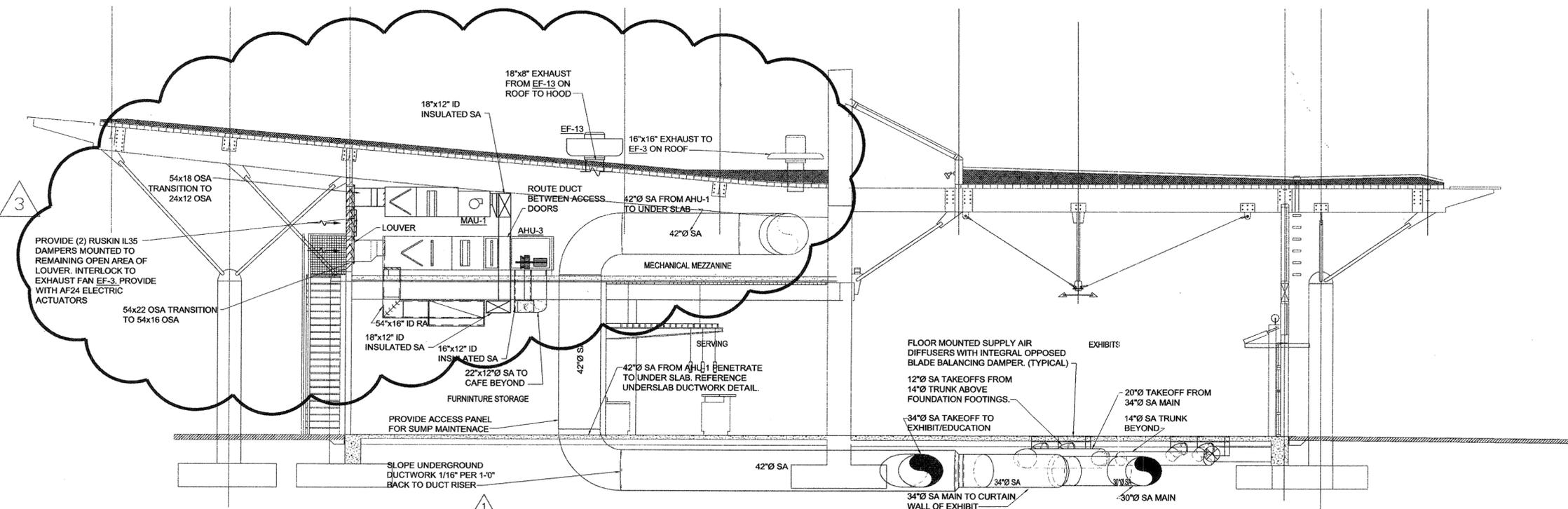
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MECHANICAL SECTION THRU MEZZANINE 2
SCALE: 1/4"=1'-0"



MECHANICAL SECTION THRU MEZZANINE 1
SCALE: 1/4"=1'-0"

FLOOR MOUNTED SUPPLY AIR
DIFFUSERS WITH INTEGRAL OPPOSED
BLADE BALANCING DAMPER, (TYPICAL)

EXHIBITS

12" SA TAKEOFFS FROM
14" TRUNK ABOVE
FOUNDATION FOOTINGS.

34" SA TAKEOFF TO
EXHIBIT/EDUCATION

20" TAKEOFF FROM
34" SA MAIN
14" SA TRUNK
BEYOND

34" SA MAIN TO CURTAIN
WALL OF EXHIBIT

NOTE: ELEVATION MAY BE
EXAGGERATED. COORDINATE
LOCATION OF UNDERGROUND
DUCTWORK WITH STRUCTURAL.
LOCATE 14" TRUNKS, TAKEOFFS, AND
SUPPLY DIFFUSERS ABOVE
FOUNDATION FOOTINGS.



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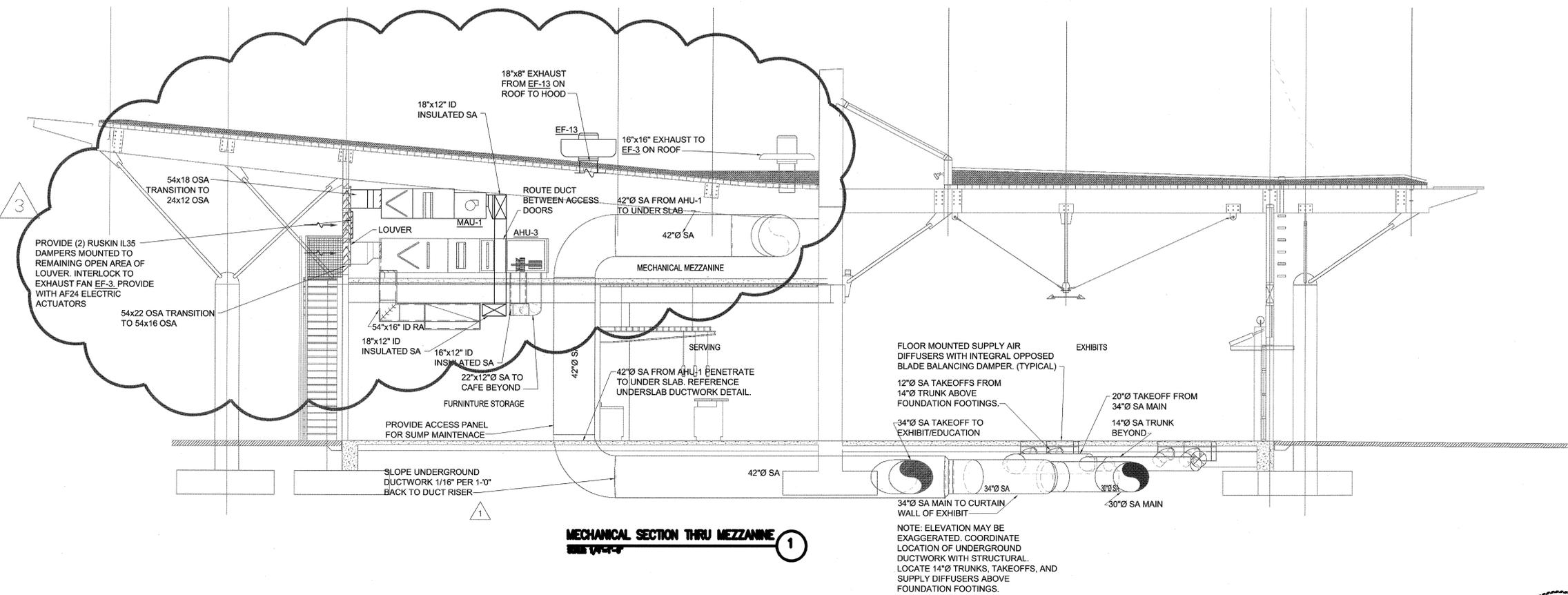
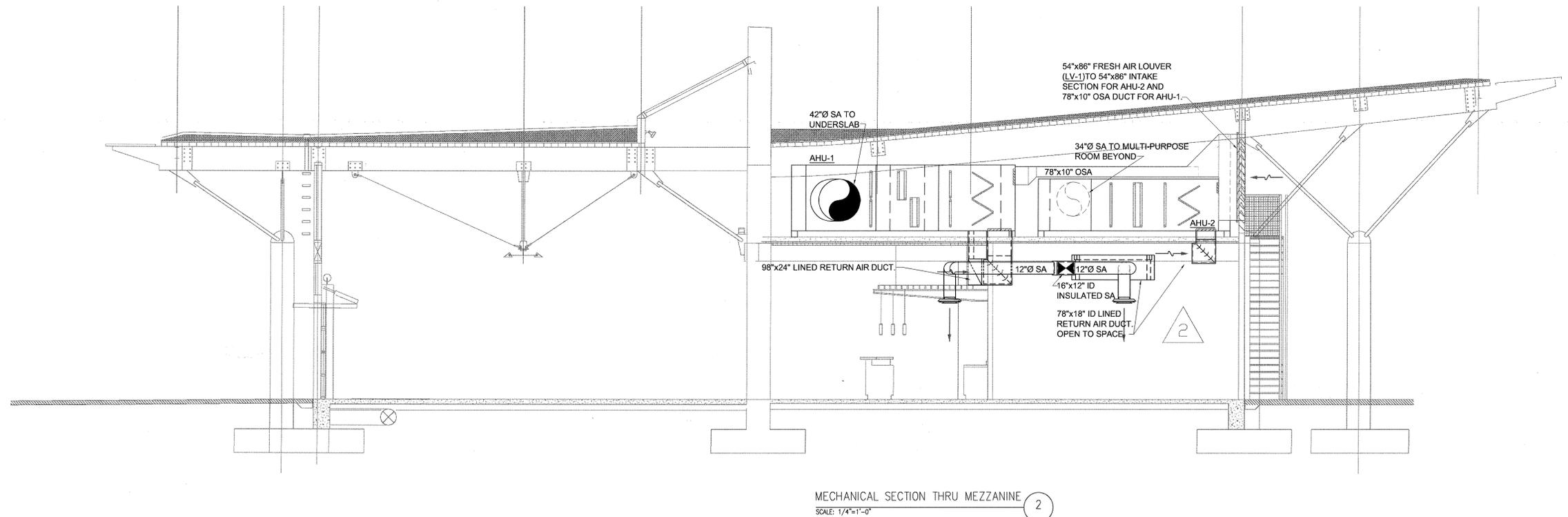
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SEQUENCE OF OPERATIONS: CHILLED/CONDENSER WATER SYSTEM

CHILLED WATER PUMPS - CHP 1 & 2
 WHEN THERE IS A CALL FOR THE CHILLER PLANT, CHP1 OR 2 SHALL BE STARTED DEPENDING UPON WHICH CHILLED WATER PUMP IS PLACED FOR OPERATION. THE PUMP SELECTION SHALL BE DONE AUTOMATICALLY BASED UPON RUNTIME HOURS TO EQUALIZE EQUIPMENT WEAR. THE DUTY PUMP SHALL BE SWITCHED AUTOMATICALLY AFTER 300 HOURS (ADJ) OR BASED UPON AN OPERATOR ASSIGNED SCHEDULE. PUMP ENABLE AND SPEED SHALL BE CONTROLLED BY THE EXISTING CONTROL METHODOLOGY OF THE EXISTING CONTROL SYSTEM. AN ADDITIONAL DIFFERENTIAL PRESSURE SENSOR SHALL BE INSTALLED 2/3 DOWNSTREAM TO THE MURPHY KELLER FACILITY AND SHALL BE USED IN CONJUNCTION TO THE SENSOR IN THE MAIN BUILDING TO DETERMINE PUMP SPEEDS. THE PUMP SPEED SHALL BE MODULATED TO MAINTAIN THE LOWEST PRESSURE READING AT THE MINIMUM DIFFERENTIAL PRESSURE SETPOINT (AS DETERMINED BY THE BALANCE CONTRACTOR).

THE MANUAL OVERRIDE IN THE SYSTEM GRAPHIC TO RUN THE CHILLED WATER SYSTEM SHALL REMAIN UNCHANGED. THIS WILL ALLOW FOR START OF ALL EQUIPMENT REGARDLESS OF THE BUILDINGS 'NEED' FOR CHILLED WATER. ALL RESPECTIVE EQUIPMENT SHALL START IN SEQUENCE IN THE SAME MANNER AS UNDER AUTOMATIC CONTROL.

CHILLED WATER PLANT INITIATION ALSO REQUIRES THE ISOLATION VALVES TO BE OPENED OR CLOSED AS REQUIRED FOR OPERATION OF THE RESPECTIVE PIECES OF EQUIPMENT.

EACH CHILLER'S EVAPORATOR DIFFERENTIAL PRESSURE SHALL BE MONITORED BY THE NEW ROSEMOUNT DIFFERENTIAL PRESSURE TRANSMITTERS. THE FORMULA $(GPM^2/GPM^2) = \Delta P^2/\Delta P^1$ SHALL BE USED TO CALCULATE THE ACTUAL FLOW IN GPM THROUGH THE CHILLER, WHERE

GPM1= ACTUAL FLOW
 GPM2= DESIGN MAXIMUM FLOW
 ΔP^1 = ACTUAL DIFFERENTIAL PRESSURE
 ΔP^2 = DESIGN DIFFERENTIAL PRESSURE AT DESIGN MAXIMUM FLOW.

EACH CHILLER'S DESIGN SPECIFICATIONS TO SOLVE THE ABOVE FORMULA FOR THE ACTUAL FLOW ARE AS FOLLOWS:

CH-1 MAXIMUM DESIGN FLOW =300 GPM
 CH-1 DIFFERENTIAL PRESSURE AT MAXIMUM DESIGN FLOW = 16.3FT=7.065PSI

CH-2 MAXIMUM DESIGN FLOW =200 GPM
 CH-2 DIFFERENTIAL PRESSURE AT MAXIMUM DESIGN FLOW = 16FT=6.938PSI

THE CONTROL SYSTEM SHALL MODULATE EACH CHILLER'S RESPECTIVE BYPASS VALVES AS REQUIRED TO MAINTAIN THEIR MINIMUM FLOW SETPOINTS OF 225 GPM FOR CH-1 AND 65 GPM FOR CH-2. (CH-1 IS ASSOCIATED WITH THE NEW 2.5" BUTTERFLY VALVE AND CH-2 IS ASSOCIATED WITH THE NEW 1.5" GLOBE VALVE.)

CONDENSER WATER PUMP

CWP-1 SHALL BE DEDICATED FOR CHILLER 1&2 AND CWP-2 SHALL BE DEDICATED FOR HX-1
 WHEN THERE IS A CALL FOR THE CHILLER PLANT, CWP1 AND OR CWP2 SHALL BE STARTED DEPENDING ON WHICH UNIT IS CALLED FOR OPERATION. PUMP ENABLE SHALL BE CONTROLLED BY THE EXISTING CONTROL METHODOLOGY OF THE EXISTING CONTROL SYSTEM. THE PUMP SPEED SHALL BE SET AT A FIXED SPEED SETPOINT TO MAINTAIN THE MINIMUM FLOW REQUIRED THROUGH EACH OPERATING PIECE OF EQUIPMENT (TOTAL FLOW CAN BE CONFIRMED AS SENSED AT THE EXISTING TOTAL TOWER SUPPLY FLOW METER).

THE BALANCE CONTRACTOR SHALL PROVIDE THE CONTROLS CONTRACTOR THE REQUIRED PUMP SPEED TO SATISFY THE FLOW REQUIREMENTS UNDER THE FOLLOWING CONDITIONS:

HX-1 =500GPM =? VFD%
 OMITTED

CH2=240GPM=? VFD%

CH1=1000GPM=? VFD%

CH1/CH2=1240GPM= 100 VFD% (BOTH CHILLERS COMBINED REQUIRED A TOTAL OF 1240 GPM CONDENSER WATER FLOW WHICH EXCEEDS THE DESIGN POTENTIAL FLOW OF EITHER CONDENSER PUMP BY 240 GPM. THE OPERATING PUMP THEREFORE SHALL RUN AT FULL SPEED WHEN THE CHILLERS ARE RUNNING TOGETHER).

THERE WILL NOT BE A TIME WHEN CH-1 AND HX-1 ARE IN OPERATION TOGETHER. THERE MAY BE A TIME WHEN CH-1 & 2 ARE OPERATED TOGETHER AND THE FLOW RATE IF NOT SUFFICIENT SHALL BE PROPORTED TO THE GPM AVAILABLE ON A PERCENTAGE BASIS (ALL BY BALANCE CONTRACTOR).

CHILLERS CH-1 & 2 AND HEAT EXCHANGER HX-1

WHEN THE CHILLER PLANT IS CALLED FOR BY THE OCCUPIED PROGRAM THE CONDENSER WATER PUMP, CHILLED WATER PUMP, COOLING TOWER FANS AND THE APPROPRIATE CHILLER OR HEAT EXCHANGER SHALL START IN THE SEQUENCE PREVIOUSLY DESIGNED. A NEW GRAPHIC SHALL BE DESIGNED FOR THE NEW CHILLER CH-2 LISTING ITS OPERATING SETPOINTS AND LOCKOUT TEMPERATURES. A NEW ADVANCED SET UP GRAPHIC WILL BE DESIGNED FOR THE PARAMETERS OF THE NEW CHILLER.

WHEN THE CHILLER PLANT IS STARTING, THE APPROPRIATE CHILLED WATER EQUIPMENT SHALL BE SELECTED AS FOLLOWS FOR SYSTEM STARTUP.

- WHEN THE OUTSIDE AIR (OSA) WET BULB (WB) IS BELOW THE LOCKOUT TEMPERATURE OF THE HEAT EXCHANGER (50°F WB ADJ) THE SYSTEM SHALL STARTUP WITH ONLY HX-1 IN OPERATION. NOTE(ADD A LOCKOUT TEMP FOR HX-1).
- WHEN THE OSA WB IS ABOVE THE LOCKOUT TEMPERATURE FOR CH-2 (50°F WB ADJ) THE SYSTEM SHALL STARTUP CH-2 AND HX-1 SHALL CONTINUE TO OPERATE.
- WHEN THE OSA WB IS ABOVE THE CH-2 LOCKOUT TEMPERATURE 62°F (ADJ), THE SYSTEM SHALL STARTUP WITH ONLY CH-2 IN OPERATION.

WHEN THE CHILLER PLANT IS RUNNING, THE APPROPRIATE CHILLED WATER EQUIPMENT SHALL BE SELECTED AS FOLLOWS FOR CHILLER LOADING/UNLOADING.

- WHEN HX-1 IS RUNNING ALONE AND THE OSA WB RISES ABOVE THE LOCKOUT SETPOINT OF 50°F, CH-2 SHALL BE STARTED AND HX-1 SHALL CONTINUE TO RUN.
- HX-1 SHALL CONTINUE TO RUN UNTIL THE PERFORMANCE OF THE HEAT EXCHANGER FALLS TO A POINT WHERE THE LEAVING CHILLED WATER TEMPERATURE IS LESS THAN 2°F FROM THE ENTERING CHILLED WATER TEMPERATURE. AT THIS POINT HX-1 SHALL BE STOPPED AND CH-2 SHALL CONTINUE TO RUN. IF THE OSA WB DROPS 2°F BELOW THE RECORDED OSA WB WHEN THE HX-1 WAS STOPPED, THEN IT WILL BE ALLOWED TO RESTART AND OPERATE WITH CH-2. IF CH-2 HAS FAILED AS DETERMINED BY THE ALARM FAILURE CONTACTS ON CH-2, THEN STOP CH-2 AND START CH-1.
- WHEN CH-2 HAS BEEN OPERATING ALONE FOR A MINIMUM OF 30 MINUTES (ADJ), CH-2 SHALL BE STOPPED AND CH-1 STARTED IF THE LEAVING WATER TEMPERATURE IS 5°F (ADJ) ABOVE THE CHILLED WATER SET POINT AND THE WB TEMPERATURE IS ABOVE THE LOCKOUT TEMPERATURE OF CH-1 (OVERLOADED CONDITION).
- WHEN CH-1 IS OPERATING AND THE LOAD AS SEEN ON THE CHILLER KW DEMAND METER DROPS TO 60 KW (ADJ), THEN TURN OFF CH-1 AND TURN ON CH-2.
- WHEN CH-2 IS RUNNING AND THE OSA WB DROPS BELOW HX-1'S OSA WB LOCKOUT SETPOINT, STOP CH-2 AND START HX-1.

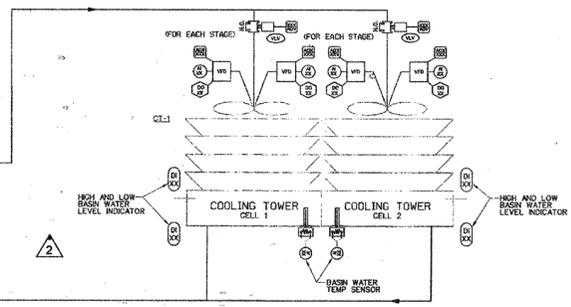
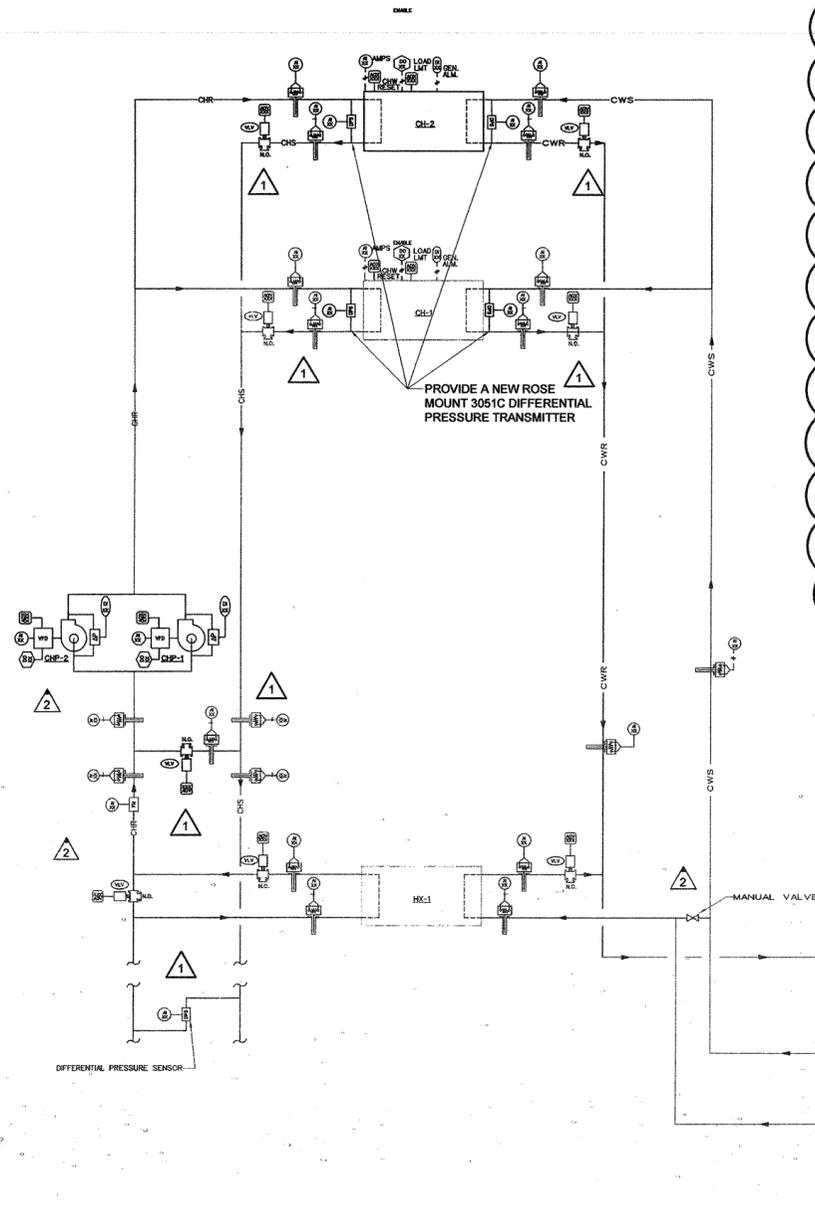
THE CHILLED WATER SETPOINT SHALL CONTROL FROM 42°F TO 50°F DEPENDING UPON THE REQUIREMENT OF THE VENTILATION UNITS. IF THE VENTILATION UNITS ARE OFF, THE CHILLED WATER SETPOINT WILL BE 50°F (ADJ). THIS WILL REMAIN THE SAME AS CURRENTLY DESIGNED. THE CHILLED WATER SETPOINT SHALL BE RESET COLDER WHEN ANY SPACE HUMIDITY SENSOR IN EITHER BUILDING EXCEEDS THE MAXIMUM HUMIDITY LEVEL OF 55% (ADJ). THE TEMPERATURE SHALL BE RESET COLDER BY 2°F EVERY 60 MIN (ADJ). WHEN ALL SPACE HUMIDITY SENSORS ARE 5% (ADJ) BELOW THE MAXIMUM HUMIDITY SETPOINT, THE CHILLED WATER SETPOINT SHALL BE ADJUSTED WARMER BY 2°F EVERY 60 MIN (ADJ) UNTIL THE SETPOINT HAS REACHED THE 'DESIRED NORMAL SETPOINT' AS DETERMINED AND DESCRIBED PREVIOUSLY.

COOLING TOWERS

CH-2 AND HX-1 WILL USE ONLY ONE COOLING TOWER CELL. CH-1 WILL USE BOTH CELLS.

USE THE SAME CONTROL STRATEGY FOR THE HEAT EXCHANGER THAT IS CURRENTLY BEING USED.

THE COOLING TOWER FANS WHEN OPERATING WITHOUT THE HEAT EXCHANGER WILL CONTROL THE FAN SPEED TO ACHIEVE A LEAVING CONDENSER WATER 5 DEGREES WARMER THAN THE CURRENT WET BULB READING.



INPUT/OUTPUT SUMMARY: CHILLED/CONDENSER WATER SYSTEM

ANALOG INPUTS (AI)

- Water System Flow
- Water System Supply Temperature
- Water System Return Temperature
- Water System Load - tons
- Individual Remote Differential Pressure Signals
- Chilled Water By-pass Position
- Chiller Supply Temperature
- Condenser Water Return Temperature
- Chilled Water Bypass Temperature
- Outside Air Temperature
- Outside Air Wet Bulb Temperature
- Cooling Tower Basin Temperature (each tower)
- Cooling Tower Return Temperature
- Cooling Tower Supply Temperature
- Chiller Differential Pressure

DIGITAL INPUTS (DI)

- Pump Fail Indication - (each pump)
- Individual H-O-A Switch Position
- Cooling Tower Basin High Level (each tower)
- Cooling Tower Basin Low Level (each tower)
- Condenser Water Chemical Feed Alarm Status
- Chilled Water Chemical Feed Alarm Status
- Cooling Tower Alarm Status (each tower)

ANALOG OUTPUTS (AO)

- Water System Differential Pressure Setpoint
- Water Temperature Setpoint
- Condenser Water By-pass Position
- Free Cooling Bypass Position
- Cooling Tower VFD Speed (each Tower)

DIGITAL OUTPUTS (DO)

- Chiller Start/Stop (each chiller)
- Chiller Isolation Valves (2 per chiller) Provide End Switches.
- Cooling Tower Isolation Valves (3 per tower) Provide End Switches.
- Cooling Tower VFD Start (each Tower)

Note: Dewpoint shall be calculated and displayed for all humidity sensing points, outside the building, inside the building, in the air handlers, and in the dessicant units.

CONTROL LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
(AI)	ANALOG INPUT POINT	WFD	VARIABLE FREQUENCY DRIVE
(AO)	ANALOG OUTPUT POINT	AFMS	AIR FLOW MONITOR
(DI)	DIGITAL INPUT POINT	CC	CHILLED WATER COIL
(DO)	DIGITAL OUTPUT POINT	HC	HOT WATER COIL
(DPS)	DIFFERENTIAL PRESSURE SENSOR	HSL	HIGH STATIC LIMIT
SP	STATIC PRESSURE SENSOR	T	ROOM TEMPERATURE SENSOR
SD	SMOKE DETECTOR	H	HUMIDITY SENSOR
DA	DAMPER ACTUATOR	CO2	CO2 SENSOR
FBD	FACE & BYPASS DAMPER	NO	NORMALLY OPEN
SAT	SUPPLY AIR TEMPERATURE SENSOR	NC	NORMALLY CLOSED
PHT	PREHEAT TEMPERATURE	C	COMMON
CCT	COOLING COIL TEMPERATURE	S	SUPPLY
MAT	MIXED AIR TEMPERATURE	R	RETURN
LTD	LOW TEMPERATURE DETECTOR	DM	DAMPER MOTOR
HWV	HOT WATER VALVE	SDM	SMOKE DAMPER MOTOR
CWV	CHILLED WATER VALVE	CWV	CHILLED WATER VALVE
DTS	DISCHARGE AIR TEMPERATURE	CHR	CHILLED WATER RETURN
OSAT	OUTSIDE AIR TEMPERATURE SENSOR	CHS	CHILLED WATER SUPPLY
MAH	MIXED AIR HUMIDITY	HR	HOT WATER RETURN
SAH	SUPPLY AIR HUMIDITY SENSOR	HS	HOT WATER SUPPLY
RAT	RETURN AIR TEMPERATURE SENSOR		

CHILLER, HEAT EXCHANGER, & COOLING TOWER CONTROLS 1
 NO SCALE

POLK STANLEY ROWLAND CURZON PORTER ARCHITECTS, LTD.

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LANDSCAPE ARCHITECT:
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 CROMWELL ENGINEERS INC.

MECH., ELEC., PLUMB. ENGINEER:
 CROMWELL ENGINEERS INC.

GLOBAL VILLAGE CONSULTANT
 CAMBRIDGE SEVEN ASSOCIATES

INTERIOR DESIGNER:
 POLK STANLEY ROWLAND
 CURZON PORTER ARCHITECTS

GENERAL CONTRACTOR:
 CDI CONTRACTORS, INC.

NOTES:

ISSUE DATE:
 17 SEPTEMBER 2007

REVISIONS:

#	DATE:	DESCRIPTION:
1	09/27/07	ADDENDUM 01
2	03/04/08	ASI #6
3	08/19/08	ASI #16

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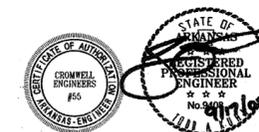
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LITTLE ROCK, ARKANSAS

PSRCP JOB NUMBER:
 431E

CONTENTS:
 MECHANICAL CONTROLS

SHEET NUMBER:
 M302



CONSULTANTS:

CIVIL ENGINEER:
MCLELLAND ENGINEERS

LANDSCAPE ARCHITECT:
LARSON BURNS SMITH

STRUCTURAL ENGINEER:
CROMWELL ENGINEERS INC.

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REVISIONS:

#	DATE:	DESCRIPTION:
1	09/27/07	ADDENDUM 01
2	01/07/08	ASI #01
3	01/16/08	ASI #02
4	06/18/08	ASI #16
5	09/14/08	ASI #31
6	02/27/09	ASI #37

MURPHY - KELLER
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LITTLE ROCK, ARKANSAS

PSRCP JOB NUMBER:
431E

CONTENTS:
MECHANICAL SCHEDULE:

SHEET NUMBER:

M401

100% O.S.A. - AIR HANDLING UNIT

MARK	SERVES	LOCATION	COOLING CAPACITY		OAT		FAN					NG MODULE		ELECTRIC HEAT		MOCP	REFERENCE PRODUCT
			TOTAL MBH	SENS. MBH	DB °F	WB °F	CFM	ESP	RPM	HP	VOLTS/Ø	FREE MBH	MAX MBH	KW	VOLTS/Ø		
MAU-1	HOOD	MECH MEZZ	-	-	96"	77"	1840	.5	910	.75	208/1	-	275	-	-	-	CAPTIVEAIRE 10"-L

PROVIDE 2" PLEATED FILTERS, WITH VBI-01 V-BANK FILTER INTAKE, DUCT DISCHARGE TEMPERATURE THERMOSTAT, 18-275 MBH D1.250 DIRECT FIRED HEATING MODULE, 5.4 FLA, 82° LAT DURING HEATING CYCLE, FILTERED AIR ONLY WHEN TEMPERATURE ABOVE 62°

AIR HANDLING UNIT

MARK	SERVES	LOCATION	FAN								COILS			FILTER(S)	REFERENCE PRODUCT	
			CFM	OSA	ESP	TSP	TYPE	RPM	BHP	MHP	VOLTS/Ø	PRE HEAT	CLG			HTG
AHU-1	EXHIBIT	MEZZANINE	18600	4000	2.0	4.0	PLENUM	1095	17.16	25	460/3	HC-1	CC-1	HC-2	20	McQUAY CAH035GDDC
AHU-2	MULTI-PURPOSE	MEZZANINE	10100	3000	2.0	4.0	PLENUM	1485	9.57	15	460/3	HC-3	CC-2	HC-4	12	McQUAY CAH021GDDC
AHU-3	CAFE	MEZZANINE	4500	1215	2.0	3.86	PLENUM	3500	7.82	10	460/3	HC-5	CC-3	HC-6	6	McQUAY CAH010GDGM
AHU-4	GIFT SHOP	MECH. RM.	4000	1045	2.0	3.82	PLENUM	3042	5.74	7.5	460/3	HC-7	CC-4	HC-8	3	McQUAY CAH010GDDC

- ① PROVIDE PLEATED 30% MERV 6 TYPE FILTERS
- ② PROVIDE PRE-WIRED VARIABLE SPEED CONTROLLER FOR ALL FANS
- ③ PROVIDE MOTORIZED OPPOSED BLADE DAMPERS. MECHANICAL CONTRACTOR RESPONSIBLE FOR INSTALLING ALL INTERNAL POWER AND CONTROL WIRING AS REQUIRED TO PROVIDE FULLY OPERATIONAL FAN AND DAMPER.

CHILLED WATER COOLING COIL

MARK	LOCATION	CFM	FACE VEL.	WIDTH	LENGTH	ROWS	FINS/INCH	TOTAL MBH	SENS. MBH	EDB °F	LDB °F	EWB °F	LWB °F	APD	EWT °F	LWT °F	GPM	WPD	REFERENCE PRODUCT
CC-1	AHU-1	18600	502	30	89	8	10	828	578	79.7	51.3	66.1	51.1	1.5	45	57.1	137	11.9	McQUAY 5W51008C
CC-2	AHU-2	10100	502	42	69	8	10	480	326	81.3	51.8	67.3	51.6	1.6	45	56.6	83.0	8.4	McQUAY 5W51008C
CC-3	AHU-3	4500	408	30	45	8	10	205	148	82.6	52.7	67.4	52.5	1.4	45	56.0	37.3	2.7	McQUAY 5W51008C
CC-4	AHU-4	4000	418	27	51	8	10	202	135	81.3	50.1	67.1	50.2	1.2	45	55.2	39.5	7.1	McQUAY 5W51008C

HOT WATER HEATING COIL

MARK	LOCATION	CFM	FACE VEL.	WIDTH	LENGTH	ROWS	FINS/INCH	MBH	EDB °F	LDB °F	APD	EWT °F	LWT °F	GPM	WPD	REFERENCE PRODUCT
HC-1	PRE-HEAT AHU-1	18600	577	27	86	1	10	690	58.0	92	0.21	180	148	43.4	8.1	McQUAY 5WQ1001C
HC-2	RE-HEAT AHU-1	18600	577	27	86	1	6	500	51.3	75.9	0.16	180	148	32.1	4.6	McQUAY 5WQ0601C
HC-3	PRE-HEAT AHU-2	10100	525	42	66	1	10	402	54.1	90.5	0.18	180	149	26.4	6.0	McQUAY 5WQ1001C
HC-4	RE-HEAT AHU-2	10100	525	42	66	1	6	275	51.8	76.7	0.13	180	148	17.1	2.6	McQUAY 5WQ0601C
HC-5	PRE-HEAT AHU-3	4500	514	30	42	1	10	172	54.9	89.8	0.18	180	150	11.5	1.5	McQUAY 5WQ1001C
HC-6	RE-HEAT AHU-3	4500	514	30	42	1	6	118	52.2	76.2	0.13	180	148	7.5	0.7	McQUAY 5WQ0601C
HC-7	PRE-HEAT AHU-4	4000	444	27	48	1	10	158	55.8	92.0	0.14	180	148	10.0	1.4	McQUAY 5WQ1001C
HC-8	RE-HEAT AHU-4	4000	444	27	48	1	6	114	50.4	76.5	0.10	180	148	7.2	0.8	McQUAY 5WQ0601C

CHILLER - WATER COOLED

MARK	LOCATION	CAPACITY (TONS)	EVAPORATOR				CONDENSER				COMPRESSORS				AMB TEMP °F	ELECTRICAL			MAX IPLV	REFERENCE PRODUCTS
			EWT °F	LWT °F	GPM	MAX. P.D.	EWT °F	LWT °F	GPM	MAX. P.D.	25%	50%	75%	100%		MCA	MOCP	VOLTS/Ø		
CH-2	1ST FLOOR MECH RM. HEADQUARTERS	83	54	42	199.4	15.1	83	93	249.3	9.6	0.879	1.759	2.638	3.517	100	111.3	150	460/3	0.523	CARRIER 30HXC086

- ① PROVIDE PRE-WIRED FACTORY MOUNTED INTEGRAL DISCONNECT DEVICE
- ② PROVIDE HOT GAS BY-PASS ON ANY ONE 15 TON CIRCUIT
- ③ PROVIDE 60 MESH BASKET STRAINER
- ④ PROVIDE (1) 30TON MODULE WITH (2) 15TON SCROLL COMPRESSORS AND (1) 50TON MODULE WITH (2) 25TON COMPRESSORS

DUCTLESS SPLIT SYSTEM

MARK	SERVES	COOLING MBH	HEATING MBH	CFM	ELECTRICAL			SEER	REFERENCE PRODUCT	
					FLA	MOCP	VOLTS/Ø			
MAC-1	MHP-1	SERVER RM.	9.0	12.2	200	10.3	20	120/1	16	SANYO INDOOR KHS0671 SANYO OUTDOOR CH0871

- ① MAC-1 AND MCU-1 COMPRISE A SINGLE AIR CONDITIONING SPLIT SYSTEM AND INCLUDES MICROPROCESSOR CONTROLS, WALL MOUNT FOR WIRELESS REMOTE, ON/OFF 24 HOUR TIMER, AND WASHABLE AIR FILTER.

UNIT HEATER - HOT WATER

MARK	LOCATION	CFM	MBH	GPM	WPD FT.	HP	RPM	VOLTS/Ø	REFERENCE PRODUCT
UH-1	WATER ROOM	340	12.8	1.3	0.5	1/60	1550	230/1	McQUAY UH-18
UH-2	MEZZANINE	1120	47	4.7	0.8	1/12	1550	230/1	McQUAY UH-63

- ① PROVIDE PRE-WIRED FACTORY MOUNTED INTEGRAL DISCONNECT DEVICE
- ② PROVIDE FACTORY LINE VOLT, HEAVY DUTY TYPE THERMOSTAT

EXHAUST FAN

MARK	SERVES	CFM	ESP	RPM	HP	VOLTS/Ø	MAX SONES	DRIVE	TYPE	CONTROL	WEIGHT	REMARKS	REFERENCE PRODUCT
EF-1	BATHROOM	700	0.5	1600	327w	120/1	4.2	DIRECT	IN-LINE	BAS	36	b,c	COOK GN-740
EF-2	MECH RM	350	0.25	1050	87.1w	120/1	5.5	DIRECT	CENTRIFUGAL	LINE VOLT T-STAT	30	a,b	COOK 100C100H
EF-3	MECH MEZZ	1400	0.25	1075	167	120/1	8.2	DIRECT	CENTRIFUGAL	LINE VOLT T-STAT	72	a,b	COOK T35C10D
EF-12	HEADQUARTERS	1250	0.50	933	221	460/3	7.0	BELT	IN-LINE	REFRIG. ALARM PANEL	150	b,c	COOK 150SQNB
EF-13	MECH MEZZ	2300	1.0	1120	1.5	208/1	14.5	BELT	CENTRIFUGAL	HOOD MOUNTED SWITCH	195	d	CAPTIVEAIRE NCA18HPFA

- ① PROVIDE PRE-WIRED FACTORY MOUNTED INTEGRAL DISCONNECT DEVICE (NEMA 3R FOR EXTERIOR)
- ② PROVIDE PRE-WIRED VARIABLE SPEED CONTROLLER ON DIRECT DRIVE FANS
- ③ PROVIDE ROOF CURB TO MATCH ROOF TYPE AND SLOPE AT ALL ROOF MOUNTED FANS
- ④ PROVIDE MOTORIZED DAMPER WITH TIME DELAY FAN START, MECHANICAL CONTRACTOR RESPONSIBLE FOR INSTALLING FAN, ROOF CURB, BACK DRAFT DAMPER, AND ALL INTERNAL POWER AND CONTROL WIRING TO PROVIDE FULLY OPERATIONAL FAN AND DAMPER
- ⑤ PROVIDE BIRD SCREEN
- ⑥ PROVIDE BACK DRAFT DAMPER
- ⑦ 700" MAX TEMPERATURE EXHAUST FAN, PROVIDE WITH MINIMUM 16 GAUGE GREASE DUCT CONNECTION TO TYPE 1 HOOD CONNECTION

INTAKE VENTILATOR

MARK	SERVES	CFM	PD	THROAT SIZE IN. x IN.	THROAT VELOCITY	TYPE	WEIGHT	REFERENCE PRODUCT
IV-1	EF-1	700	0.1	16x16	420	TIERED	50	COOK TRE
IV-2	AHU-4	1040	0.1	18x18	500	TIERED	50	COOK TRE

- ① PROVIDE ROOF MOUNTED EQUIPMENT CURB

PUMPS

MARK	SERVES	LOCATION	FLUID	TYPE	GPM	TDH FT.	IMPELLER DIA.	RPM	HP	VOLTS/Ø	MIN EFF.	REFERENCE PRODUCT
CHP-1	CHILLERS	HEADQUARTERS	WATER	CENTRIFUGAL	500	100	10.4	1750	20	460/3	77.2	PACO PUMPS 30127
CHP-2	CHILLERS	HEADQUARTERS	WATER	CENTRIFUGAL	500	100	10.4	1750	20	460/3	77.2	PACO PUMPS 30127

- ① PROVIDE NEW VARIABLE FREQUENCY DRIVE
- ② PROVIDE NEW SUCTION DIFFUSER WITH STRAINER

LOUVERS

MARK	SERVES	DESCRIPTION	SIZE (W/L)	MAX PD (IN W.G.)	MIN FREE AREA (SQFT)	VELOCITY (FT/MIN)	REFERENCE PRODUCT
LV-1	AHU-1 & AHU-2	INTAKE	54/86	0.25	16.96	412	RUSKIN ELF 6375D
LV-2	AHU-3	INTAKE	54/22	0.25	3.00	404	RUSKIN ELF 6375D
LV-3	MECH MEZZ	INTAKE	54/26	0.25	3.54	395	RUSKIN ELF 6375D

AIR DEVICE

MARK	TYPE	DESCRIPTION	SIZE	REFERENCE PRODUCT
A	SUPPLY DIFFUSER	ALUMINUM LINEAR BAR 0" DEFLECTION, 1/8" FIXED BARS, 1/4" SPACING WIDTH WALL MOUNTED	4' x 4"	TITUS CT-480-4-01-N-AG35
B	SUPPLY DIFFUSER	ALUMINUM LINEAR BAR 0" DEFLECTION, 7/32" FIXED BARS, 7/16" SPACING WIDTH FLOOR MOUNTED	4' x 2-1/2"	TITUS CT-PP-0-5-01-A-AG35
C	SUPPLY DIFFUSER	ALUMINUM LINEAR BAR 0" DEFLECTION, 7/32" FIXED BARS, 7/16" SPACING WIDTH FLOOR MOUNTED	3' x 3-1/2"	TITUS CT-PP-0-5-01-A-AG35
D	SUPPLY DIFFUSER	ALUMINUM LINEAR BAR 0" DEFLECTION, 7/32" FIXED BARS, 7/16" SPACING WIDTH FLOOR MOUNTED	4'x5"	TITUS CT-PP-0-5-01-A-AG35
E	SUPPLY DIFFUSER	ALUMINUM LINEAR SLOT 3/4" SLOT WIDTH DUCT MOUNTED	3 SLOT	TITUS ML-38-48-16-3-01-20
F	SUPPLY DIFFUSER	ALUMINUM LINEAR SLOT 3/4" SLOT WIDTH DUCT MOUNTED	2 SLOT	TITUS ML-38-48-16-2-01-12
G	SUPPLY DIFFUSER	ALUMINUM ADJUSTABLE SPOT DIFFUSER	12"	AIR CONCEPTS APLD
H	SUPPLY DIFFUSER	ALUMINUM LAYIN CEILING DIFFUSER	2' x 2'	TITUS "OMNI"
X	EXHAUST GRILLE	LAYIN CEILING EGGRATE GRILLE	2' x 2'	TITUS "50F"
Y	RETURN GRILLE	HEAVY DUTY SIDE WALL RETURN GRILLE 1/2" O.C. SPACING, 38" DEFLECTION BLADES PARALLEL TO LONG DIMENSION	54"x26"	TITUS "33R"
Z	RETURN GRILLE	LAYIN CEILING EGGRATE GRILLE	2' x 2'	TITUS "50F"
J	RETURN GRILLE	SIDEWALL RETURN GRILLE 1/2" SPACING, 0" DEFLECTION BLADES PARALLEL TO LONG DIMENSION	42" x 20"	TITUS "355ZFL"

