

BASIC PLUMBING PIPING

SYMBOL	DESCRIPTION	ABBREVIATION	SYMBOL	DESCRIPTION	ABBREVIATION
	STORM DRAIN	SD		FLOW SWITCH	FSW
	SANITARY SEWER	SS		PRESSURE SWITCH	PS
	VENT	V		GATE VALVE	GV
	COMBINATION WASTE AND VENT	CWV		GLOVE VALVE	GLV
	GREASE WASTE	GW		ANGLE VALVE	ANV
	ACID DRAIN	AD		BALL VALVE	BFV
	ACID VENT	AV		POST INDICATOR VALVE	PIV
	DRAIN	D		SWING CHECK VALVE	CV
	VENTS FOR TANKS OR EQUIPMENT	EV		BACKFLOW PREVENTOR	BFP
	COLD WATER	CW		GAS COCK, GAS STOP, PLUG COCK	GC, GS, PC
	HOT WATER	HW		PLUG VALVE, BALANCING COCK	PC, PV, BC
	HOT WATER RETURN	HWR		AIR OPERATED VALVE (PNEUMATIC)	AVA
	DOMESTIC HOT WATER SUPPLY (140°F)			MOTOR OR SOLENOID OPERATED VALVE (ELECTRIC)	MVA
	(180°F) SANITIZING HOT WATER	180°S		SELF-OPERATED VALVE (THERMO, VAPOR-PRESSURE)	TVA
	(180°F) SANITIZING HOT WATER RETURN	180°R		GAS PRESSURE REGULATOR	GPR
	CHILLED DRINKING WATER SUPPLY	DWS		VALVE IN RISER (TYPE AS SPECIFIED OR NOTED)	
	DISTILLED WATER	DWR		PIPE ANCHOR	AN
	CHILLED DRINKING WATER RETURN	DI		PIPE GUIDE	GJ
	SUMP PUMP DISCHARGE	SPD		EXPANSION JOINT	EJ
	PITCH DOWN IN DIRECTION OF ARROW			FLEXIBLE CONNECTOR (FLEX. CONN.)	FC
	FLOW - IN DIRECTION OF ARROW			STRAINER-WYE TYPE	STR
	RISER DOWN (ELBOW)			STRAINER-VERTICAL BASKET TYPE	STR
	RISER UP (ELBOW)			WATER HAMMER ARRESTOR	WHA
	COMBINATION PRV & RELIEF VALVE			PRESSURE GAUGE WITH GAUGE COCK	PG
	RISE OR DROP			THERMOMETER (STRAIGHT SCALE)	TH
	BRANCH CONNECTION OUT OF TOP			AUTOMATIC AIR VENT	AAV
	BRANCH CONNECTION OUT OF BOTTOM			AIR CHAMBER	ACH
	BRANCH CONNECTION OUT OF SIDE			HOSE BIB	HB
	CAP ON END OF PIPE	COP		VALVE IN CAST IRON BOX	
	PLUGGED TEE	PT		VACUUM BREAKER (ELEVATION)	VB
	CONCENTRIC REDUCER	CR		TRAP, STEAM OR MOISTURE	T
	ECCENTRIC REDUCER	ER		SIGHT GLASS	SG
	UNION (SCREWED)	UN		BLIND FLANGE CONNECTION	BF
	UNION (FLANGED)	UN		VALVE WITH CHAIN OPERATOR	CHO
	LAWN SPRINKLER MAIN SUPPLY	LSM		BLOW-DOWN VALVE (Y-PATTERN)	BDV
	LAWN SPRINKLER BRANCH	LS		TEST PLUG	TP
	PRESSURE REDUCING VALVE	PRV		AUXILIARY ROOF DRAIN	ARD
	PRESSURE RELIEF VALVE	RV		PLUMBING RISER NUMBER	
	BUTTERFLY VALVE				

ABBREVIATIONS

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

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GENERAL CONTRACTOR:
CDI

GENERAL 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 SERIES SUPPLY	CHSS
	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
	THERMOSTAT	TSTAT
	HUMIDISTAT	
	REFRIGERANT DISCHARGE	RD
	REFRIGERANT SUCTION	RS
	REFRIGERANT LIQUID	RL
	REFRIGERANT HOT GAS	RHG
	CONNECT TO EXISTING	

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		RETURN AIR DEVICE
	PARALLEL BLADE DAMPER		EXHAUST AIR DEVICE
	MANUAL DAMPER		
	FLEXIBLE CONNECTION		
	LINED DUCT		
	DOUBLE WALL DUCT WITH PERFORATED LINER		
	90° ELBOW W/TURNING VANE		
	SUPPLY AIR DEVICE		

NOTE: ALL SYMBOLS MAY NOT BE USED.

NOTES:

ISSUE DATE:
DECEMBER 15, 2003
CORE/SHELL
PACKAGE #5

REVISIONS:

#	DATE	DESCRIPTION
1	1-16-04	ADDENDUM #1
2	7-1-04	PACKAGE 7, 100% ROLL UP

HEIFER INTERNATIONAL CENTER OFFICE BUILDING

LITTLE ROCK, ARKANSAS

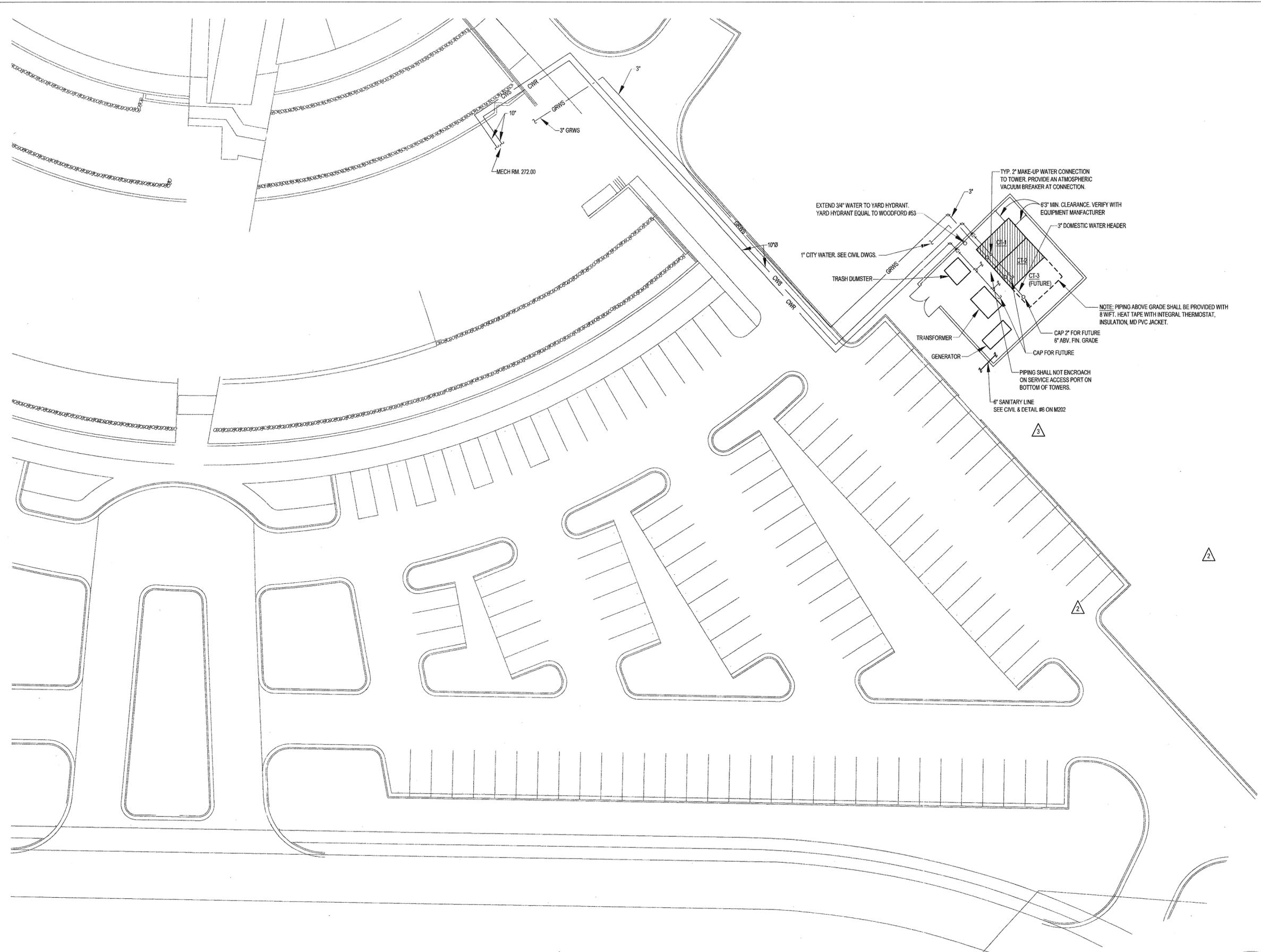
PSY PROJECT NUMBER:
431C

CONTENTS:
MECHANICAL LEGEND

SHEET NUMBER:

M000





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CORE/SHELL
PACKAGE #5

REVISIONS:

#	DATE	DESCRIPTION
1	1-16-04	ADDENDUM #1
2	1-23-04	PACKAGE 5-ADDM. 02
3	5-26-04	ASH#03
4	7-1-04	PACKAGE 7, 100% ROLL UP

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INTERNATIONAL
CENTER
OFFICE BUILDING**

LITTLE ROCK, ARKANSAS

PSY PROJECT NUMBER:
431C

CONTENTS:
MECHANICAL SITE PLAN

SHEET NUMBER:
M001

1 MECHANICAL SITE PLAN
SCALE: 1"=15'-0"



CONSULTANTS:

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1	1-16-04	ADDENDUM #1
2	1-23-04	PACKAGE 5-ADDM. 02
3	7-1-04	PACKAGE 7, 100% ROLL UP
4	11-29-04	ASI #27

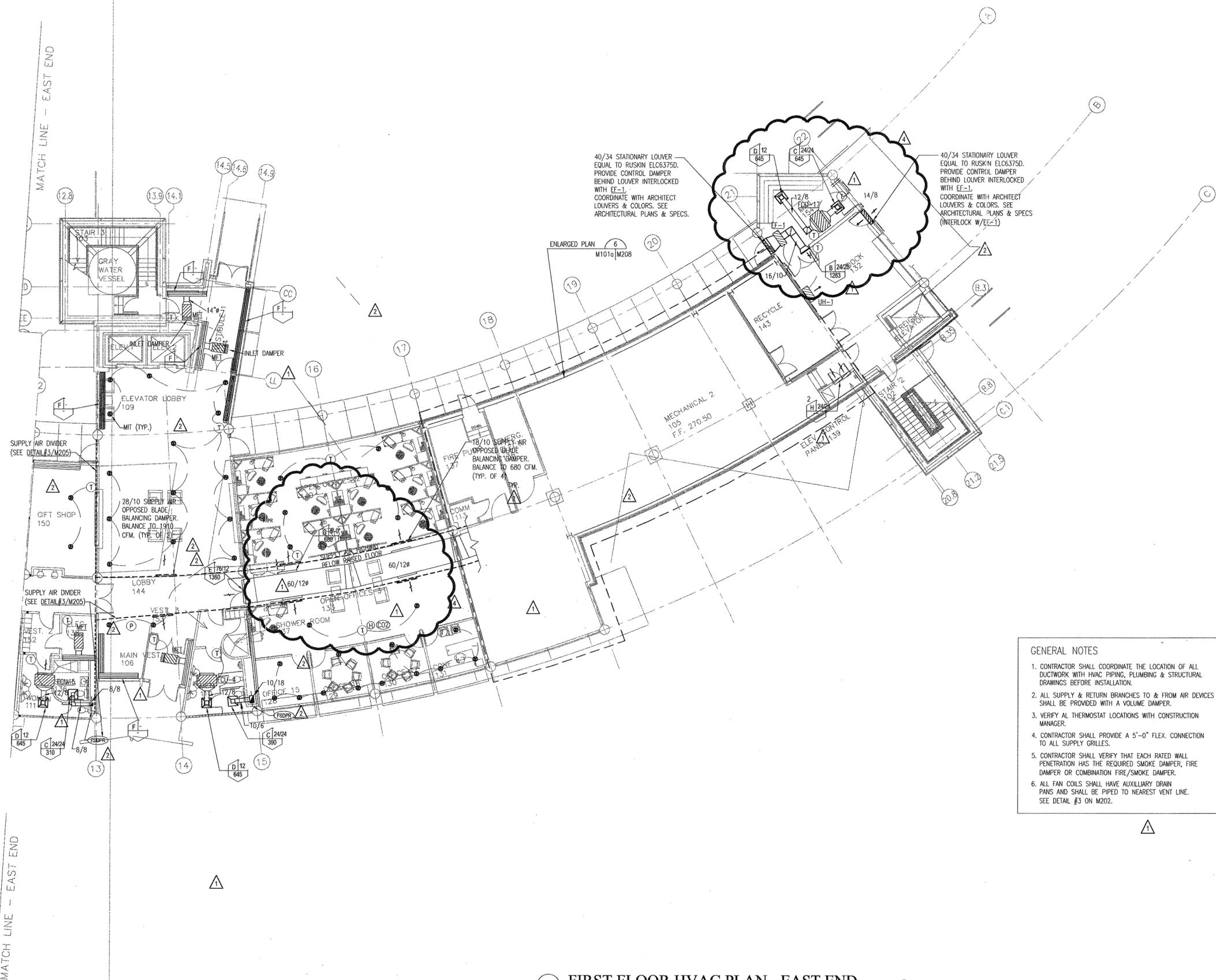
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LITTLE ROCK, ARKANSAS

PSY PROJECT NUMBER:
431C

CONTENTS:
FIRST FLOOR HVAC
PLAN - EAST END
SHEET NUMBER:

M101a



1 FIRST FLOOR HVAC PLAN - EAST END
SCALE: 1/8" = 1'-0"



GENERAL NOTES

- CONTRACTOR SHALL COORDINATE THE LOCATION OF ALL DUCTWORK WITH HVAC PIPING, PLUMBING & STRUCTURAL DRAWINGS BEFORE INSTALLATION.
- ALL SUPPLY & RETURN BRANCHES TO & FROM AIR DEVICES SHALL BE PROVIDED WITH A VOLUME DAMPER.
- VERIFY ALL THERMOSTAT LOCATIONS WITH CONSTRUCTION MANAGER.
- CONTRACTOR SHALL PROVIDE A 5'-0" FLEX CONNECTION TO ALL SUPPLY GRILLES.
- CONTRACTOR SHALL VERIFY THAT EACH RATED WALL PENETRATION HAS THE REQUIRED SMOKE DAMPER, FIRE DAMPER OR COMBINATION FIRE/SMOKE DAMPER.
- ALL FAN COILS SHALL HAVE AUXILIARY DRAIN PANS AND SHALL BE PIPED TO NEAREST VENT LINE. SEE DETAIL #3 ON M202.



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GENERAL NOTES:

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CORE/SHELL
PACKAGE #5

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#	DATE	DESCRIPTION
1	1-16-04	ADDENDUM #1
2	1-23-04	PACKAGE 5-ADDM. 02
3	7-1-04	PACKAGE 7, 100% ROLL UP
4	11-29-04	ASI #27

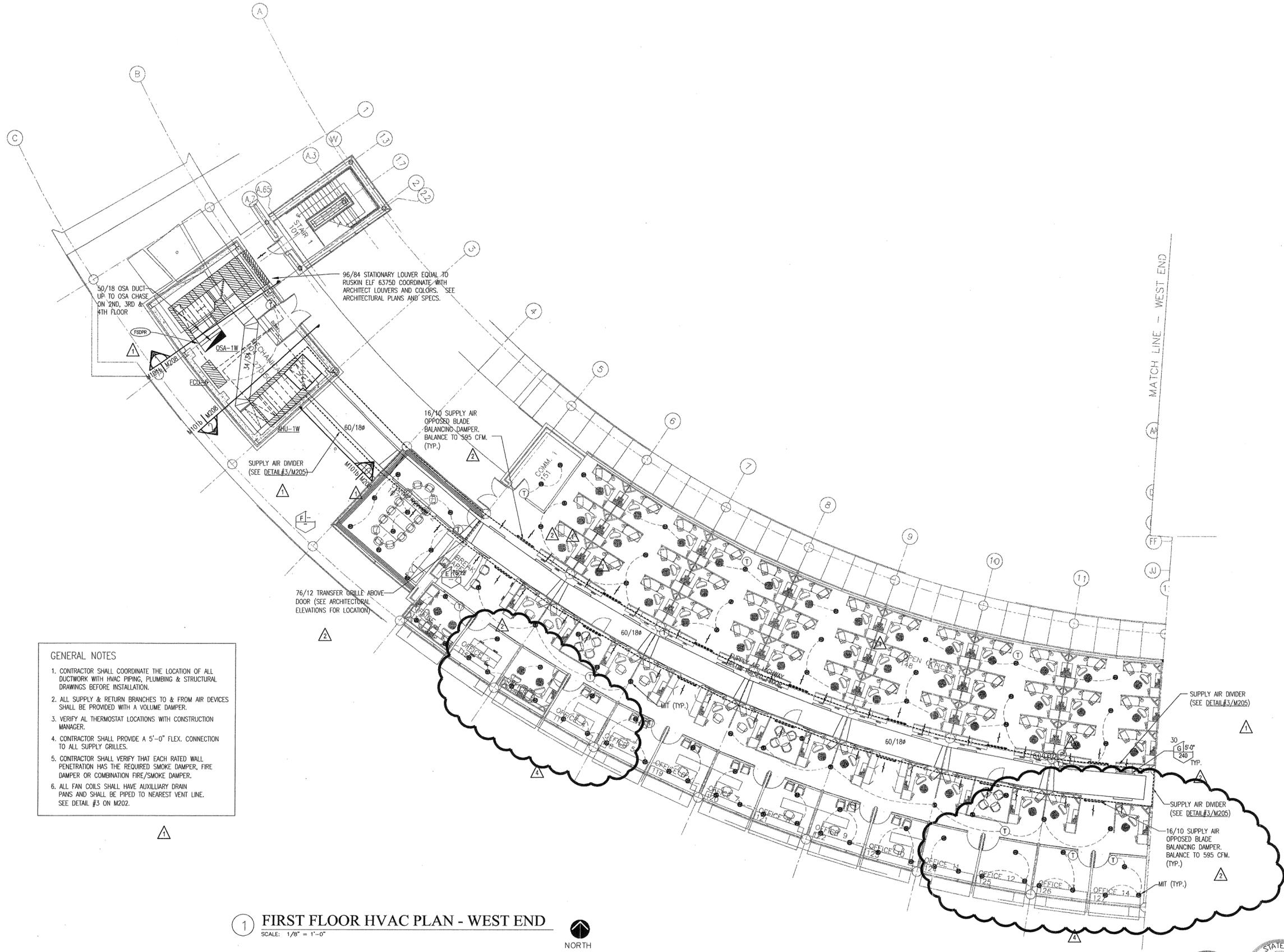
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PSY PROJECT NUMBER:
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CONTENTS:
FIRST FLOOR HVAC
PLAN - WEST END

SHEET NUMBER:
M101b



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3. VERIFY ALL THERMOSTAT LOCATIONS WITH CONSTRUCTION MANAGER.
4. CONTRACTOR SHALL PROVIDE A 5'-0" FLEX. CONNECTION TO ALL SUPPLY GRILLES.
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6. ALL FAN COILS SHALL HAVE AUXILIARY DRAIN PANS AND SHALL BE PIPED TO NEAREST VENT LINE. SEE DETAIL #3 ON M202.

1 FIRST FLOOR HVAC PLAN - WEST END
SCALE: 1/8" = 1'-0"
NORTH



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1	1-16-04	ADDENDUM #1
2	1-23-04	PACKAGE 5-ADDM. 02
3	7-1-04	PACKAGE 7, 100% ROLL UP
4	11-29-04	ASI #27

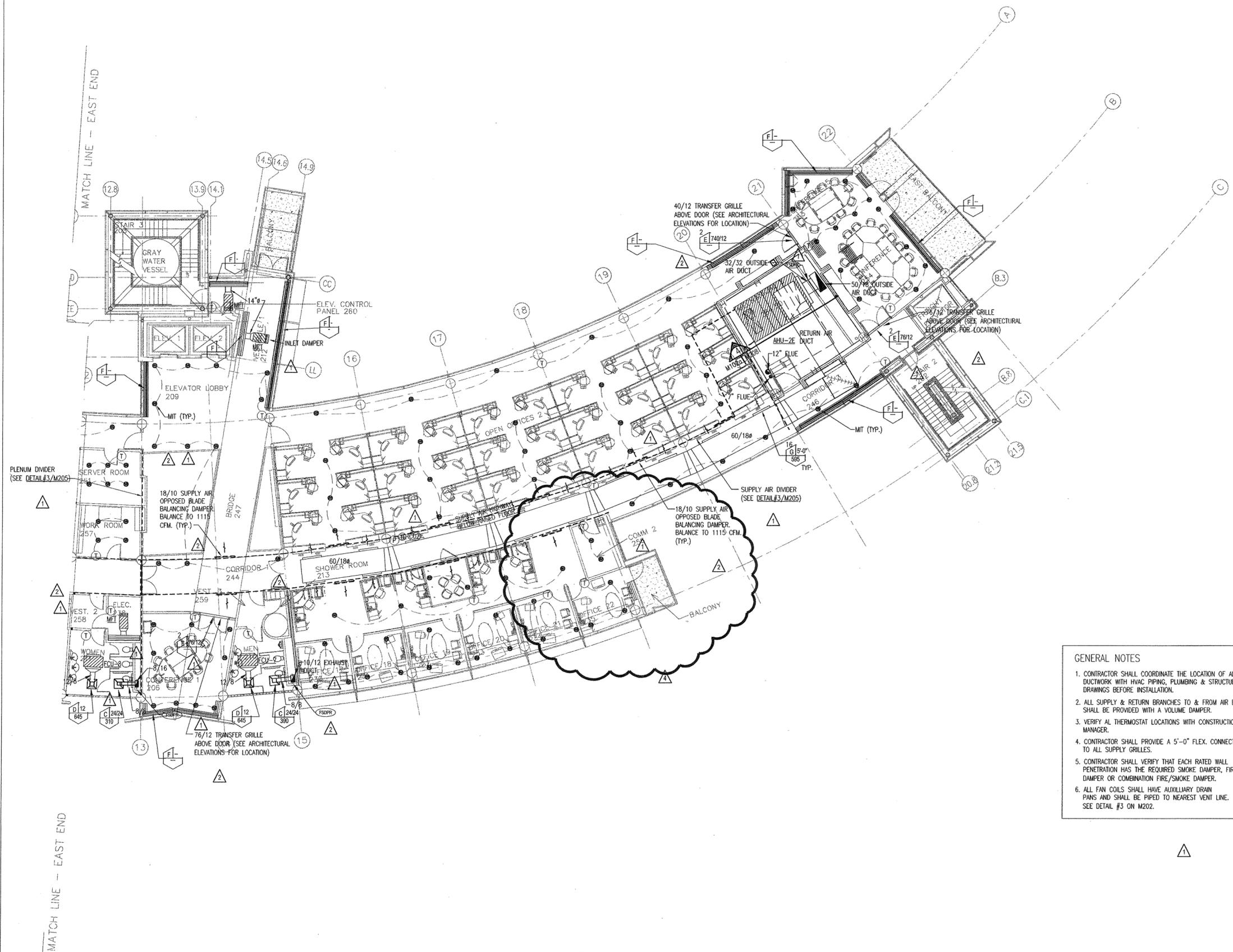
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PSY PROJECT NUMBER:
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CONTENTS:
SECOND FLOOR HVAC
PLAN - EAST END
SHEET NUMBER:

M102a



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1 SECOND FLOOR HVAC PLAN - EAST END
SCALE: 1/8" = 1'-0"



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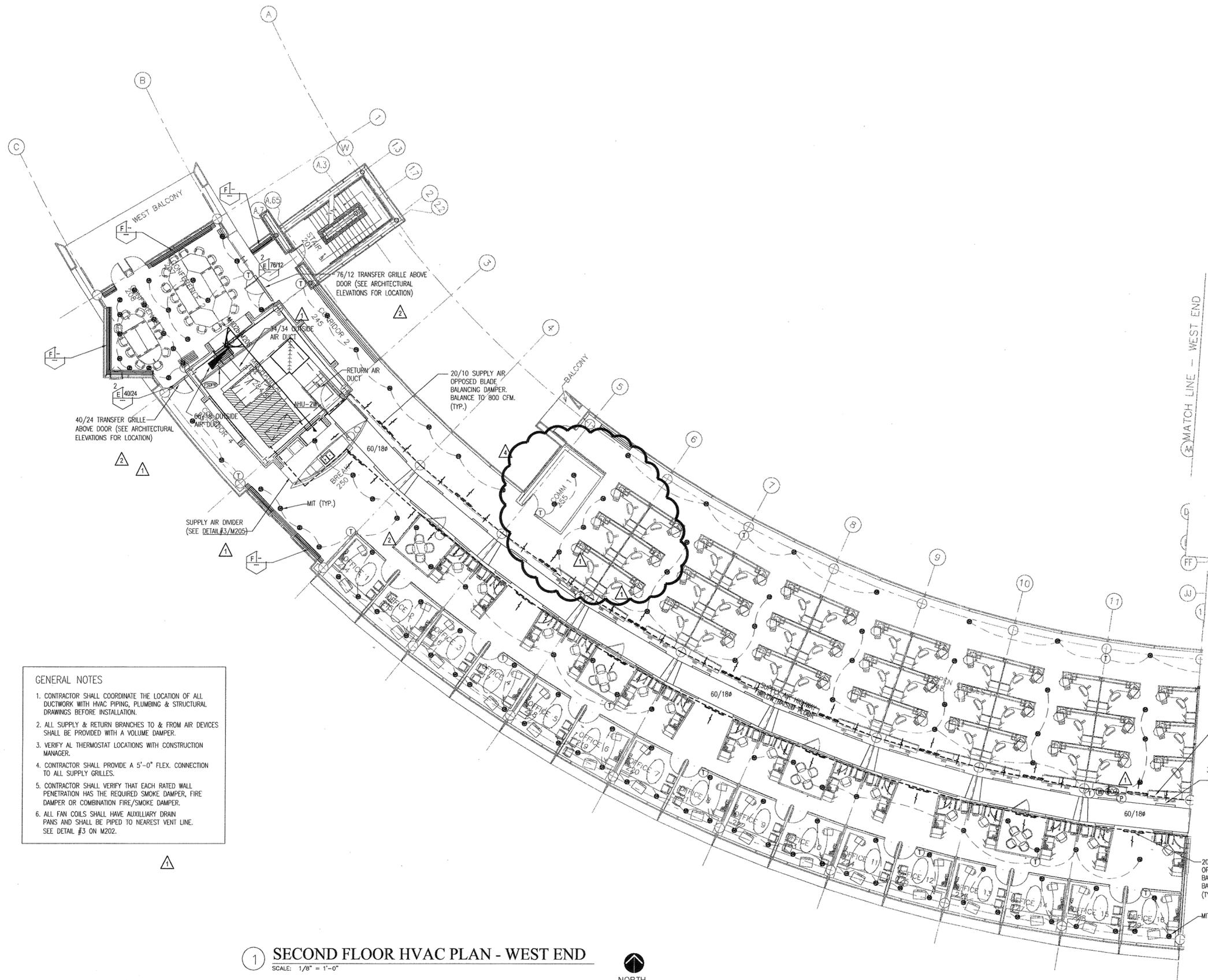
LITTLE ROCK, ARKANSAS

PSY PROJECT NUMBER:
431C

CONTENTS:
SECOND FLOOR HVAC
PLAN - WEST END

SHEET NUMBER:

M102b



GENERAL NOTES

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1 SECOND FLOOR HVAC PLAN - WEST END
SCALE: 1/8" = 1'-0"



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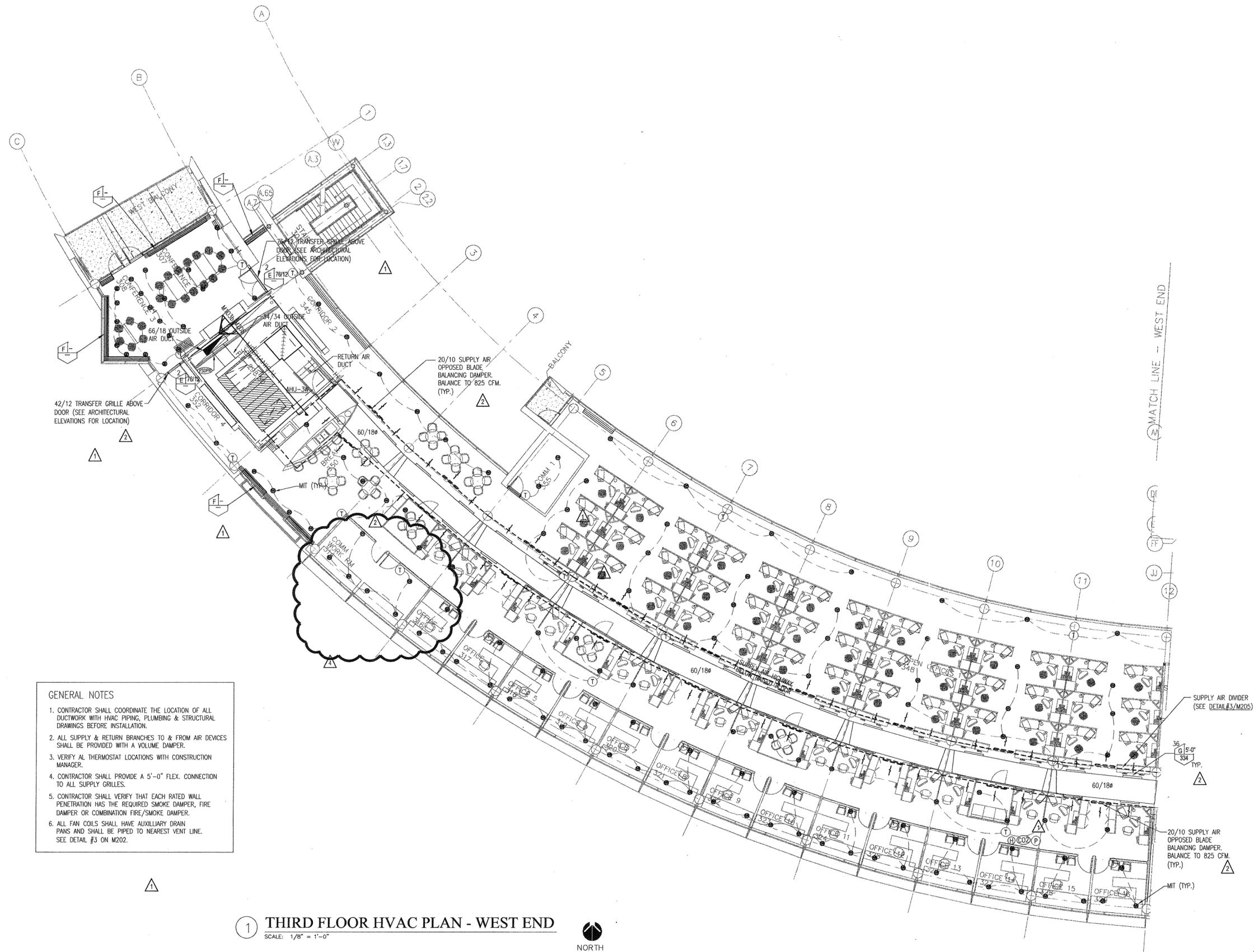
LITTLE ROCK, ARKANSAS

PSY PROJECT NUMBER:
431C

CONTENTS:
THIRD FLOOR HVAC
PLAN - WEST END

SHEET NUMBER:

M103b



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1 THIRD FLOOR HVAC PLAN - WEST END
SCALE: 1/8" = 1'-0"
NORTH



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STRUCTURAL ENGINEER:
CROMWELL ENGINEERS INC.

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

SUSTAINABLE CONSULTANT:
BNIM / ELEMENTS

GLOBAL VILLAGE CONSULTANT
CAMBRIDGE SEVEN ASSOCIATES

INTERIOR DESIGNER:
POLK STANLEY YEARY

GENERAL CONTRACTOR:
CDI

GENERAL NOTES:

NOTES:

ISSUE DATE:
DECEMBER 15, 2003
CORE/SHELL
PACKAGE #5

REVISIONS:

#	DATE	DESCRIPTION
1	1-16-04	ADDENDUM #1
2	1-23-04	PACKAGE 5-ADDM. 02
3	7-1-04	PACKAGE 7, 100% ROLL UP
4	11-29-04	ASI #27

**HEIFER
INTERNATIONAL
CENTER
OFFICE BUILDING**

LITTLE ROCK, ARKANSAS

PSY PROJECT NUMBER:
431C

CONTENTS:
FOURTH FLOOR HVAC
PLAN - EAST END

SHEET NUMBER:

M104a



GENERAL NOTES

- CONTRACTOR SHALL COORDINATE THE LOCATION OF ALL DUCTWORK WITH HVAC PIPING, PLUMBING & STRUCTURAL DRAWINGS BEFORE INSTALLATION.
- ALL SUPPLY & RETURN BRANCHES TO & FROM AIR DEVICES SHALL BE PROVIDED WITH A VOLUME DAMPER.
- VERIFY ALL THERMOSTAT LOCATIONS WITH CONSTRUCTION MANAGER.
- CONTRACTOR SHALL PROVIDE A 5'-0" FLEX. CONNECTION TO ALL SUPPLY GRILLES.
- CONTRACTOR SHALL VERIFY THAT EACH RATED WALL PENETRATION HAS THE REQUIRED SMOKE DAMPER, FIRE DAMPER OR COMBINATION FIRE/SMOKE DAMPER.
- ALL FAN COILS SHALL HAVE AUXILIARY DRAIN PANS AND SHALL BE PIPED TO NEAREST VENT LINE. SEE DETAIL #3 ON M202.

1 FOURTH FLOOR HVAC PLAN - EAST END
SCALE: 1/8" = 1'-0"



CONSULTANTS:

OWNER'S PROJECT ADVISOR:
MOSES TUCKER REAL ESTATE, INC.

CIVIL ENGINEER:
McCLELLAND ENGINEERS

LANDSCAPE ARCHITECT:
LARSON BURNS SMITH

STRUCTURAL ENGINEER:
CROMWELL ENGINEERS INC.

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

SUSTAINABLE CONSULTANT:
BNIM / ELEMENTS

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GENERAL NOTES:

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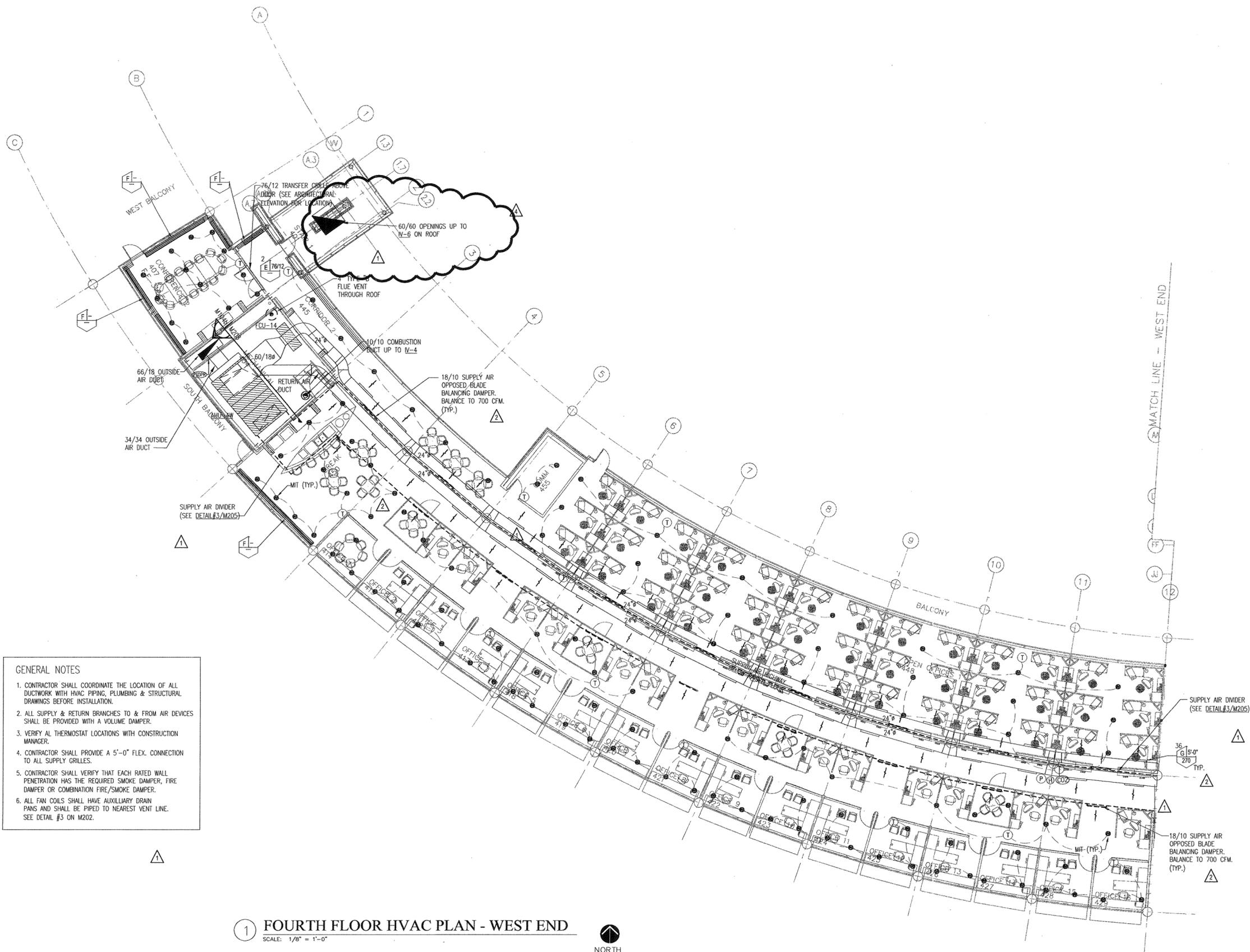
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CENTER
OFFICE BUILDING**

LITTLE ROCK, ARKANSAS

PSY PROJECT NUMBER:
431C

CONTENTS:
FOURTH FLOOR HVAC
PLAN - WEST END
SHEET NUMBER:

M104b



- GENERAL NOTES**
1. CONTRACTOR SHALL COORDINATE THE LOCATION OF ALL DUCTWORK WITH HVAC PIPING, PLUMBING & STRUCTURAL DRAWINGS BEFORE INSTALLATION.
 2. ALL SUPPLY & RETURN BRANCHES TO & FROM AIR DEVICES SHALL BE PROVIDED WITH A VOLUME DAMPER.
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1 FOURTH FLOOR HVAC PLAN - WEST END
SCALE: 1/8" = 1'-0"



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FAX 372-7629

21 W. MOUNTAIN, SUITE 227
FAYETTEVILLE, AR 72701
479-444-0473

CONSULTANTS:

OWNER'S PROJECT ADVISOR:
MOSES TUCKER REAL ESTATE, INC.

CIVIL ENGINEER:
McCLELLAND ENGINEERS

LANDSCAPE ARCHITECT:
LARSON BURNS SMITH

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3	7-1-04	PACKAGE 7, 10% ROLL UP
4	11-29-04	ASI #27

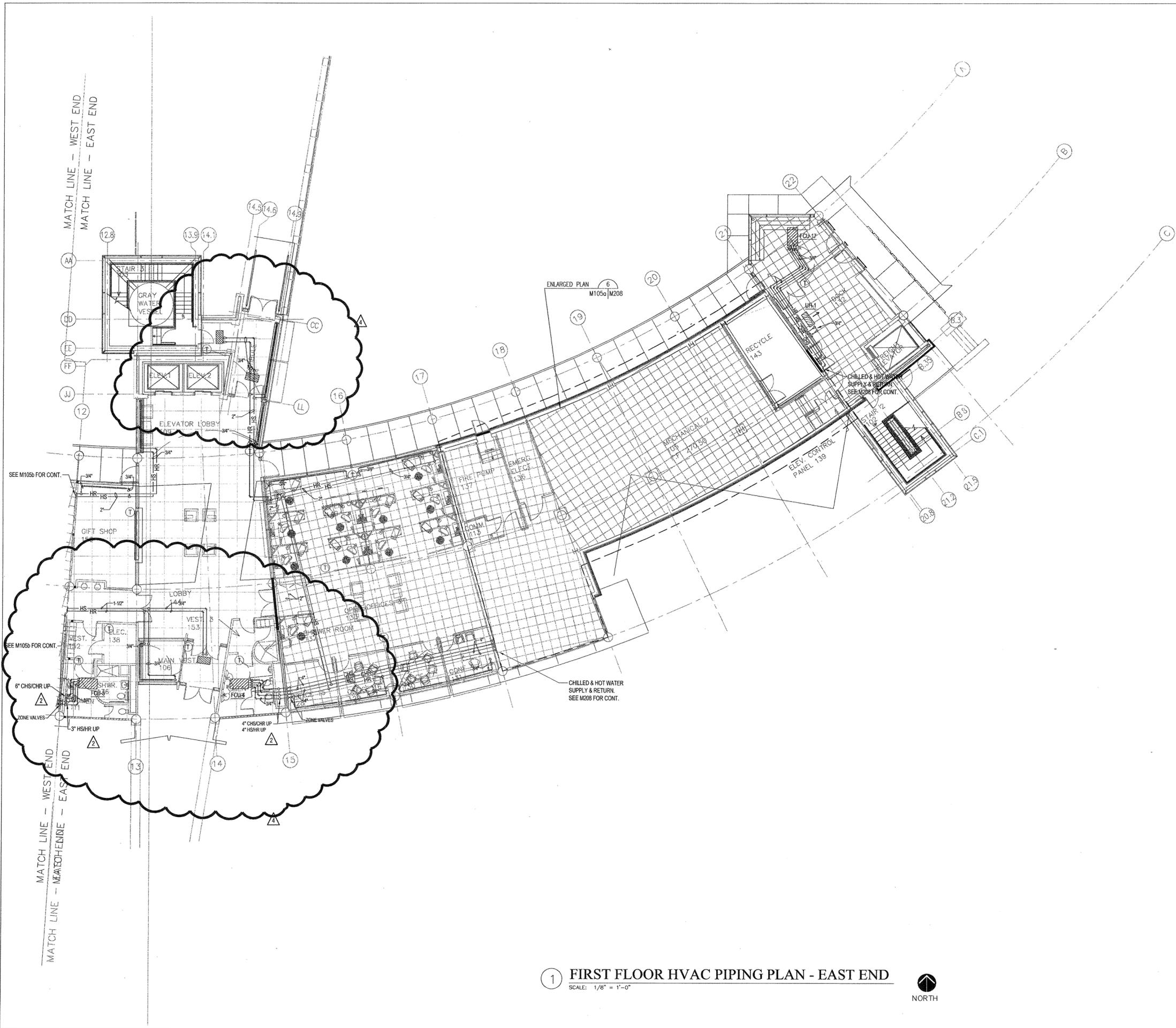
**HEIFER
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CENTER
OFFICE BUILDING**

LITTLE ROCK, ARKANSAS

PSY PROJECT NUMBER:
431C

CONTENTS:
FIRST FLOOR HVAC
PIPING PLAN - EAST END
SHEET NUMBER

M105a



1 FIRST FLOOR HVAC PIPING PLAN - EAST END
SCALE: 1/8" = 1'-0"



M105a

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479-444-0473

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LANDSCAPE ARCHITECT:
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PACKAGE #5

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4	11-29-04	ASI #27

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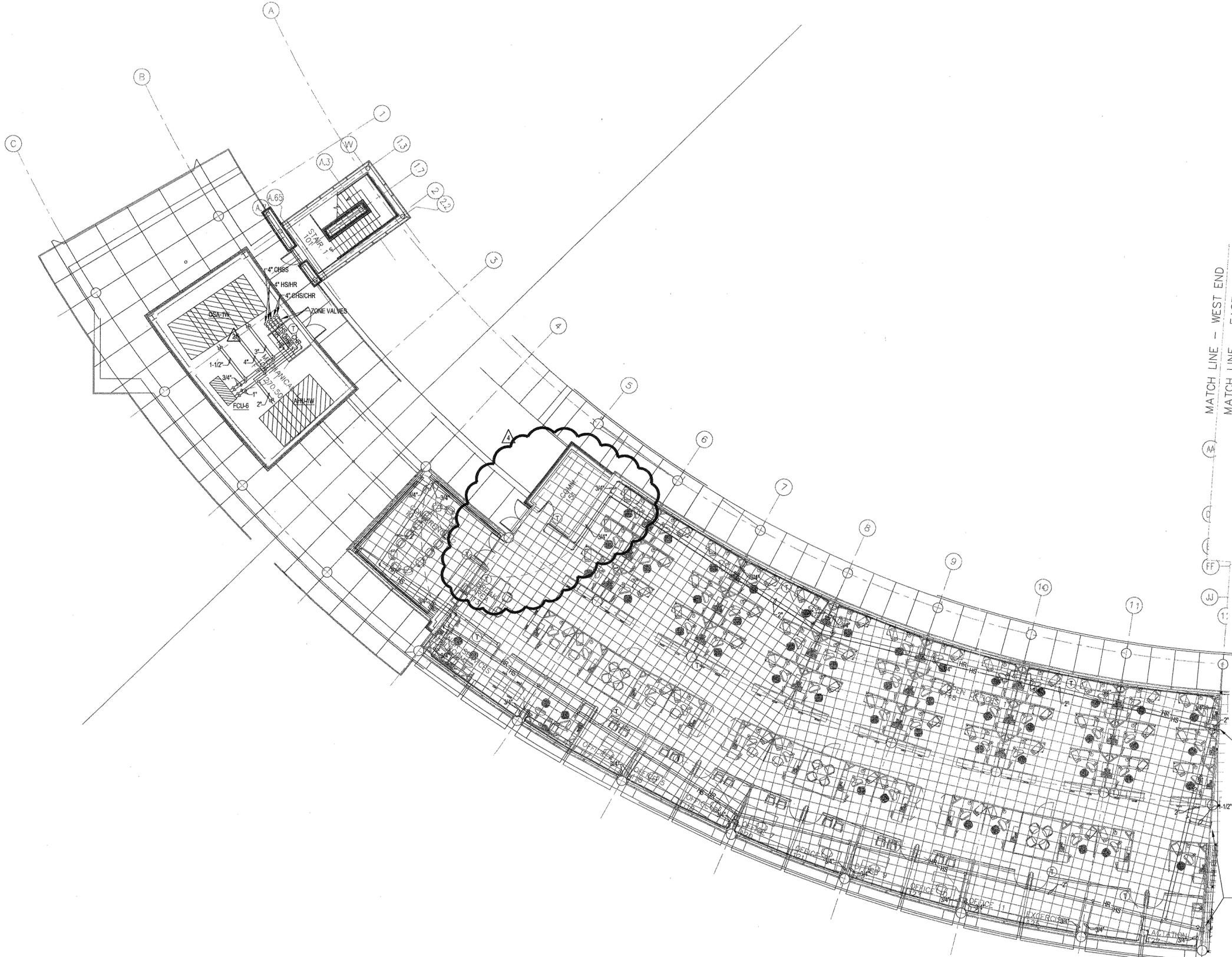
LITTLE ROCK, ARKANSAS

PSY PROJECT NUMBER:
431C

CONTENTS:
FIRST FLOOR HVAC PIPING
PLAN - WEST END

SHEET NUMBER:

M105b



1 FIRST FLOOR HVAC PIPING PLAN - WEST END
SCALE: 1/8" = 1'-0"



MATCH LINE - WEST END
MATCH LINE - EAST END

WEST END
EAST END



REGISTERED PROFESSIONAL ENGINEER
TODD A. KUAN
NO. 9408
STATE OF ARKANSAS

**POLK
STANLEY
YEARY
ARCHITECTS, LTD.**

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479-444-0473

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CORE/SHELL
PACKAGE #5
REVISIONS:

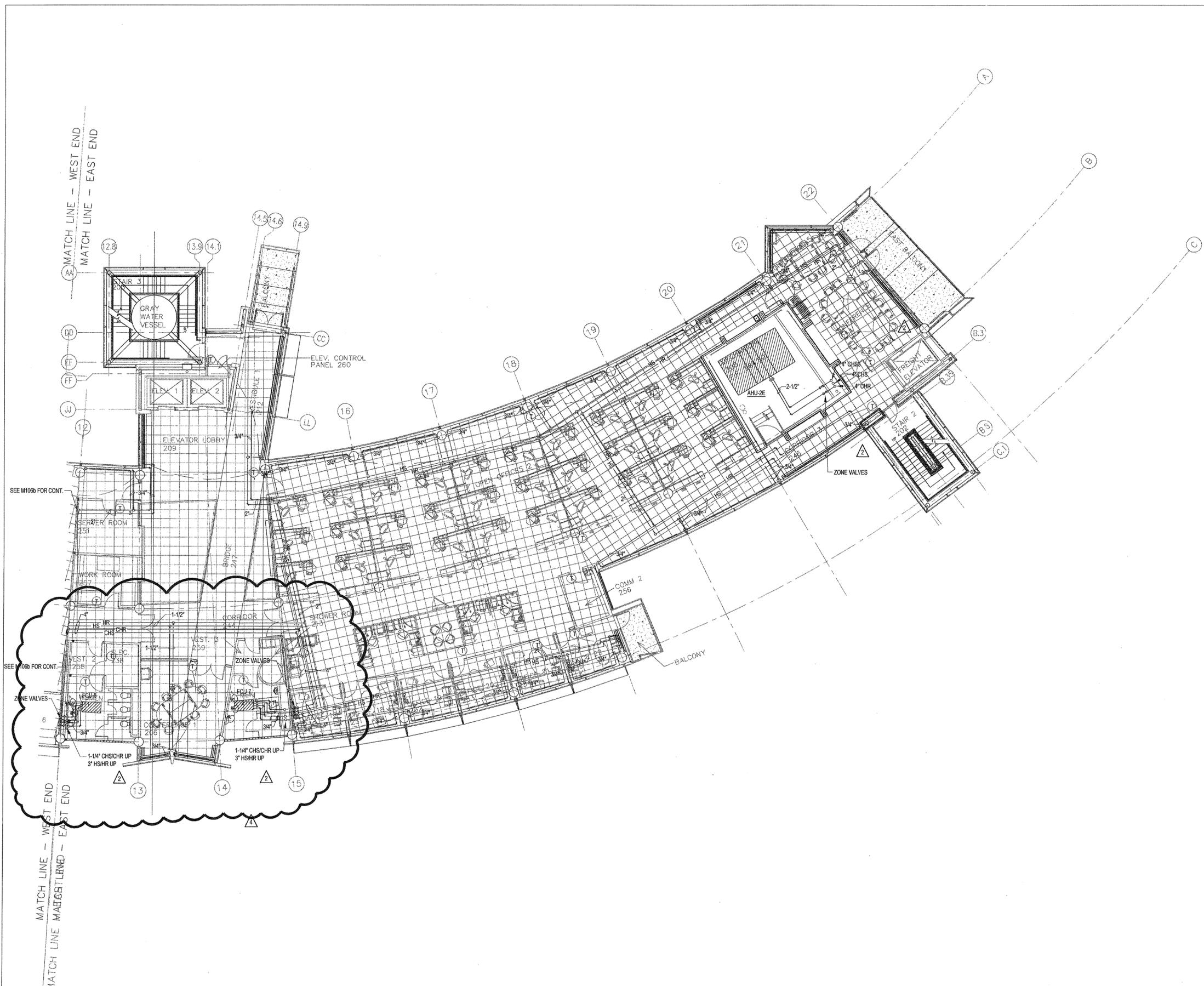
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▲	1-23-04	PACKAGE 5-ADDM. 02
▲	7-1-04	PACKAGE 7, 100% ROLL UP
▲	11-29-04	ASI #27

**HEIFER
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OFFICE BUILDING**
LITTLE ROCK, ARKANSAS

PSY PROJECT NUMBER:
431C

CONTENTS:
SECOND FLOOR HVAC
PIPING PLAN - EAST END
SHEET NUMBER:

M106a



1 SECOND FLOOR HVAC PIPING PLAN - EAST END
SCALE: 1/8" = 1'-0"



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CONSULTANTS:

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MCLELLAND ENGINEERS

LANDSCAPE ARCHITECT:
LARSON BURNS SMITH

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ISSUE DATE:
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CORE/SHELL
PACKAGE #5

REVISIONS:

#	DATE	DESCRIPTION
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4	11-29-04	ASI #27

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OFFICE BUILDING**

LITTLE ROCK, ARKANSAS

PSY PROJECT NUMBER:
431C

CONTENTS:
SECOND FLOOR HVAC
PIPING PLAN - WEST END

SHEET NUMBER:

M106b



1 SECOND FLOOR HVAC PIPING PLAN - WEST END
SCALE: 1/8" = 1'-0"



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479-444-0473

CONSULTANTS:

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MCCLELLAND ENGINEERS

LANDSCAPE ARCHITECT:
LARSON BURNS SMITH

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CROMWELL ENGINEERS INC.

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DECEMBER 15, 2003
CORE/SHELL
PACKAGE #5
REVISIONS:

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3	7-1-04	PACKAGE 7, 100% ROLL UP
4	11-29-04	ASI #27

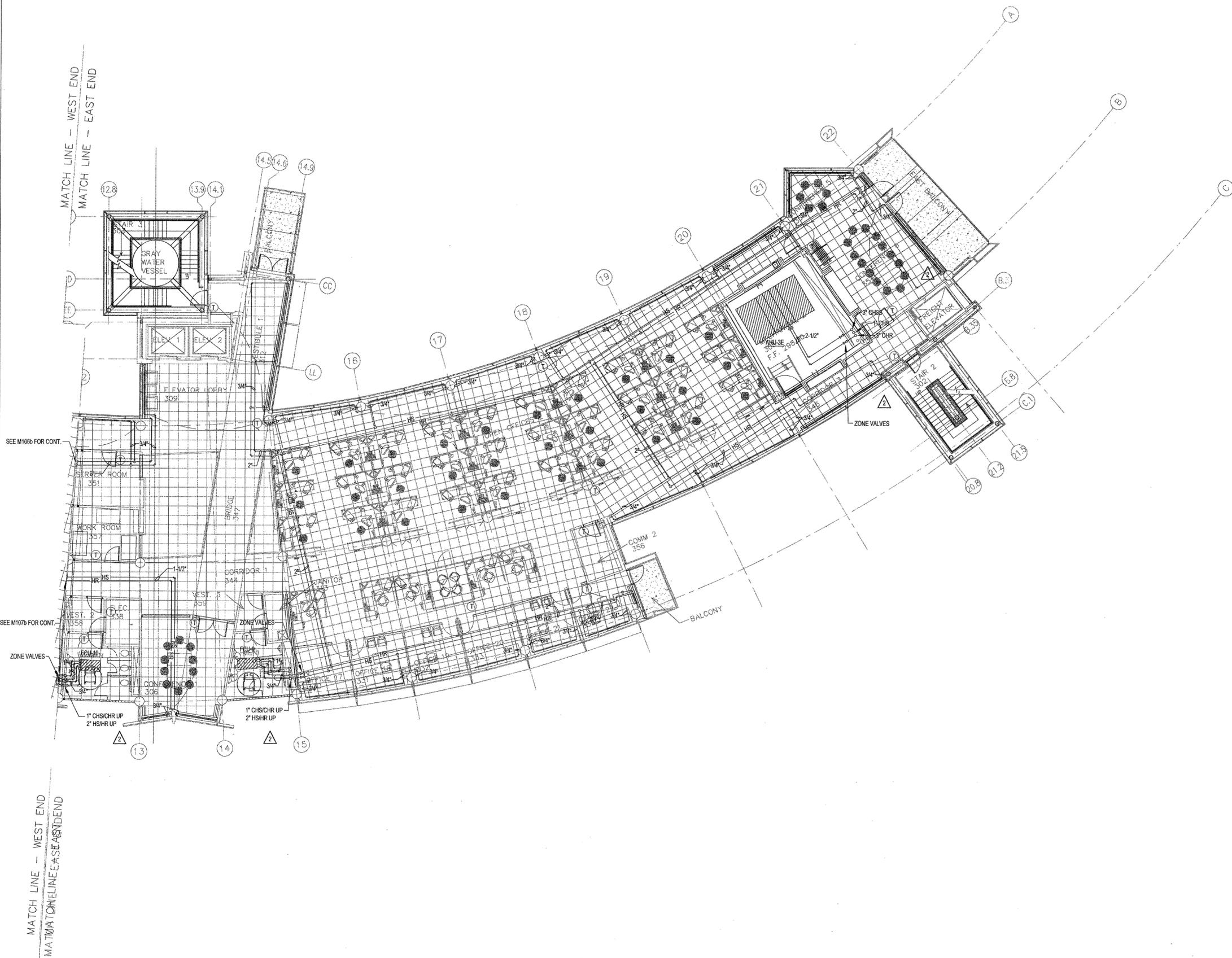
**HEIFER
INTERNATIONAL
CENTER
OFFICE BUILDING**

LITTLE ROCK, ARKANSAS

PSY PROJECT NUMBER:
431C

CONTENTS:
THIRD FLOOR HVAC
PIPING PLAN - EAST END
SHEET NUMBER:

M107a



1 THIRD FLOOR HVAC PIPING PLAN - EAST END
SCALE: 1/8" = 1'-0"



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LITTLE ROCK, AR 72201
501 378-0878
FAX 372-7629

21 W. MOUNTAIN, SUITE 227
FAYETTEVILLE, AR 72701
479-444-0473

CONSULTANTS:

OWNER'S PROJECT ADVISOR:
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McCLELLAND ENGINEERS

LANDSCAPE ARCHITECT:
LARSON BURNS SMITH

STRUCTURAL ENGINEER:
CROMWELL ENGINEERS INC.

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

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ISSUE DATE:
DECEMBER 15, 2003
CORE/SHELL
PACKAGE #5

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4	11-29-04	ASI #27

**HEIFER
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OFFICE BUILDING**

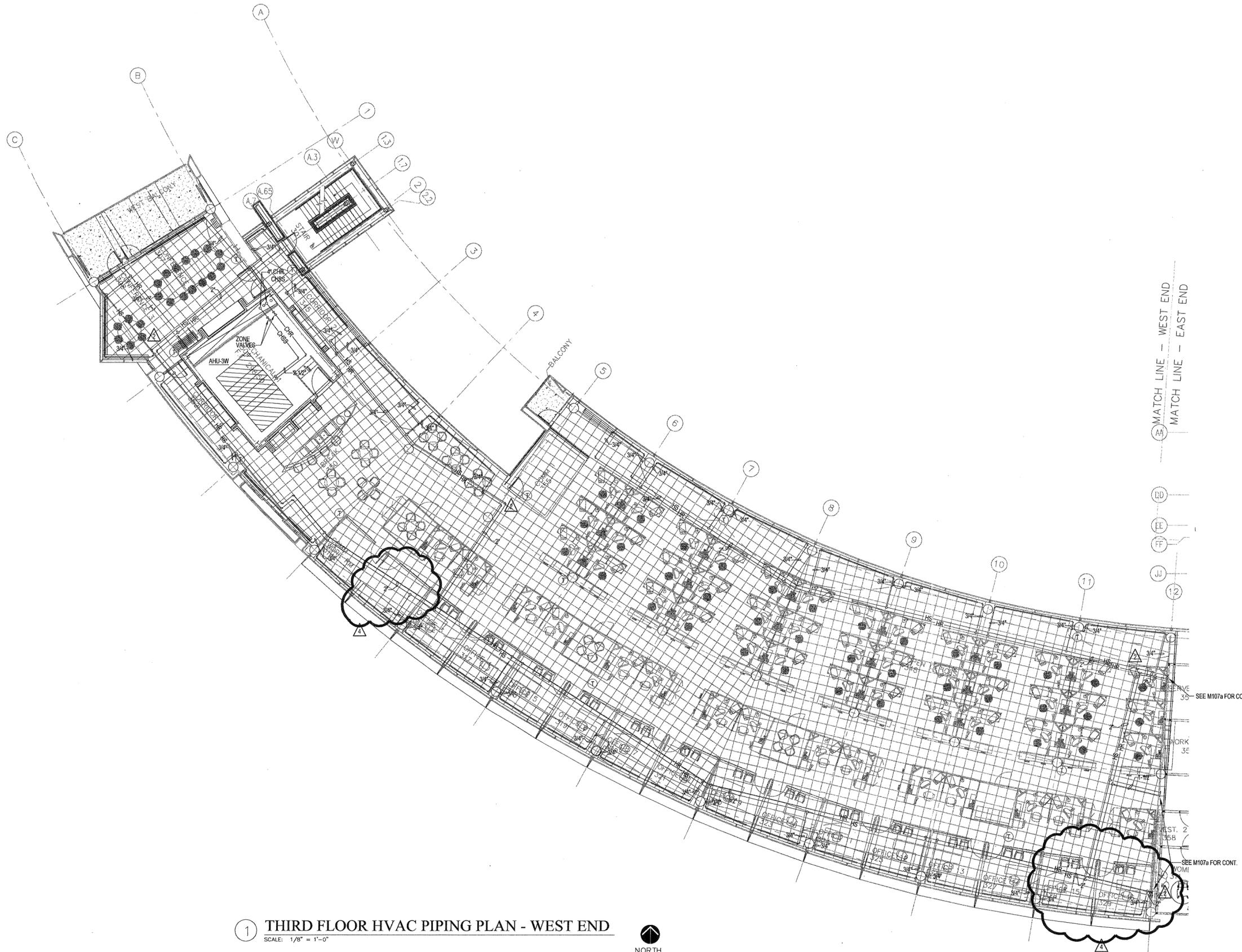
LITTLE ROCK, ARKANSAS

PSY PROJECT NUMBER:
431C

CONTENTS:
THIRD FLOOR HVAC
PIPING PLAN - WEST END

SHEET NUMBER:

M107b



1 THIRD FLOOR HVAC PIPING PLAN - WEST END
SCALE: 1/8" = 1'-0"



CROMWELL ENGINEERS, INC.

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21 W. MOUNTAIN, SUITE 227
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479-444-0473

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OFFICE BUILDING**

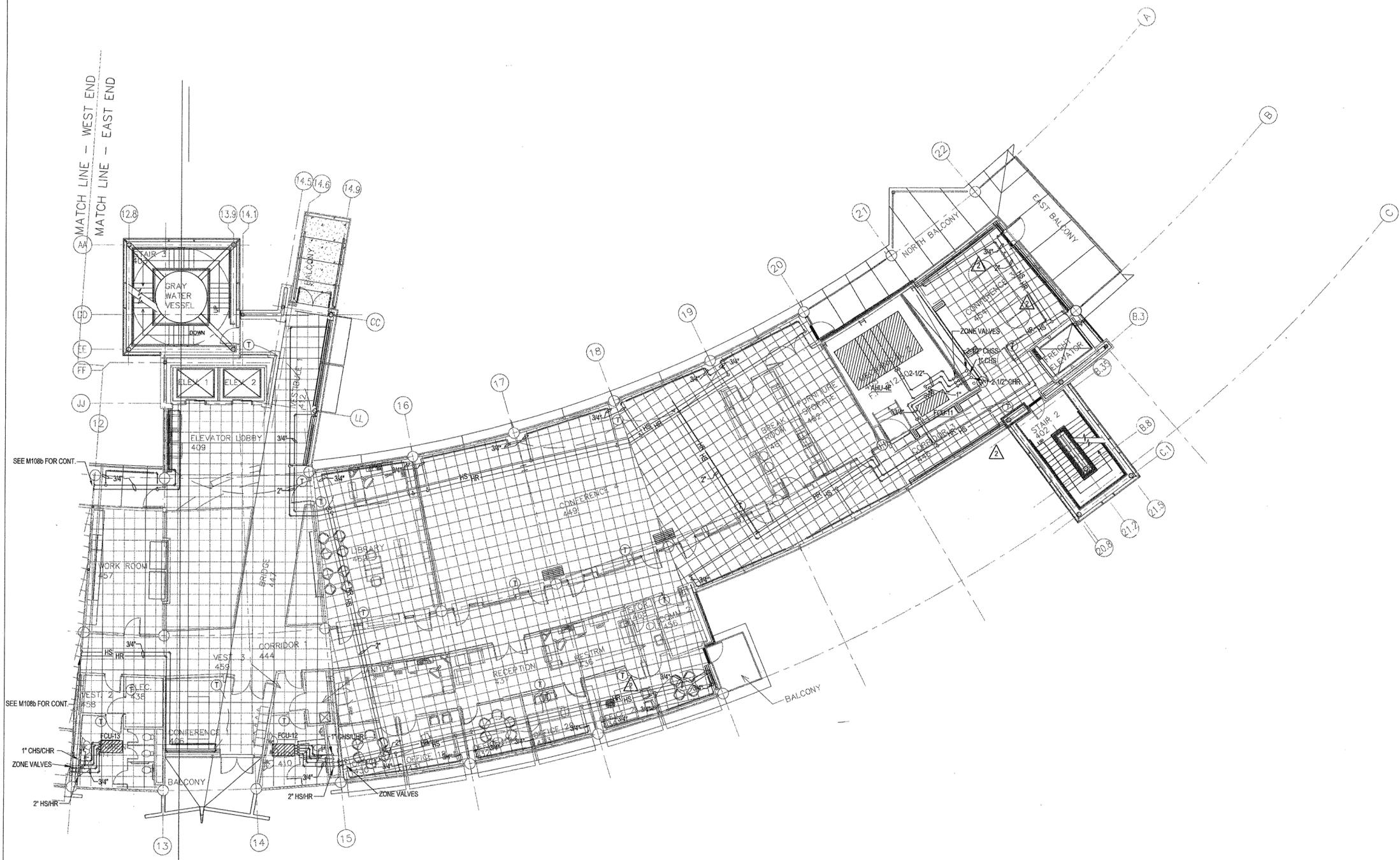
LITTLE ROCK, ARKANSAS

PSY PROJECT NUMBER:
431C

CONTENTS:
FOURTH FLOOR HVAC
PIPING PLAN - EAST END

SHEET NUMBER:

M108a



1 FOURTH FLOOR HVAC PIPING PLAN - EAST END
SCALE: 1/8" = 1'-0"



PSY PROJECT NUMBER:
431C

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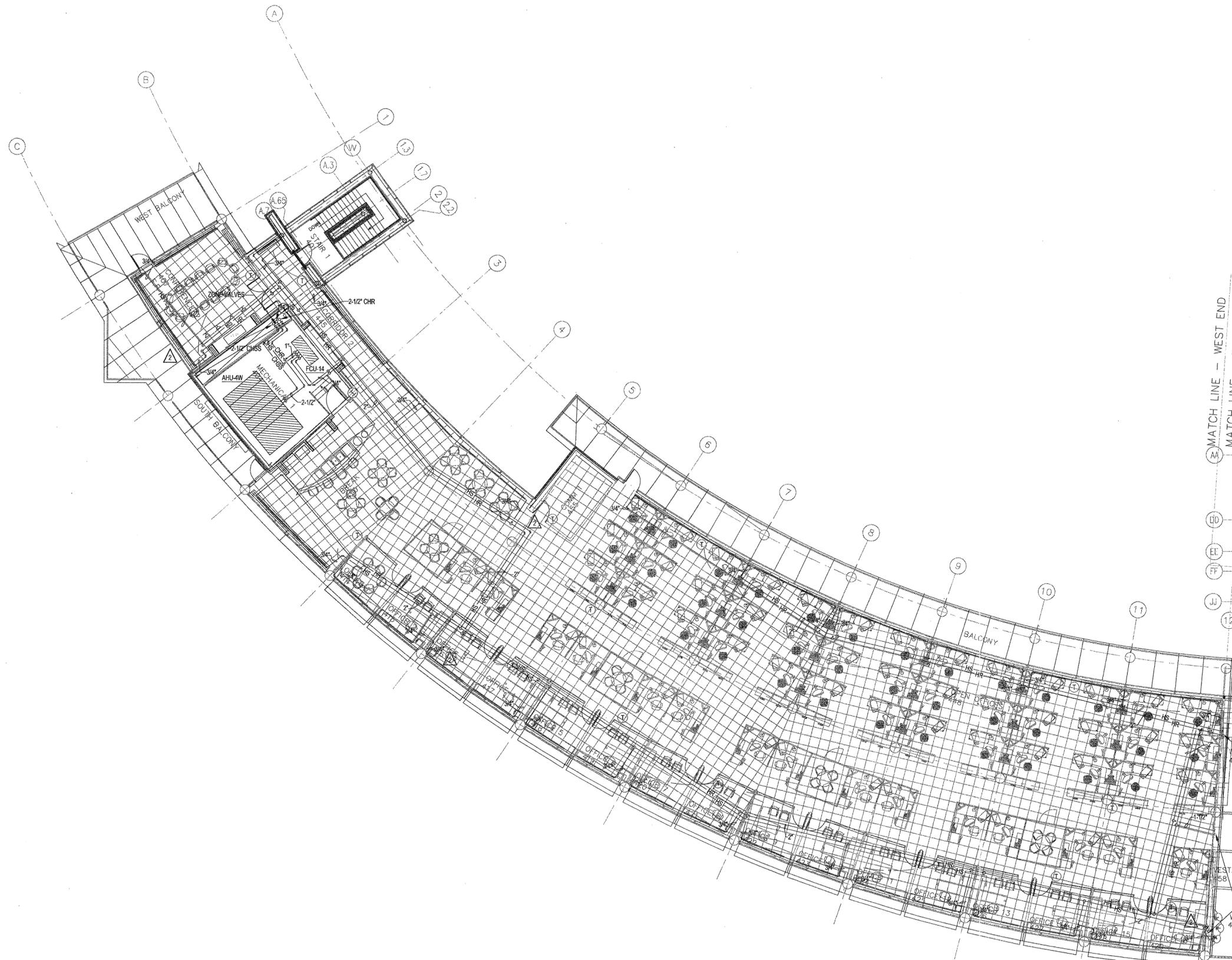
LITTLE ROCK, ARKANSAS

PSY PROJECT NUMBER:
431C

CONTENTS:
FOURTH FLOOR HVAC
PIPING PLAN - WEST END

SHEET NUMBER

M108b



1 FOURTH FLOOR HVAC PIPING PLAN - WEST END
SCALE: 1/8" = 1'-0"



DATE PLOTTED: 12/15/03 10:58 AM

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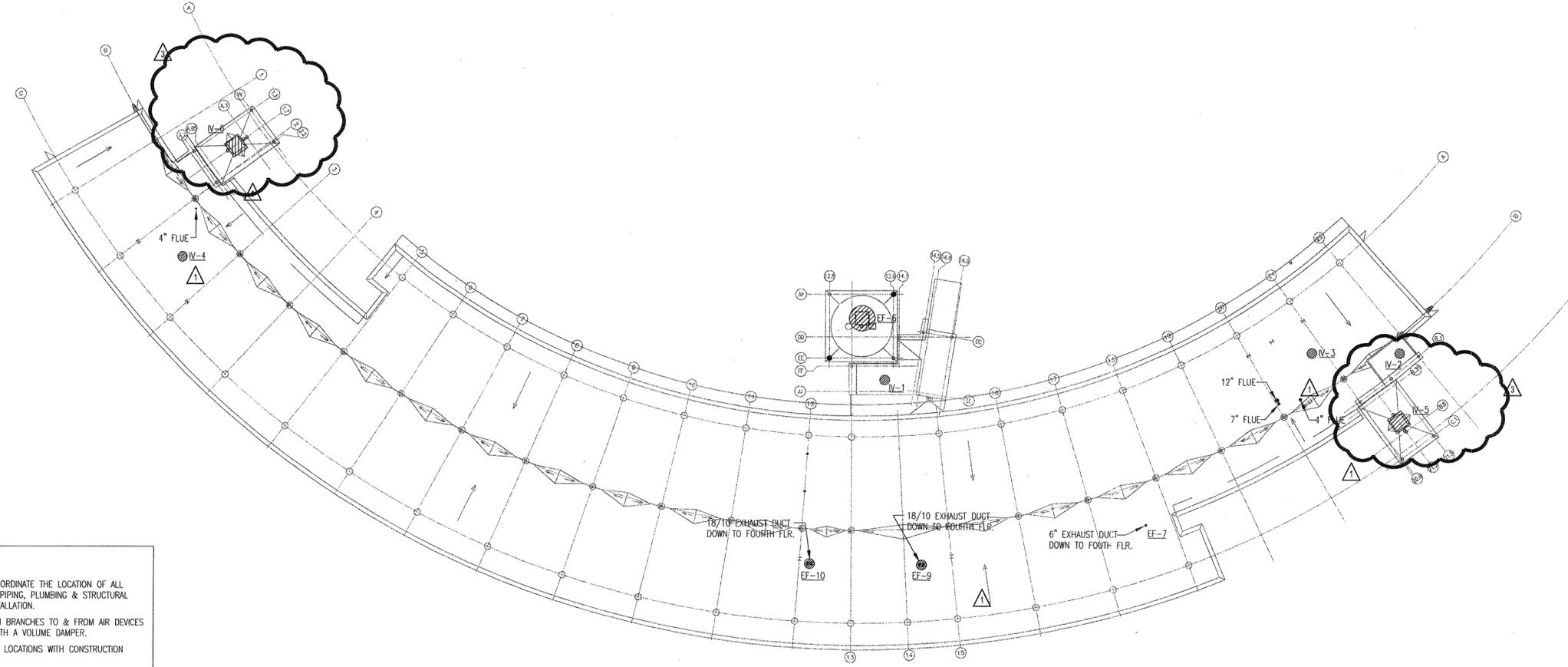
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**HEIFER
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LITTLE ROCK, ARKANSAS

PSY PROJECT NUMBER:
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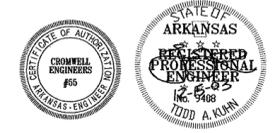
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HVAC ROOF PLAN

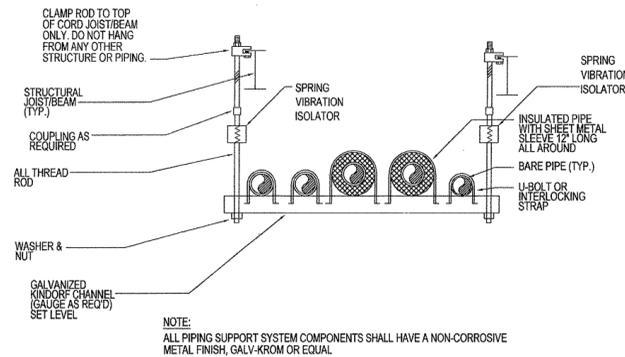
SHEET NUMBER:
M109



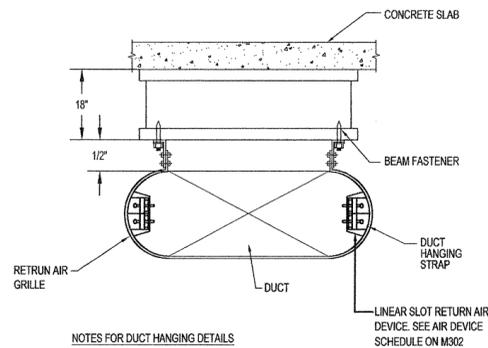
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1. CONTRACTOR SHALL COORDINATE THE LOCATION OF ALL DUCTWORK WITH HVAC PIPING, PLUMBING & STRUCTURAL DRAWINGS BEFORE INSTALLATION.
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1 HVAC ROOF PLAN
SCALE: 1/16" = 1'-0"
NORTH





1 TRAPEZE PIPE SUPPORT DETAIL
M-203 | M-203 NO SCALE



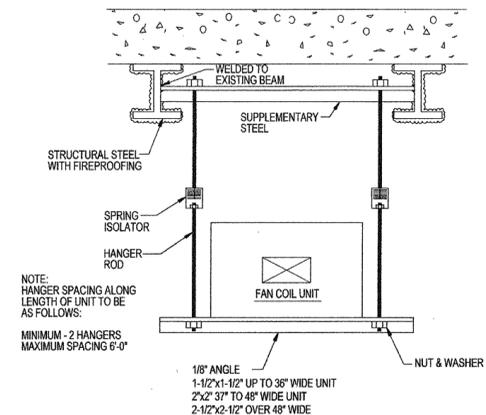
NOTES FOR DUCT HANGING DETAILS

1. DUCT SHALL BE SUSPENDED WITH GALVANIZED BAND IRON STRAPS SECURELY FASTENED TO THE BOTTOM AND SIDE OF THE DUCT. STRAPS TO BE SIZED IN ACCORDANCE WITH SMACNA TABLE 4-1 OR ACCORDING TO LOCAL CODES, WHICHEVER IS MORE STRINGENT.

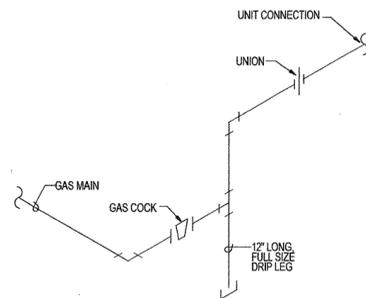
CROSS SECTIONAL AREA (SQ.FT.)	MAX. HANGER SPACING (FT.)
UP TO 4	8
OVER 4 NOT TO EXCEED 10	6
OVER 10	4

2. DUCTS WIDER THAN 60 INCHES TO BE SUPPORTED BY TRAPEZE ANGLES IN ACCORDANCE WITH SMACNA TABLE 4-3.

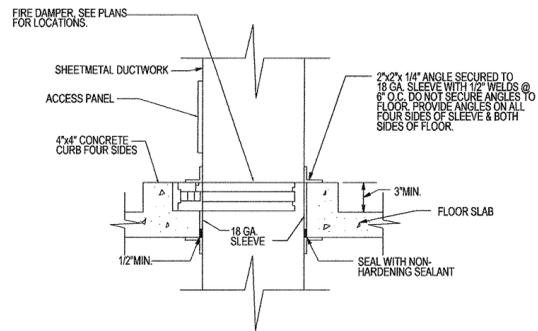
2 DUCT HANGING DETAIL FOR CONCRETE SLAB
M-203 | M-203 NO SCALE



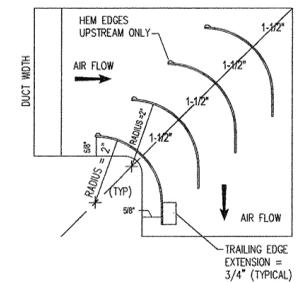
3 EQUIPMENT SUSPENDED FROM STRUCTURAL STEEL
M-203 | M-203 NO SCALE



4 TYPICAL GAS PIPING CONNECTION
M-203 | M-203 NO SCALE



5 DUCT PENETRATION THRU FIRE RATED FLOOR
M-203 | M-203 NO SCALE

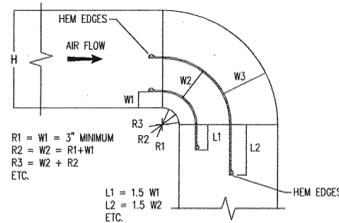


NOTES:

- ALL TURNING VANES TO BE MADE OF 18 GAUGE GALV. SHEET METAL, 2" RADIUS, 1-1/2" SPACING ON DIAGONAL, 3/4" TRAILING EDGE, SINGLE THICKNESS, FOR DUCT VELOCITIES ABOVE 2000 FPM.
- EDGES OF VANES SHALL BE CLEANLY SHEARED WITH NO BURRS, ETC.
- VANES SHALL BE SECURELY ATTACHED TO RUNNERS, AND RUNNERS TO DUCT SIDES, AS SHOWN FOR DOUBLE THICKNESS VANES IN SMACNA HIGH VELOCITY MANUAL.

TURNING VANES FOR SQUARE ELBOWS IN HIGH VELOCITY DUCTWORK OF MAXIMUM 36"x36" CROSS-SECTION

6 TURNING VANES DETAIL
M-203 | M-203 NO SCALE

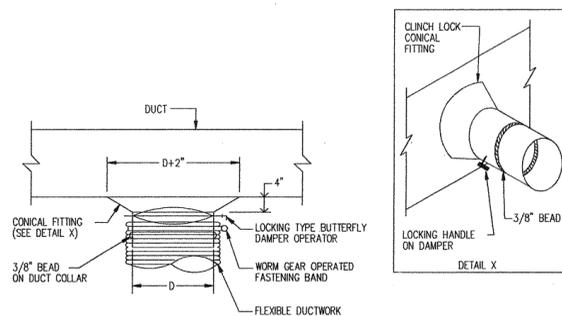


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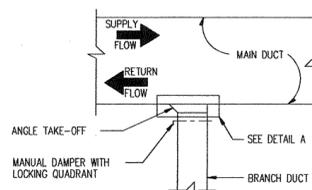
- RADIUS ELBOWS, WHERE POSSIBLE, SHOULD HAVE THROAT RADIUS AT LEAST EQUAL TO DUCT WIDTH, W.
- ALL RADIUS ELBOWS WITH A THROAT RADIUS LESS THAN THE DUCT WIDTH ARE TO BE FABRICATED WITH SPLITTERS, AS SHOWN IN THIS DRAWING. WHEN THROAT IS SQUARE, W1 IS TO BE 3 INCHES, W2 THEN = 6", W3 = 12", ETC.
- WHERE VANED ELBOWS ARE REQUIRED FOR HIGH VELOCITY (>2000 FPM) SYSTEMS DUE TO SPACE CONDITIONS, THIS IS ONE APPROVED TYPE OF ELBOW. DO NOT USE DOUBLE THICKNESS TURNING VANES FOR THIS APPLICATION.
- NUMBER OF SPLITTERS TO SUIT TOTAL DUCT WIDTH.

ELBOWS TO BE USED FOR HIGH VELOCITY DUCTWORK ABOVE 36"x36" CROSS-SECTION

7 TURNING VANES DETAIL
M-203 | M-203 NO SCALE



FLEXIBLE DUCT CONNECTION TO MAIN DUCTS



BRANCH DUCT CONNECTION

8 LOW PRESSURE BRANCH DUCT CONNECTIONS
M-203 | M-203 NO SCALE

POLK STANLEY YEARY ARCHITECTS, LTD.

700 SOUTH SCHILLER
LITTLE ROCK, AR 72201
501 378-8878
FAX 372-7629

21 W. MOUNTAIN, SUITE 227
FAYETTEVILLE, AR 72701
479-444-0473

CONSULTANTS:

OWNER'S PROJECT ADVISOR:
MOSES TUCKER REAL ESTATE, INC.

CIVIL ENGINEER:
MCLELLAND ENGINEERS

LANDSCAPE ARCHITECT:
LARSON BURNS SMITH

STRUCTURAL ENGINEER:
CROMWELL ENGINEERS INC.

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

SUSTAINABLE CONSULTANT:
BNIM / ELEMENTS

GLOBAL VILLAGE CONSULTANT
CAMBRIDGE SEVEN ASSOCIATES

INTERIOR DESIGNER:
POLK STANLEY YEARY

GENERAL CONTRACTOR:
CDI

GENERAL NOTES:

NOTES:

ISSUE DATE:
DECEMBER 15, 2003
CORE/SHELL
PACKAGE #5

REVISIONS:

#	DATE	DESCRIPTION
Δ	1-16-04	ADDENDUM #1
Δ	7-1-04	PACKAGE 7, 100% ROLL UP

HEIFER INTERNATIONAL CENTER OFFICE BUILDING

LITTLE ROCK, ARKANSAS

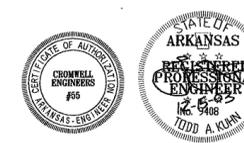
PSY PROJECT NUMBER:
431C

CONTENTS:

HVAC DETAILS

SHEET NUMBER:

M203



CONSULTANTS:

OWNER'S PROJECT ADVISOR:
MOSES TUCKER REAL ESTATE, INC.

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McCLELLAND ENGINEERS

LANDSCAPE ARCHITECT:
LARSON BURNS SMITH

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CROMWELL ENGINEERS INC.

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CORE/SHELL
PACKAGE #5

REVISIONS:

#	DATE	DESCRIPTION
1	1-16-04	ADDENDUM #1
2	7-1-04	PACKAGE 7, 100% ROLL UP
3	11-29-04	ASI #27

**HEIFER
INTERNATIONAL
CENTER
OFFICE BUILDING**

LITTLE ROCK, ARKANSAS

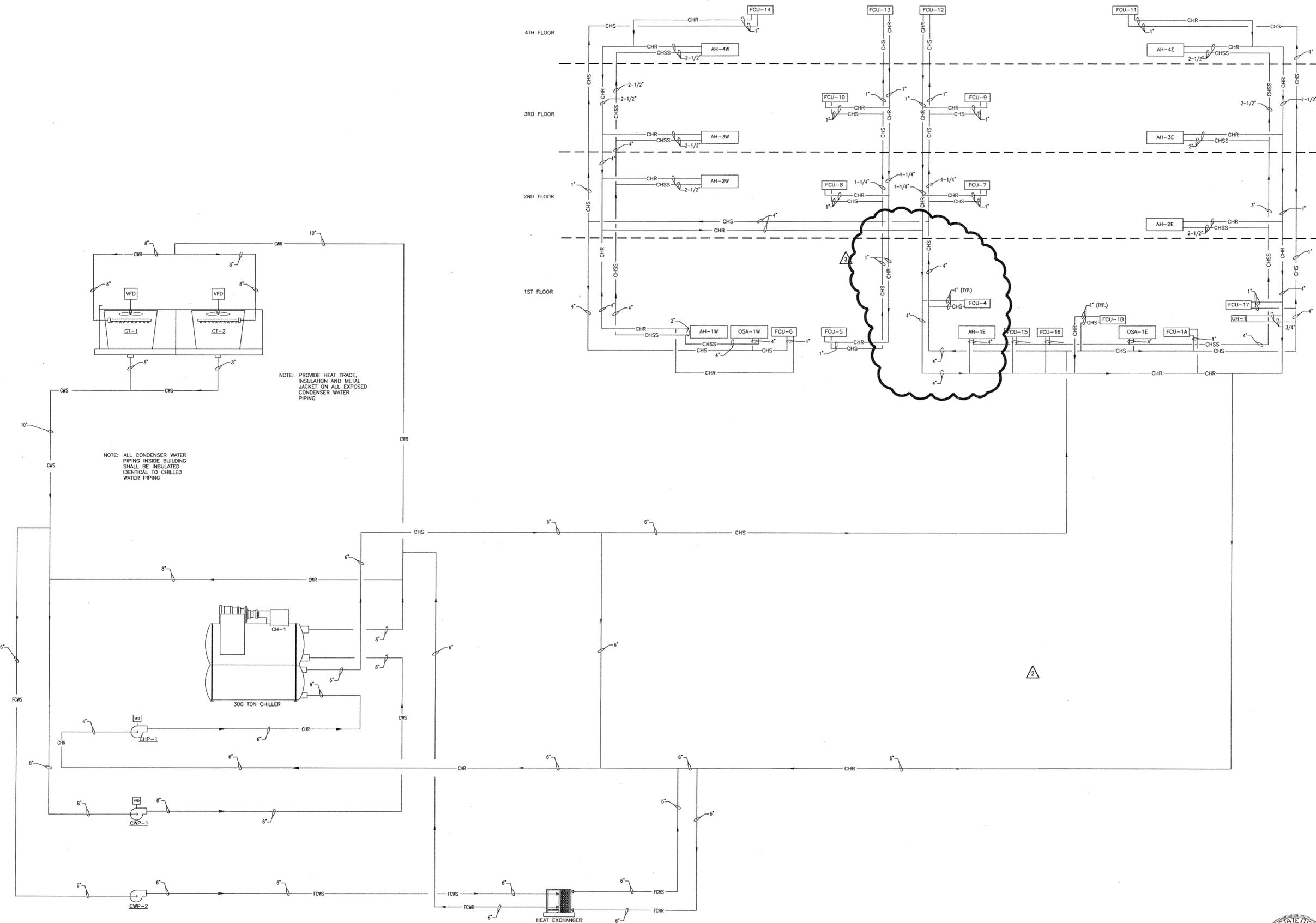
PSY PROJECT NUMBER:
431C

CONTENTS:

HVAC DETAILS

SHEET NUMBER:

M206



1 CHILLED WATER FLOW DIAGRAMS

M402 | M402 NO SCALE



DATE PLOTTED: 11/15/03 10:58 AM

**POLK
STANLEY
YEARY
ARCHITECTS, LTD.**

700 SOUTH SCHILLER
LITTLE ROCK, AR 72201
501 378-0878
FAX 372-7629

21 W. MOUNTAIN, SUITE 227
FAYETTEVILLE, AR 72701
479-444-0473

CONSULTANTS:

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LARSON BURNS SMITH

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CROMWELL ENGINEERS INC.

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

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CAMBRIDGE SEVEN ASSOCIATES

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POLK STANLEY YEARY

GENERAL CONTRACTOR:
CDI

GENERAL NOTES:

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ISSUE DATE:
DECEMBER 15, 2003
CORE/SHELL
PACKAGE #5
REVISIONS:

#	DATE	DESCRIPTION
Δ	1-16-04	ADDENDUM #1
Δ	7-1-04	PACKAGE 7, 100% ROLL UP
Δ	11-29-04	ASI #27

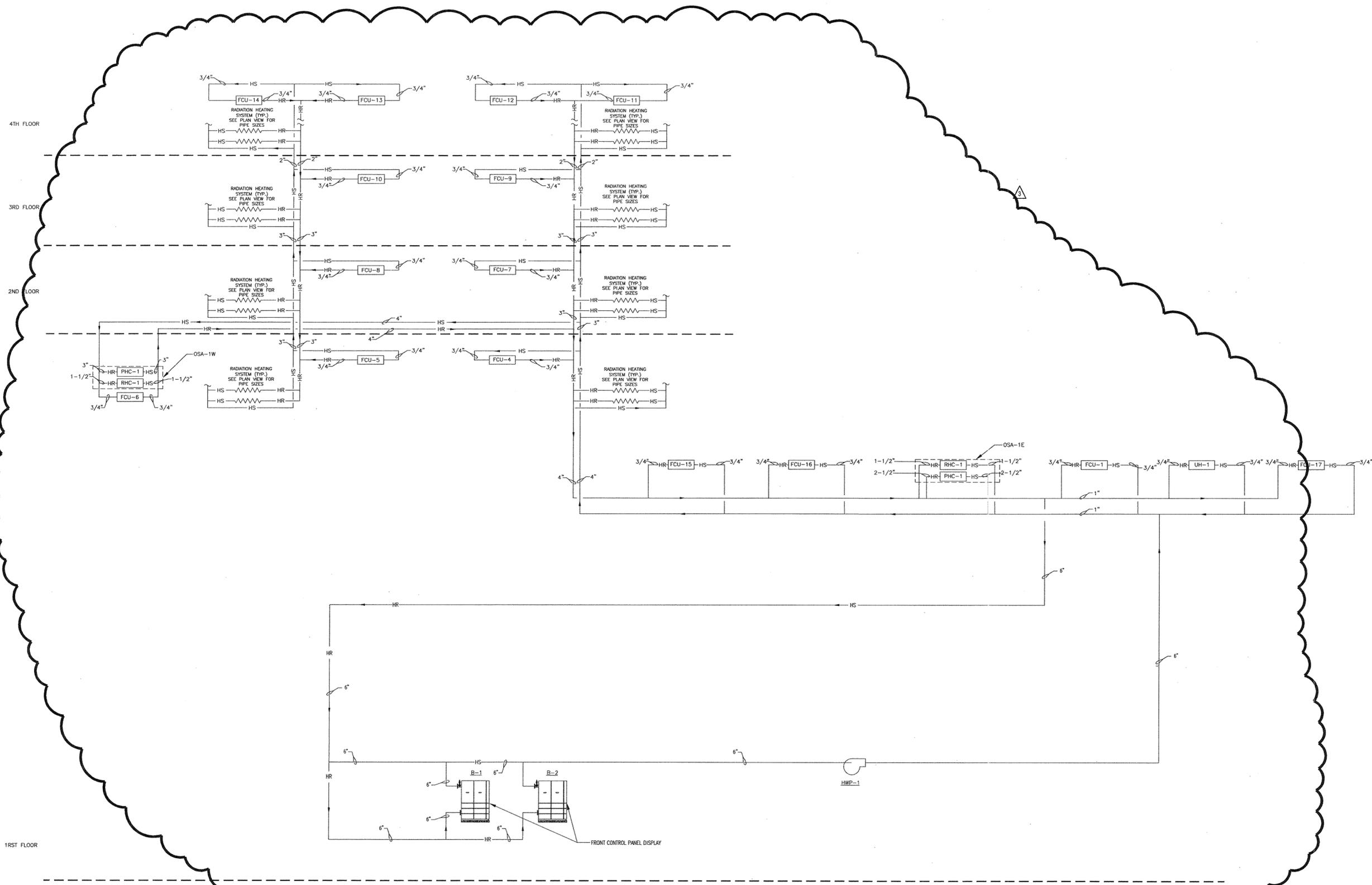
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CENTER
OFFICE BUILDING**
LITTLE ROCK, ARKANSAS

PSY PROJECT NUMBER:
431C

CONTENTS:

HVAC DETAILS
SHEET NUMBER:

M207



1 HOT WATER FLOW DIAGRAMS
M403 | M403 NO SCALE



DATE PLOTTED: 11/15/03 10:58 AM

CONSULTANTS:

OWNER'S PROJECT ADVISOR:
MOSES TUCKER REAL ESTATE, INC.

CIVIL ENGINEER:
McCLELLAND ENGINEERS

LANDSCAPE ARCHITECT:
LARSON BURNS SMITH

STRUCTURAL ENGINEER:
CROMWELL ENGINEERS INC.

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

SUSTAINABLE CONSULTANT:
BNIM / ELEMENTS

GLOBAL VILLAGE CONSULTANT
CAMBRIDGE SEVEN ASSOCIATES

INTERIOR DESIGNER:
POLK STANLEY YEARY

GENERAL CONTRACTOR:
CDI

GENERAL NOTES:

NOTES:

ISSUE DATE:
DECEMBER 15, 2003
CORE/SHELL
PACKAGE #5

REVISIONS:

#	DATE	DESCRIPTION
1	1-16-04	ADDENDUM #1
2	1-23-04	PACKAGE 5-ADDM. 02
3	7-1-04	PACKAGE 7, 100% ROLL UP
4	11-29-04	ASI #27

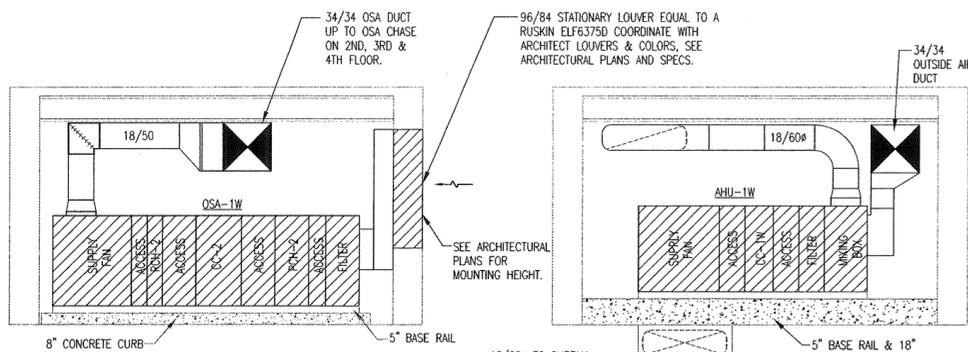
**HEIFER
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OFFICE BUILDING**

LITTLE ROCK, ARKANSAS

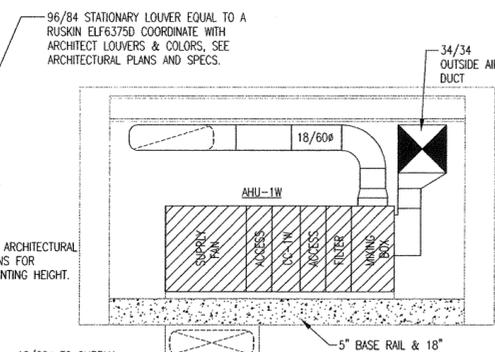
PSY PROJECT NUMBER:
431C

CONTENTS:
HVAC DETAILS
SHEET NUMBER:

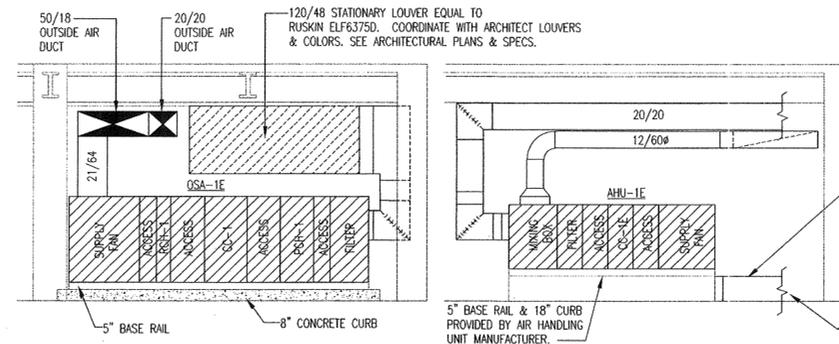
M208



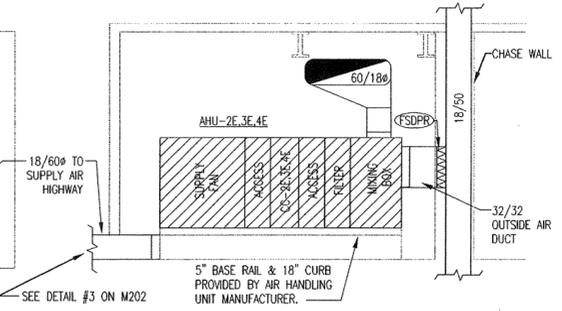
1 ELEVATION @ OSA-1W
M-208 | M101b 1/4"=1'-0"



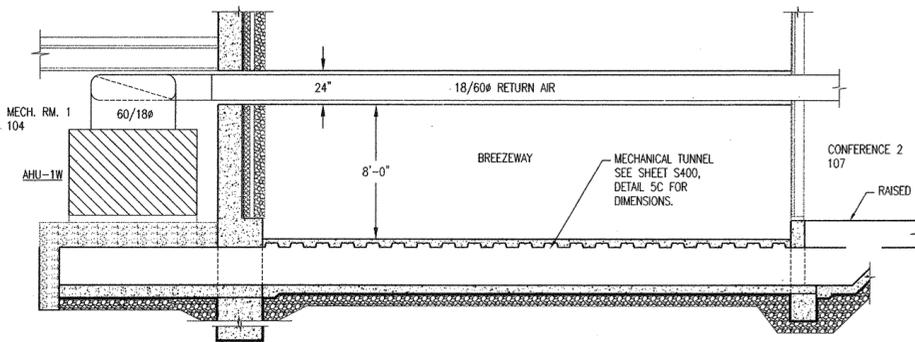
2 ELEVATION @ AHU-1W
M-208 | M101c 1/4"=1'-0"



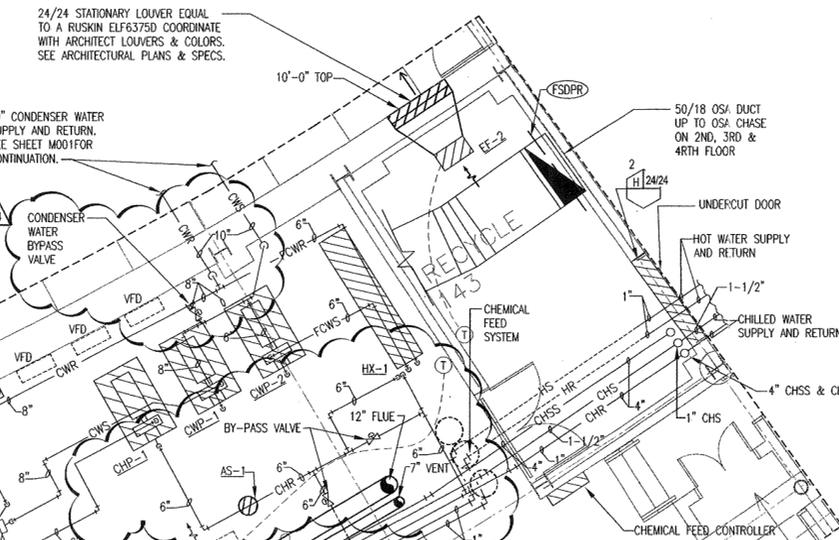
3 ELEVATION @ AHU-1E & OSA-1E
M-208 | M101a 1/4"=1'-0"



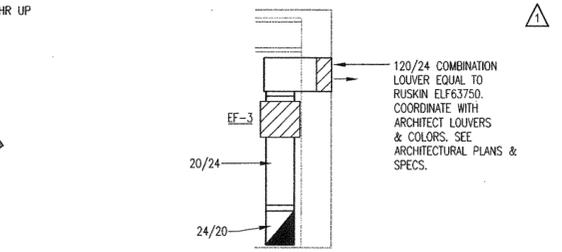
4 ELEVATION @ AHU-2E, 3E & 4E
M-208 | M102a 1/4"=1'-0"



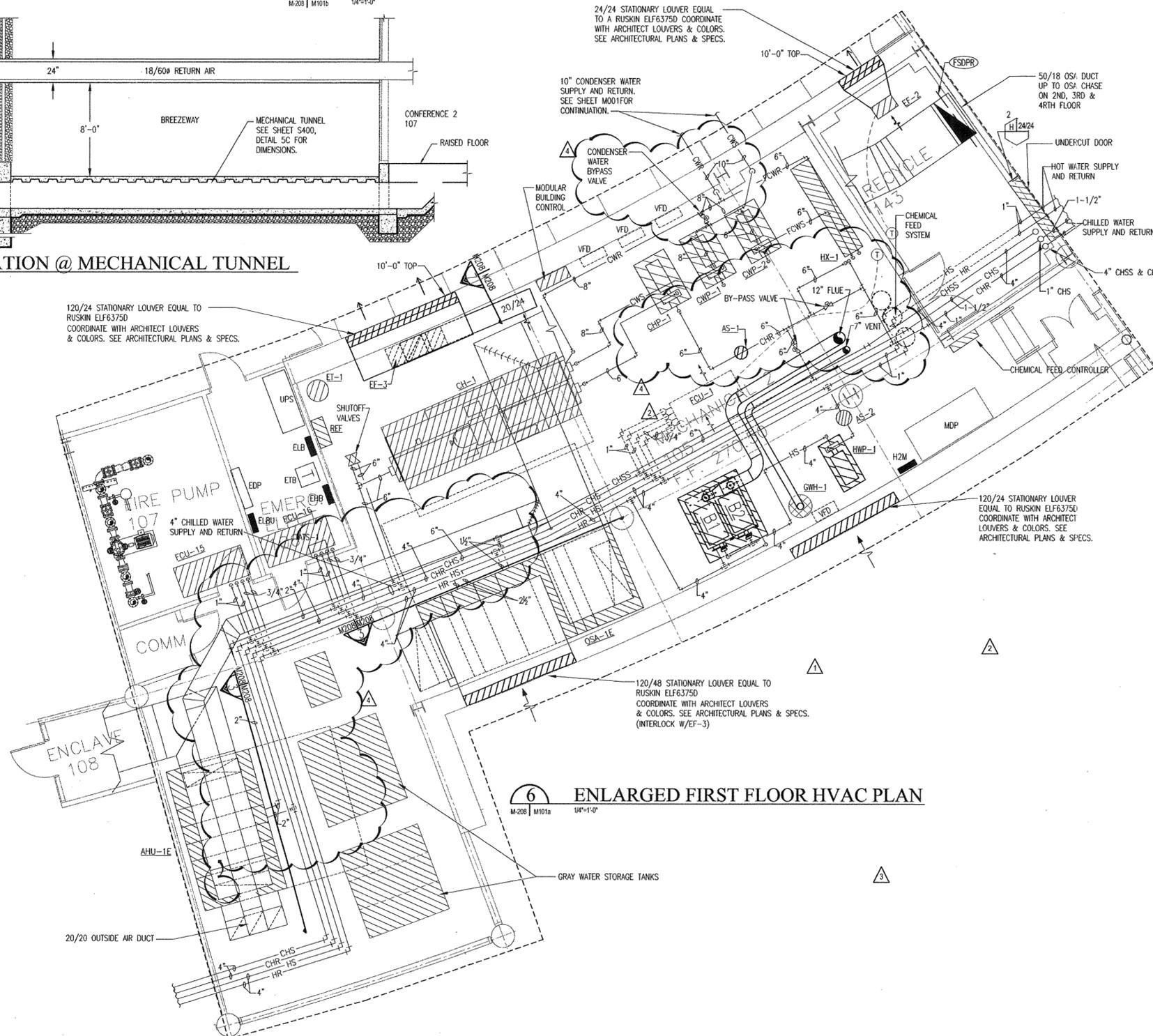
10 ELEVATION @ MECHANICAL TUNNEL
M-208 | M101b 1/4"=1'-0"



5 ELEVATION @ AHU-2W, 3W & 4W
M-208 | M102b 1/4"=1'-0"



7 ELEVATION @ MECH. 105
M-208 | M208 1/4"=1'-0"



6 ENLARGED FIRST FLOOR HVAC PLAN
M-208 | M101a 1/4"=1'-0"



AIR HANDLING UNIT																
MARK	LOCATION	SERVES	TYPE	AIR QUANTITIES CFM			SUPPLY FAN CHARACTERISTICS		COILS			ACCESSORIES				REFERENCE PRODUCT ①
				SUPPLY MAX	MIN OUTSIDE AIR	RETURN AIR	ARR	V-β-HZ	PRE HEAT	HEATING	COOLING	AIRSIDE ECONOMIZER	FILTER	LINER	DAMPERS	
AHU-1E	SEE PLANS	1ST (EAST)	HOR2	6544	2452	4092	PLENUM	480/3φ	-----	-----	CC-1E	NONE	① ②	SOLID	③	YORK AP-170
AHU-1W	SEE PLANS	1ST (WEST)	HOR2	8920	1715	7205	PLENUM	480/3φ	-----	-----	CC-1W	NONE	① ②	SOLID	③	YORK AP-250
AHU-2E	SEE PLANS	2ND (EAST)	HOR2	11122	1655	9467	PLENUM	480/3φ	-----	-----	CC-2E	NONE	① ②	SOLID	③	YORK AP-305
AHU-2W	SEE PLANS	2ND (WEST)	HOR2	14403	2839	11564	PLENUM	480/3φ	-----	-----	CC-2W	NONE	① ②	SOLID	③	YORK AP-360
AHU-3E	SEE PLANS	3RD (EAST)	HOR2	11400	1655	9745	PLENUM	480/3φ	-----	-----	CC-3E	NONE	① ②	SOLID	③	YORK AP-305
AHU-3W	SEE PLANS	3RD (WEST)	HOR2	14842	2839	12003	PLENUM	480/3φ	-----	-----	CC-3W	NONE	① ②	SOLID	③	YORK AP-360
AHU-4E	SEE PLANS	4TH (EAST)	HOR2	10355	2620	7735	PLENUM	480/3φ	-----	-----	CC-4E	NONE	① ②	SOLID	③	YORK AP-305
AHU-4W	SEE PLANS	4TH (WEST)	HOR2	12503	2811	9692	PLENUM	480/3φ	-----	-----	CC-4W	NONE	① ②	SOLID	③	YORK AP-360
OSA-1E	SEE PLANS	EAST	HOR2	8400	8400	---	PLENUM	480/3φ	PHC-1	RHC-1	CC-1E	NONE	①	SOLID	③	YORK AP-250
OSA-1W	SEE PLANS	WEST	HOR2	10200	10200	---	PLENUM	480/3φ	PHC-2	RHC-2	CC-2W	NONE	①	SOLID	③	YORK AP-305

- ① 30% PLEATED MEDIA PREFILTER
- ② 65% 12" RIGID FILTER
- ③ MOTORIZED CONTROL DAMPER WILL BE SUPPLIED FOR RETURN & OUTSIDE AIR INLETS
- ④ OSA FOR AHU'S IS SUPPLIED BY OSA UNITS. SIZE OSA DAMPER FOR 1000 FPM AT SCHEDULED OSA CFM.

CHILLED WATER COOLING COILS																	
MARK	LOCATION	CFM	FACE VEL.	ROWS	FPF	TOTAL MBH	SENS. MBH	EDB	EWB	MAX LDB	MAX LWB	MAX APD	EWT	LWT	GPM	MAX WPD	REFERENCE PRODUCT ①
CC-1E	AHU-1E	6544	388	4	120	102.6	102.6	74.4	61.5	60.1	56.2	.28	54	63	23.7	4.0	YORK
CC-1W	AHU-1W	8920	364	4	168	162.9	162.9	77.1	62.0	60.0	55.6	.32	54	66	27.6	3.1	YORK
CC-2E	AHU-2E	11122	369	4	168	222.2	222.2	77.8	63.4	59.6	56.8	.33	54	66	35.7	4.9	YORK
CC-2W	AHU-2W	14403	401	4	168	269.8	269.8	77.0	62.0	60.0	55.6	.38	54	66	44.4	5.3	YORK
CC-3E	AHU-3E	11400	375	4	168	227.0	227.0	77.8	63.4	59.7	56.8	.35	54	66	36.7	5.2	YORK
CC-3W	AHU-3W	14842	413	4	168	278.2	278.2	77.1	62.0	60.0	55.6	.40	54	66	46.0	5.6	YORK
CC-4E	AHU-4E	10355	343	4	168	188.1	188.1	76.2	61.5	59.6	55.3	.29	54	66	30.3	3.7	YORK
CC-4W	AHU-4W	12503	348	4	168	233.6	233.6	76.6	61.6	59.6	55.2	.30	54	66	37.6	4.0	YORK
CC-1	OSA-1E	8400	345	10	108	998.2	574.3	97.0	77.0	46.45	46.45	.81	42	56	119.6	6.0	YORK
CC-2	OSA-2W	10200	344	10	96	869.9	325.9	73.9	73.9	46.71	46.71	.45	42	56	144.2	13.7	YORK

- ① PROVIDE 2-WAY CONTROL VALVE PACKAGES

FAN COIL UNITS																									
MARK	SERVES	LOCATION	COOLING						HEATING						FAN				REFERENCE PRODUCT ① ② ③ ④ ⑤						
			EAT (°F) DB	WB	GPM	EWT °F	LWT °F	WPD FT.	SENS.	TOTAL	ROW	GPM	MAX WPD	EDB °F	MIN. LAT.	EWT °F	LWT °F	SMBH		CFM	TSP IN. H2O	ESP IN. H2O	RPM	MOTOR HP	VOLTS/φ
FCU-1	MECH. ROOM	SEE PLANS	80	67	5.7	45	55	13.2	21.9	28.5	2	2.2	5.6	70	-	180	150	33.1	1290	-	0.00	HIGH	1/2 / 3/8	115/1	YORK HE-12
FCU-4	RESTROOMS	SEE PLANS	80	67	3.2	45	55	7.4	11.2	16.0	2	1.3	11.7	70	-	180	150	19.7	645	0.50	0.10	HIGH	1/2	115/1	YORK HCP-06
FCU-5	RESTROOMS	SEE PLANS	80	67	3.2	45	55	7.4	11.2	16.0	2	1.3	11.7	70	-	180	150	19.7	645	0.50	0.10	HIGH	1/2	115/1	YORK HCP-06
FCU-6	MECH. ROOM	SEE PLANS	80	67	5.7	45	55	13.2	21.9	28.5	2	2.2	5.6	70	-	180	150	33.1	1290	-	0.00	HIGH	1/2 / 3/8	115/1	YORK HE-12
FCU-7	RESTROOMS	SEE PLANS	80	67	3.2	45	55	7.4	11.2	16.0	2	1.3	11.7	70	-	180	150	19.7	645	0.50	0.10	HIGH	1/2	115/1	YORK HCP-06
FCU-8	RESTROOMS	SEE PLANS	80	67	3.2	45	55	7.4	11.2	16.0	2	1.3	11.7	70	-	180	150	19.7	645	0.50	0.10	HIGH	1/2	115/1	YORK HCP-06
FCU-9	RESTROOMS	SEE PLANS	80	67	3.2	45	55	7.4	11.2	16.0	2	1.3	11.7	70	-	180	150	19.7	645	0.50	0.10	HIGH	1/2	115/1	YORK HCP-06
FCU-10	RESTROOMS	SEE PLANS	80	67	3.2	45	55	7.4	11.2	16.0	2	1.3	11.7	70	-	180	150	19.7	645	0.50	0.10	HIGH	1/2	115/1	YORK HCP-06
FCU-11	MECH. ROOM	SEE PLANS	80	67	5.7	45	55	13.2	21.9	28.5	2	2.2	5.6	70	-	180	150	33.1	1290	-	0.00	HIGH	1/2 / 3/8	115/1	YORK HE-12
FCU-12	RESTROOMS	SEE PLANS	80	67	3.2	45	55	7.4	11.2	16.0	2	1.3	11.7	70	-	180	150	19.7	645	0.50	0.10	HIGH	1/2	115/1	YORK HCP-06
FCU-13	RESTROOMS	SEE PLANS	80	67	3.2	45	55	7.4	11.2	16.0	2	1.3	11.7	70	-	180	150	19.7	645	0.50	0.10	HIGH	1/2	115/1	YORK HCP-06
FCU-14	MECH. ROOM	SEE PLANS	80	67	5.7	45	55	13.2	21.9	28.5	2	2.2	5.6	70	-	180	150	33.1	1290	-	0.00	HIGH	1/2 / 3/8	115/1	YORK HE-12
FCU-15	FIRE PUMP	SEE PLANS	80	67	5.7	45	55	13.2	21.9	28.5	2	2.2	5.6	70	-	180	150	33.1	1290	-	0.00	HIGH	1/2 / 3/8	115/1	YORK HE-12
FCU-16	ELECT. ROOM	SEE PLANS	80	67	5.7	45	55	13.2	21.9	28.5	2	2.2	5.6	70	-	180	150	33.1	1290	-	0.00	HIGH	1/2 / 3/8	115/1	YORK HE-12
FCU-17	MAIL ROOM	SEE PLANS	80	67	5.7	45	55	13.2	21.9	28.5	2	2.2	5.6	70	-	180	150	33.1	1290	-	0.00	HIGH	1/2 / 3/8	115/1	YORK HE-12

- ① PROVIDE 2-WAY VALVE PACKAGES
- ② PROVIDE UNIT MOUNTED DISCONNECT
- ③ PROVIDE 30% FILTER SECTION
- ④ PROVIDE AUXILIARY DRAIN PANS

HEAT EXCHANGERS															
MARK	SERVES	LOCATION	MBH	HOT LOOP					COOL LOOP					REFERENCE PRODUCT	REMARKS
				FLUID	EWT °F	LWT °F	GPM	WPD PSI	FLUID	EWT °F	LWT °F	GPM	WPD PSI		
HX-1	CHILLER	MECH. ROOM	1199.879	WATER	66.0	54.0	200	1.3	WATER	53.0	57.8	500	6.8	MUELLER ACCU-THERM	

AIR HANDLING UNITS SUPPLY																	
MARK	SERVES	CFM	ESP IN.	HP WATT	VOLTS/φ	DRIVE	TYPE	CONTROLS	MAX. db AT OCTAVE BAND ①								REFERENCE PRODUCT ②
									63	125	250	500	1000	2000	4000	8000	
AHU-1E	1ST (EAST)	6544	1.0"	5.0	480/3φ	BELT	PLENUM	VFD	78	81	84	79	75	71	67	65	
AHU-1W	1ST (WEST)	8920	1.0"	7.5	480/3φ	BELT	PLENUM	VFD	84	85	80	77	72	67	63	59	
AHU-2E	2ND (EAST)	11122	1.0"	10.0	480/3φ	BELT	PLENUM	VFD	84	84	80	77	72	69	64	59	
AHU-2W	2ND (WEST)	14403	1.0"	10.0	480/3φ	BELT	PLENUM	VFD	85	88	84	82	78	74	68	62	
AHU-3E	3RD (EAST)	11400	1.0"	7.5	480/3φ	BELT	PLENUM	VFD	84	84	80	77	73	70	65	60	
AHU-3W	3RD (WEST)	14842	1.0"	10.0	480/3φ	BELT	PLENUM	VFD	86	89	84	83	78	75	69	63	
AHU-4E	4TH (EAST)	10355	1.0"	10.0	480/3φ	BELT	PLENUM	VFD	84	83	79	76	72	68	64	59	
AHU-4W	4TH (WEST)	12503	1.0"	10.0	480/3φ	BELT	PLENUM	VFD	84	85	81	79	74	71	65	59	
OSA-1E	EAST	8400	1.0"	7.5	480/3φ	BELT	PLENUM	VFD	82	82	77	74	69	64	60	56	
OSA-2W	WEST	10200	1.0"	5.0	480/3φ	BELT	PLENUM	VFD	85	85	79	77	72	69	65	60	

- ① db LEVEL AT DISCHARGE
- ② PROVIDE FACTORY MOUNTED VARIABLE FREQUENCY DRIVES

HOT WATER HEATING COILS															
MARK	LOCATION	CFM	MAX. FACE VEL.	ROWS	FPF	CAPACITY MBH	EAT F°	LAT F°	MAX APD IN. H2O	EWT	LWT	GPM	MAX WPD FT. H2O	REFERENCE PRODUCT	
PHC-1	OSA-1E	8400	450	2	11	428.4	0	47	0.19	150	120.7	29.2	1.1	WING WFB VB7W ①	
PHC-2	OSA-2W	10600	500	2	11	540.6	0	47	0.23	150	133.5	66.8	1.75	WING WFB VB8W ①	
RCH-1	OSA-1E	8400	345	2	12	209.6	47	71.6	0.04	150	100	9.1	1.4	YORK	
RCH-2	OSA-2W	10600	344	2	12	264.5	47	72	0.04	150	100	10.7	2.0	YORK	

- ① PROVIDE 2-WAY CONTROL VALVE

UNIT HEATER									
MARK	LOCATION	MBH CAP.	GPM	WPD FT.	CFM	HP	VOLTS/φ	EWT/LWT	NOTES ① ②
UH-1	DOCK	115	11.5	147	2900	1/3	120/1φ	180/160	

- ① PROVIDE UNIT MOUNTED DISCONNECT
- ② PROVIDE 2-WAY CONTROL VALVE

INTAKE VENTILATOR						
MARK	SERVES	CFM	MAX FPM	P.D. IN.	THROAT AREA	REFERENCE PRODUCT
IV-1	ELEV SHAFT	---	---	---	5.2	COOK TR30
IV-2	ELEV SHAFT	---	---	---	3.4	COOK TR24
IV-3	MECH	---	---	---	1.9	COOK TR12
IV-4	MECH	---	---	---	.9	COOK TR12
IV-5	EAST STAIR	---	---	---	25.0	COOK TRE 60x60
IV-6	WEST STAIR	---	---	---	25.0	COOK TRE 60x60

POLK STANLEY YEARY ARCHITECTS, LTD.

700 SOUTH SCHILLER
LITTLE ROCK, AR 72201
501-378-0878
FAX 372-7629
21 W. MOUNTAIN, SUITE 227
FAYETTEVILLE, AR 72701
479-444-0473

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MCCLELLAND ENGINEERS

LANDSCAPE ARCHITECT:
LARSON BURNS SMITH

STRUCTURAL ENGINEER:
CROMWELL ENGINEERS INC.

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

SUSTAINABLE CONSULTANT:
BNIM / ELEMENTS

GLOBAL VILLAGE CONSULTANT
CAMBRIDGE SEVEN ASSOCIATES

INTERIOR DESIGNER:
POLK STANLEY YEARY

GENERAL CONTRACTOR:
CDI

GENERAL NOTES:

NOTES:

ISSUE DATE:
DECEMBER 15, 2003
CORE/SHELL
PACKAGE #5

REVISIONS:

#	DATE	DESCRIPTION
1	1-16-04	ADDENDUM #1
2	1-23-04	PACKAGE 5-ADDM. 02
3	7-1-04	PACKAGE 7, 100% ROLL UP
4	11-29	

**POLK
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5	11-29-04	ASI #27

**HEIFER
INTERNATIONAL
CENTER
OFFICE BUILDING**

LITTLE ROCK, ARKANSAS

PSY PROJECT NUMBER:
431C

CONTENTS:

HVAC SCHEDULES

SHEET NUMBER:

M302

CIRCULATING PUMPS													
MARK	SERVES	LOCATION	FLUID	TYPE	GPM	TDH FT	IMPELLER DIA.	RPM	HP	VOLTS/Ø	MIN. EFF.	REFERENCE PRODUCT	REMARKS
CHP-1	CHILLED WATER	RM105	WATER	BASEMOUNTED	300	95FT	10.12"	1800	15.0	480/3Ø	72.86%	ARMSTRONG	SERIES 4030
CWP-1,2	CONDENSER WATER	RM105	WATER	BASEMOUNTED	900	53FT	8.84"	1800	20.0	480/3Ø	80.58%	ARMSTRONG	SERIES 4030
HWP-1	HOT WATER	RM105	WATER	BASEMOUNTED	300	100FT	10.07"	1800	15.0	480/3Ø	71.73%	ARMSTRONG	SERIES 4030

① PROVIDE SUCTION DIFFUSER WITH STRAINER

EXPANSION TANK											
MARK	SERVES	TANK VOLUME	TANK ACCEP. VOLUME	TYPE	LOCATION	MIN. TEMP.	MAX. TEMP.	MIN. PRESS. PSIG	MAX. PRESS. PSIG	TANK PRESS.	REFERENCE PRODUCT
ET-1	HOT WATER	132	132	BLADDER	BOILER RM B06	50	240	-	-	45	ARMSTRONG A500-L
ET-2	CHILLED WATER	132	132	BLADDER	MECH RM 105	40	150	-	-	38	ARMSTRONG A500-L

MODULAR INTEGRATED TERMINAL						
MARK	LOCATION	CFM	P.D.	TYPE	OPERATION	REFERENCE PRODUCT
MIT	SEE PLANS	130	0.05"	PRESSURE INDEPENDENT	VARIABLE AIR VOLUME	YORK MIT-G-R
MIT	SEE PLANS	600	0.05"	PRESSURE INDEPENDENT	CONSTANT AIR VELOCITY	YORK MFT

WATER COOLED CENTRIFUGAL CHILLER																			
MARK	LOCATION	REFRIG.	VFD	TONS	EVAPORATOR					CONDENSER					COMPRESSOR			REFERENCE PRODUCT ①	
					EWI	LWT	GPM	MAX WFO	PASS	EWI	LWT	GPM	MAX WFO	PASS	MAX KW	MOTOR	VOLTSØ		MAX NPLV
CH-1	MECHANICAL ROOM 105	134A	YES	300	66	42	300	12.7	3	83	92.3	900	8.3	2	197	-	480/3Ø	0.44	YORK YKAAADP2-CKF

① PROVIDE UNIT MOUNTED VFD
② PROVIDE REFRIGERANT MONITORING SYSTEM
③ PROVIDE SELF-CONTAINED BREATHING APPARATUS (2)

COOLING TOWER																
MARK	SERVES	LOCATION	AMB. WB	EWT	LWT	GPM TOTAL	BASIN HEATCELL			FAN MOTORCELL				REFERENCE PRODUCT		
							# MAX KW	VOLTSØ	HP	RPM	VOLTSØ	VFD	DRIVE			
CT-1	CHILLER CH-1	MECH YARD	80	93	83	1000	15	480/3Ø	7 1/2	285	480/3Ø	YES	GEAR	MARLEY NC 8305CL2		
CT-2	CHILLER CH-1	MECH YARD	80	93	83	1000	15	480/3Ø	7 1/2	285	480/3Ø	YES	GEAR	MARLEY NC 8305CL2		

① PROVIDE VFD (VFD SHALL BE FIELD MOUNTED AS SHOWN ON DWGS.)

HOT WATER BOILER													
MARK	SERVES	LOCATION	FUEL	MBH INPUT	MBH OUTPUT	EWT	LWT	GPM	Pi	VOLTSØ	FLA	MARK	MANUFACTURER & MODEL NO.
B-1,2	HOT WTR.	BASEMENT	NGAS	2000	1740	180	140	300	②	480/3Ø	6	20	AERCO BENCHMARK (BMK) 2.0 GWB ①

① PROVIDE MODEL 168 AERCO BOILER MANAGEMENT SYSTEM. VENTING MATERIAL SHALL BE AL29-4C STAINLESS STEEL
② 10.1 FT @ 170 GPM

FINNED TUBE						
MARK	TUBE SIZE	FFF	EWT	LWT	BTU/FT	REFERENCE PRODUCT
FT-1	3-1/4"	50	180	170	660	STERLING C314-35

① 2-WAY CONTROL VALVE PACKAGE (SILENT CONTROL)

AIR DEVICES				
MARK	TYPE	DESCRIPTION	SIZE	REFERENCE PRODUCT
A	SUPPLY	SIDEWALL	SEE PLANS	TITUS 300RL
B	RETURN	SIDEWALL	SEE PLANS	TITUS 355RL
C	EXHAUST	EGGCRATE	24/24	TITUS 50F
D	SUPPLY	LOUVERED	24/24	TITUS TMS
E	RETURN	LINEAR BAR	SEE PLANS	TITUS 33R ①
F	SUPPLY	LINEAR FLOOR	SEE PLANS	TITUS CT-PP-0 ②
G	RETURN	LINEAR RETURN	SEE PLANS	TITUS ML-39 ③ ⑤
H	RETURN	DOOR GRILLE	24/24	TITUS L24 ④

① LINEAR BAR GRILLES SHALL BE 6" WIDE BALANCING DAMPER
② SEE ARCHITECT PLANS FOR SIZES
③ 3 1" SLOTS
④ PROVIDE FIRE DAMPER (AT BOILER ROOM)
⑤ PROVIDE BORDER TYPE #16

EXHAUST FAN									
MARK	SERVES	CFM	ESP IN	RPM	HP	VOLTS/Ø	DRIVE	TYPE	REFERENCE PRODUCT ①
EF-1	DOCK	1283	0.5	900	1/2	115/1Ø	DIRECT	INLINE	COOK GC-1000
EF-2	RECYCLE	3600	0.5	1440	1-1/2	480/3Ø	BELT	INLINE	COOK GR-20
EF-3	REFRIGERATION	3600	0.5	1440	1-1/2	480/3Ø	BELT	INLINE	COOK 165 SQN-B
EF-4	NOT USED	----	----	----	----	----	----	----	----
EF-5	NOT USED	----	----	----	----	----	----	----	----
EF-6	TOWER STAIR	14907	0.75	500	5	480/3Ø	BELT	ROOF MTD	COOK ACE-B-402C11B ② ④
EF-7	4TH FLOOR TOILET	1685	1.0	1685	1/2	115/1Ø	BELT	ROOF MTD	COOK ACE-B-135C5B ② ③
EF-8	SHOWERS	810	0.5	700	300W	115/1Ø	DIRECT	INLINE	COOK GH-820 ③
EF-9	TOILETS	1685	1.0	1685	1/2	115/1Ø	BELT	ROOF MTD	COOK ACE-B-135C5B ② ③
EF-10	TOILETS	1685	1.0	1685	1/2	115/1Ø	BELT	ROOF MTD	COOK ACE-B-135C5B ② ③

① PROVIDE UNIT MOUNTED DISCONNECT
② PROVIDE ROOFCURB
③ PROVIDE BACKDRAFT DAMPER
④ PROVIDE MOTORIZED DAMPER

AIR SEPARATOR						
MARK	SIZE	MAX. WPD FT.	GPM MAX.	LOCATION	REFERENCE PRODUCT	REMARKS
AS-1	6"	1.0	300	RM 105	ARMSTRONG VA-6	
AS-2	6"	1.0	300	BASEMENT	ARMSTRONG VA-6	



DATE PLOTTED: 11/29/04 10:58 AM

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**HEIFER
INTERNATIONAL
CENTER
OFFICE BUILDING**

LITTLE ROCK, ARKANSAS

PSY PROJECT NUMBER:
431C

CONTENTS:
HVAC CONTROLS

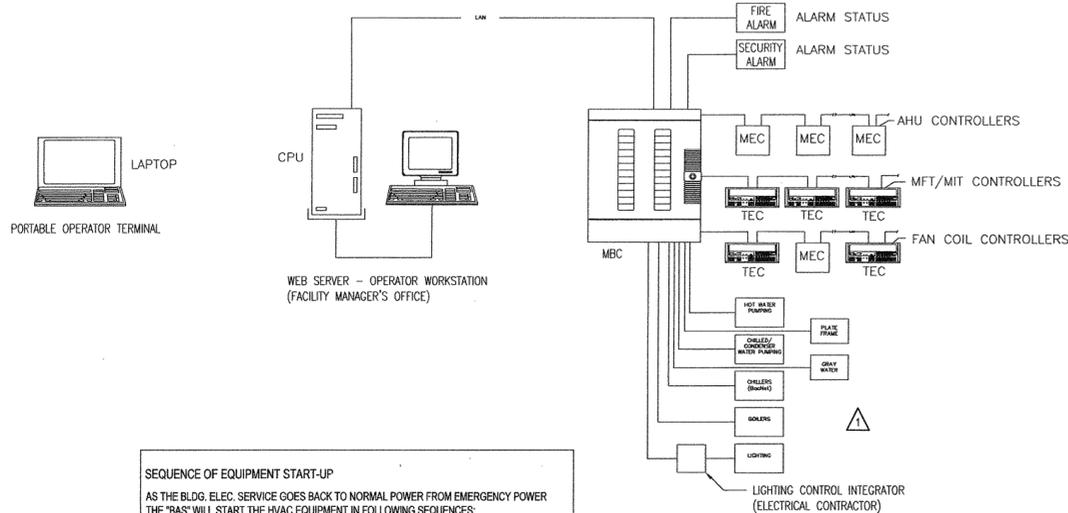
SHEET NUMBER:

M400

CONTROL LEGEND	
SYMBOL	DESCRIPTION
(AI)	ANALOG INPUT POINT
(AO)	ANALOG OUTPUT POINT
(DI)	DIGITAL INPUT POINT
(DO)	DIGITAL OUTPUT POINT
(CT)	CURRENT TRANSMITTER
(LRT)	LOOP RETURN TEMPERATURE
(LST)	LOOP SUPPLY TEMPERATURE
(SD)	SMOKE DETECTOR
(SD)	SMOKE DAMPER
(DPS)	DIFFERENTIAL PRESSURE SENSOR
(RAH)	RETURN AIR HUMIDITY
(RAT)	RETURN AIR TEMPERATURE
(MAT)	MIXED AIR TEMPERATURE
(MAH)	MIXED AIR HUMIDITY
(SAT)	SUPPLY AIR TEMPERATURE
(SAH)	SUPPLY AIR HUMIDITY
(CHR)	CHILLED WATER RETURN TEMPERATURE
(CWS)	CHILLED WATER SUPPLY TEMPERATURE
(CWR)	CONDENSER WATER RETURN SENSOR
(CWS)	CONDENSER WATER SUPPLY SENSOR
(HWR)	HOT WATER RETURN TEMPERATURE
(HWS)	HOT WATER SUPPLY TEMPERATURE
(CV)	CONTROL VALVE
(BV)	BUTTERFLY VALVE
(HSL)	HIGH STATIC LIMIT
(LSL)	LOW STATIC LIMIT
(HHL)	HIGH HUMIDITY LIMIT
(RHS)	ROOM HUMIDITY SENSOR
(RTS)	ROOM TEMPERATURE SENSOR
(RSP)	ROOM STATIC PRESSURE SENSOR
(HCL)	HEATING COIL LEAVING AIR TEMPERATURE
(CCL)	COOLING COIL LEAVING AIR TEMPERATURE
(PRT)	PLATINUM RTD SENSOR
(OAT)	OUTSIDE AIR TEMPERATURE
(OAH)	OUTSIDE AIR HUMIDITY
(AMS)	AIRFLOW MEASURING STATION
(DPT)	DIFFERENTIAL PRESSURE TRANSMITTER
(LTD)	LOW TEMPERATURE DETECTOR (LOW LIMIT)
(HTD)	HIGH TEMPERATURE DETECTOR (HIGH LIMIT)
(CDD)	CARBON DIOXIDE DETECTOR
(FTS)	FLOOR TEMPERATURE SENSOR
(FM)	WATER FLOW METER
BAS	BUILDING AUTOMATION AND CONTROL SYSTEM
CWR	CONDENSER WATER RETURN
CWS	CONDENSER WATER SUPPLY
FCR	FREE COOLING WATER RETURN
FCS	FREE COOLING WATER SUPPLY
VFD	VARIABLE FREQUENCY DRIVE
N.O.	NORMALLY OPEN
N.C.	NORMALLY CLOSED
CHS	CHILLED WATER SUPPLY
CHR	CHILLED WATER RETURN
HS	HOT WATER SUPPLY
HR	HOT WATER RETURN
MBC	MASTER BUILDING DDC PANEL
TEC	TERMINAL EQUIPMENT CONTROLLER
MEC	MECHANICAL EQUIPMENT CONTROLLER
(IW)	IMMERSION SENSOR WITH WELL
(SD)	SMOKE DETECTOR
(H/L)	HIGH OR LOW LIMIT WITH INTERLOCK
(AT)	AIR TEMPERATURE OR HUMIDITY SENSOR
(DPS)	DIFFERENTIAL PRESSURE SENSOR
(RT)	ROOM TEMPERATURE OR HUMIDITY SENSOR
(ADPT)	AIR DIFFERENTIAL PRESSURE TRANSMITTER
(DPT)	WATER DIFFERENTIAL PRESSURE TRANSMITTER
(FM)	WATER FLOW METER

- The HVAC system shall be provided with a computer controlled central building automation system (BAS) that monitors the temperature in each room, evaluates the operating status of all major pieces of equipment, turns equipment on and off to meet changes in environment (both inside and out), evaluates operating conditions, sends operating alarms, and provides for the lowest cost energy use of the system. The system shall be connected to all portions of the building.
- Monitoring points for the BAS system shall include the Security Control Center and the Building Maintenance Offices. Remote download and access to the system by modem and internet broadband connection is also required as well as the capabilities to connect to the system by laptop computer at various locations in the building, including the major mechanical and equipment rooms.
- The BAS shall have a graphical user interface (Windows compatible), be user friendly, and show operating conditions of the equipment and alarms on a color monitor. The user interface shall show a floor plan and room by room status against the required operating conditions so that the security or building maintenance staff can quickly note any problems and advise the facility manager's staff.
- Radiation system zone valves must be absolutely silent. Use motorized ball valve with two position actuator.
- Provide multiple copies of BAS software if required to provide offsite access by the laptop.

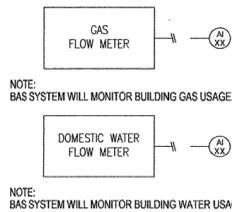
4 CONTROL GUIDELINES
M400 | M400 NO SCALE



SEQUENCE OF EQUIPMENT START-UP
AS THE BLDG. ELEC. SERVICE GOES BACK TO NORMAL POWER FROM EMERGENCY POWER THE "BAS" WILL START THE HVAC EQUIPMENT IN FOLLOWING SEQUENCES:
- "BAS" WILL BRING THE CHILLER PLANT ON-LINE.
- "BAS" WILL BRING ALL THE AIR HANDLING UNITS AND EXHAUST FANS ON-LINE.
- "BAS" WILL BRING OTHER MISCELLANEOUS EQUIPMENT ON-LINE.

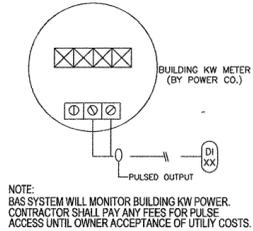
NOTE: USE OF ANY TYPE OF POINT (AI,AO,DI,DO) IN A CONTROLLER (EXCEPT TECs) SHALL NOT EXCEED 90% OF THE CONTROLLER'S POPULATION OF THAT TYPE OF POINT. MINIMUM SPARE POINT REQUIREMENT IS ONE OF EACH.

1 BAS NETWORK SYSTEM
M400 | M400 NO SCALE



NOTE: BAS SYSTEM WILL MONITOR BUILDING GAS USAGE.

NOTE: BAS SYSTEM WILL MONITOR BUILDING WATER USAGE.

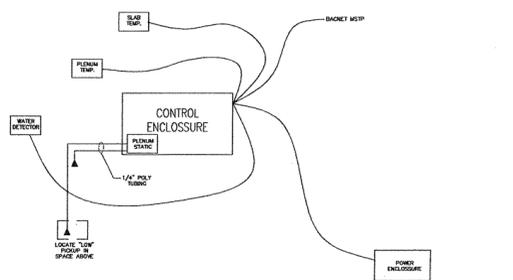


NOTE: BAS SYSTEM WILL MONITOR BUILDING KW POWER. CONTRACTOR SHALL PAY ANY FEES FOR PULSE ACCESS UNTIL OWNER ACCEPTANCE OF UTILITY COSTS.

2 BUILDING UTILITY MONITORING
M400 | M400 NO SCALE

TEMPERATURE AND RELATIVE HUMIDITY STANDARDS		
AREAHOLDING TYPE	DRY BULB TEMPERATURE RANGE - °F	RELATIVE HUMIDITY RANGE - %
OFFICES	70 - 78	35 - 55
MECHANICAL ROOMS	50-80	55-60

3 TEMPERATURE AND RH STANDARDS
M400 | M400 NO SCALE



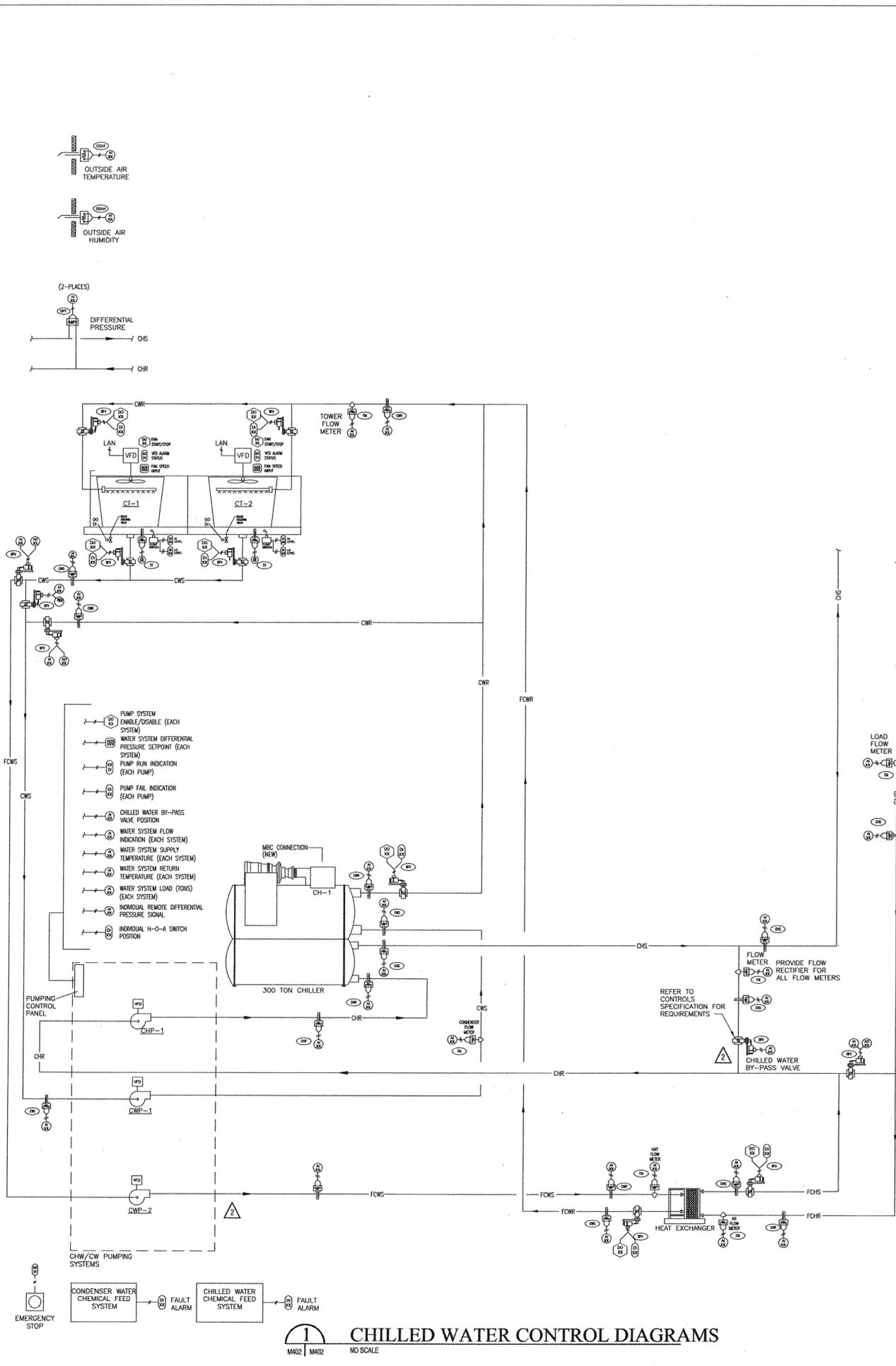
SEQUENCE OF EQUIPMENT START-UP
SLAB TEMPERATURE MONITORING:
THE SLAB TEMPERATURE SHALL BE MONITORED AND THE DATA REPORTED TO THE GLOBAL CONTROLLER.
PLENUM TEMPERATURE AND RELATIVE HUMIDITY MONITORING:
VLC SHALL MONITOR PLENUM TEMPERATURE AND RELATIVE HUMIDITY TO CALCULATE THE PLENUM AIR DEWPOINT. CALCULATED DEWPOINT IS TRANSMITTED TO THE GLOBAL CONTROLLER. GLOBAL CONTROLLER SHALL NOTIFY CORRESPONDING AHU CONTROLLER AND DISPLAY AN ALARM AT THE OPERATOR WORKSTATION IF SLAB TEMPERATURE IS SENSED TO BE 5(1) OF THE CALCULATED PLENUM DEWPOINT TEMPERATURE. CORRESPONDING AHU CONTROLLER SHALL TAKE ACTION TO RAISE THE PLENUM DEWPOINT (I.E. BY RAISING SUPPLY AIR SETPOINT AND/OR INITIATING DEHUMIDIFICATION CYCLE).
PLENUM STATIC PRESSURE CONTROL:
THE VLC SHALL MONITOR THE STATIC AND MODULATE THE VFD TO MAINTAIN A PLENUM TO SPACE PRESSURE OF +.05 W.C.

4 PLENUM SLAB CONTROLLER
M400 | M400 NO SCALE

WATER DETECTION SEQUENCE
PROVIDE A WATER DETECTOR EQUAL TO KELE MODEL WD-16 AT FLOOR DRAIN UNDER ALL RESTROOMS & SHOWERS IF WATER IS DETECTED AN ALARM SHALL BE SENT TO THE BAS.

5 RAISED FLOOR WATER DETECTION SEQUENCE
M400 | M400 NO SCALE





1 CHILLED WATER CONTROL DIAGRAMS
M402 M402 NO SCALE

CHILLED/CONDENSER WATER SEQUENCE OF OPERATION

CHILLED WATER SYSTEM

Zone Air Handling Units (AH-1E, AH-1W, AH-2E, AH-2W, AH-3E, AH-3W, AH-4E, AH-4W)
Chilled water valves shall be 2-way pattern and shall be operated by a DDC actuator to provide a 62.0F (adjustable) dry bulb temperature leaving the unit (after the fan). See Zone Air Handling sequence on M401.

Ventilation Units (VU-E, VU-W)
Chilled water valve shall be 2-way pattern and shall be operated by a DDC actuator to provide a 47.0F (adjustable) dry bulb temperature leaving the coil. Combination of temperature sensor, controller and actuator shall have a repeatable accuracy better than 0.1F. See Ventilation Air Handling sequence on M401.

Zone Unit Flow Valves (ZV-E and ZV-W)
These valves pass water from CHS to CHSS in the first floor Mech. Rooms to allow increased flow through the zone units. Zone Flow Valves shall be positioned by a critical zone reset routine based on the position of their associated zone valves (ZV-W responds to AH-1W, AH-2W, AH-3W and AH-4W; ZV-E responds to AH-1E, AH-2E, AH-3E and AH-4E). The Zone Flow Valve shall open in 10% increments to respond to any associated zone valve that is 95% open or more. The Zone Flow Valve shall close in 10% increments until at least one associated zone valve is 85% open or more. Zone valve positions shall be sampled at 5 second intervals and Zone Flow Valve position shall be adjusted, if necessary, at 30 second intervals. Zone Flow Valve position shall not be used in the Pump DP reset routine.

OSA Unit Flow Valves (OSAFV-E & OSAFV-W)
These valves pass water from CHSS to CHR in the fourth floor Mech. Rooms to allow increased flow through the OSA unit. OSA Unit Flow Valves shall be positioned by a critical zone reset routine based on the position of their associated zone valves (OSAFV-W responds to OSA-W; OSAFV-E responds to OSA-E). The OSA Unit Flow Valve shall open in 10% increments to respond to any associated zone valve that is 95% open or more. The OSA Unit Flow Valve shall close in 10% increments until at least one associated zone valve is 85% open or more. The OSA Unit Valve positions shall be sampled at 5 second intervals and OSA Unit Flow Valve position shall be adjusted, if necessary, at 30 second intervals. OSA Unit Flow Valve position shall not be used in the Pump DP reset routine.

Chiller Minimum Flow Bypass Valve
Chiller Minimum Flow Bypass Valve shall be DDC controlled. Refer to Project Manual for Specifications of Valve, Actuator. Valve shall be controlled through a DDC Controller to maintain chiller total flow in the range of 105% to 110% of Chiller Manufacturer's required concurrent minimum flow. Valve shall be fully closed whenever the flow exceeds 110% of Chiller Manufacturer's required minimum flow. Valve shall be selected for 105% of Chiller Manufacturer's required minimum flow with a concurrent pressure drop not exceeding 10% of scheduled chilled water pump head.

Flow Meters
Flow meters shall be placed to measure total flow to the load, total flow through the bypass and total flow through the chillers.

Chillers (CH-1)
Chilled water plant shall be controlled to 42F (adjustable) entering the load branch whenever either Ventilation Unit (VU-E, VU-W) chilled water valve is not closed (>0%), and controlled to 54F (adjustable) entering the load branch whenever both Ventilation Units (VU-E, VU-W) chilled water valves are closed (0%). Multiple compressor chillers shall be operated to keep equal operating hours on each compressor. Differential operating time between any two compressors shall not exceed 25 hours. Provide a time delay (30 min., Adj.) before execution of a setpoint reset.

Chilled Water Pumps (CHP-1)
Chilled Water Pump shall be operated to achieve peak wire-to-water operating efficiency. The pump speed shall be controlled to match the differential pressure setpoint. The differential pressure setpoint shall be determined as follows: If at least one chilled water valve (OSA-E, AH-1E, AH-2E, AH-3E, AH-4E, OSA-W, AH-1W, AH-2W, AH-3W, AH-4W) is 85% open or greater, and no chilled water valve is 95% or greater open, the setpoint shall not be changed. If no valve is 85% open, or greater, the setpoint shall be reduced 0.1 ft wg. If any valve is 95% open, or greater, the setpoint shall be increased 0.1 ft wg. Valve positions shall be sampled at 5 second intervals and setpoint adjustments shall be made, if required, at 30 second intervals. The minimum allowable setpoint is XXXX ft wg, and the maximum setpoint is YYYY ft wg. Pressure adjustment shall not be made while the valve setting requiring the change is served by a ZV and OSAFV pair where either of the flow valves is partially open.

Plate Frame Heat Exchanger (HX-1)
Whenever the outdoor wet bulb is 5F (adjustable) or more below the return chilled water temperature, the Plate Frame Heat Exchanger shall be enabled. Operation of the heat exchanger shall be started by fully opening the heat exchanger isolation valve and partially closing the bypass valve. The valves shall be positioned as necessary to maximize the tonnage contribution of the heat exchanger until but not greater than the capacity required to meet the current chilled water setpoint. Whenever the heat exchanger is operating, the heat exchanger performance shall be calculated by multiplying Load Branch flow times the difference between the temperature in the load branch main line before the heat exchanger diversion and the temperature in the main line before the pumps. This value shall be divided by 24 to determine tons of capacity contribution by the heat exchanger. If the contribution is less than ZZZZ tons, the heat exchanger shall be bypassed, and operation of the heat exchanger not re-attempted until the difference between the wet bulb temperature, and load branch main line temperature has increased by 2F (adjustable). Once the heat exchanger operation is initiated, it shall continue until the contributed capacity falls below ZZZZ tons, regardless of temperatures unless the chiller is off. The difference between the wet bulb temperature, and load branch main line temperature at the time of heat exchanger shut-down plus 1F (adjustable) shall become the new difference required to re-initiate heat exchanger operation.

Fan Coil Units
Fan coil units shall have a two-way two-position chilled water valve. A modulating valve or an analog output as fan coil unit chilled water valve control is not acceptable. On a rise above cooling setpoint of the room thermostat, open the chilled water valve. On a fall to cooling setpoint of the room thermostat, close the chilled water valve.

CONDENSER WATER SYSTEM

Condenser Water Pumps (CWP-1, CWP-2)
CWP-1 is designated as the primary pump to serve CH-1. CWP-2 is designated as the primary pump to serve HX-1.

Pump Variable Frequency Drives shall be modulated to provide the flow required by the Heat Exchanger Loop or the Chiller Condenser Loop. The Heat Exchanger Loop flow is the cold side flow scheduled for HX-1 in approved submittals for the heat exchanger. The Chiller Condenser Loop flow is the sum of the flows of the operating condensers as scheduled in the approved submittals for the chiller.

Head Pressure Control Valves
Head Pressure Control Valves shall modulate as required to maintain chiller head pressure as low as possible and above the chiller manufacturer's required minimum pressure. Measure head pressure or differential pressure between evaporator and condenser as required to provide satisfactory high efficiency operation. On a fall in head pressure, the valves shall modulate to allow more bypass loop water. On a rise in head pressure, the valves shall modulate to allow more tower loop water.

Cooling Towers (CT-1, CT-2)
When HX-1 is not operating, the cooling tower fans shall operate and modulate as required to maintain chiller head pressure as low as possible and above the chiller manufacturer's required minimum pressure. Measure head pressure or differential pressure between evaporator and condenser as required to provide satisfactory high efficiency operation. On a fall in head pressure, the fans shall modulate slower, or turn off. On a rise in head pressure, the fans shall modulate faster.
When HX-1 is operating, the cooling tower fan or fans shall operate to maintain the lowest leaving water temperature that does not cause operation of the tower coil basin heaters, or that supplies the required leaving chilled water temperature, whichever is warmer.
Both tower cells shall operate for CH-1 and one tower cell shall operate for HX-1.

On a call for tower operation, the isolation valves associated with the cell, shall open and remain open while there is flow to the cell. Valves shall be closed while the cell is idle. An automatic lead-lag sequencing routine shall equalize running time between the cells. Hours of operation shall be recorded.
Bleed solenoid valve shall open whenever its associated cell is in use.

Valve Timing
Controls contractor shall submit, for approval by the Engineer, a detailed, timed sequence of events for opening and closing valves in coordination with starting and stopping of pumps, chiller, heat exchanger, and cooling towers. Sequence shall include: start of chiller, shutting down chiller plant. This sequence shall include each discrete event, control action and expected feedback, and be approved by the manufacturers of the controlled devices, in writing, before submission to the Engineer.

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 - MECH., ELEC., PLUMB. ENGINEER: CROMWELL ENGINEERS INC.
 - SUSTAINABLE CONSULTANT: BNIM / ELEMENTS
 - GLOBAL VILLAGE CONSULTANT: CAMBRIDGE SEVEN ASSOCIATES
 - INTERIOR DESIGNER: POLK STANLEY YEARY
 - GENERAL CONTRACTOR: CDI

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ISSUE DATE: DECEMBER 15, 2003
CORE/SHELL PACKAGE #5

REVISIONS:

#	DATE	DESCRIPTION
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A	7-1-04	PACKAGE 7, 100% ROLL UP

HEIFER INTERNATIONAL CENTER OFFICE BUILDING
LITTLE ROCK, ARKANSAS

PSY PROJECT NUMBER: 431C

CONTENTS:
HVAC CONTROLS

SHEET NUMBER:
M402



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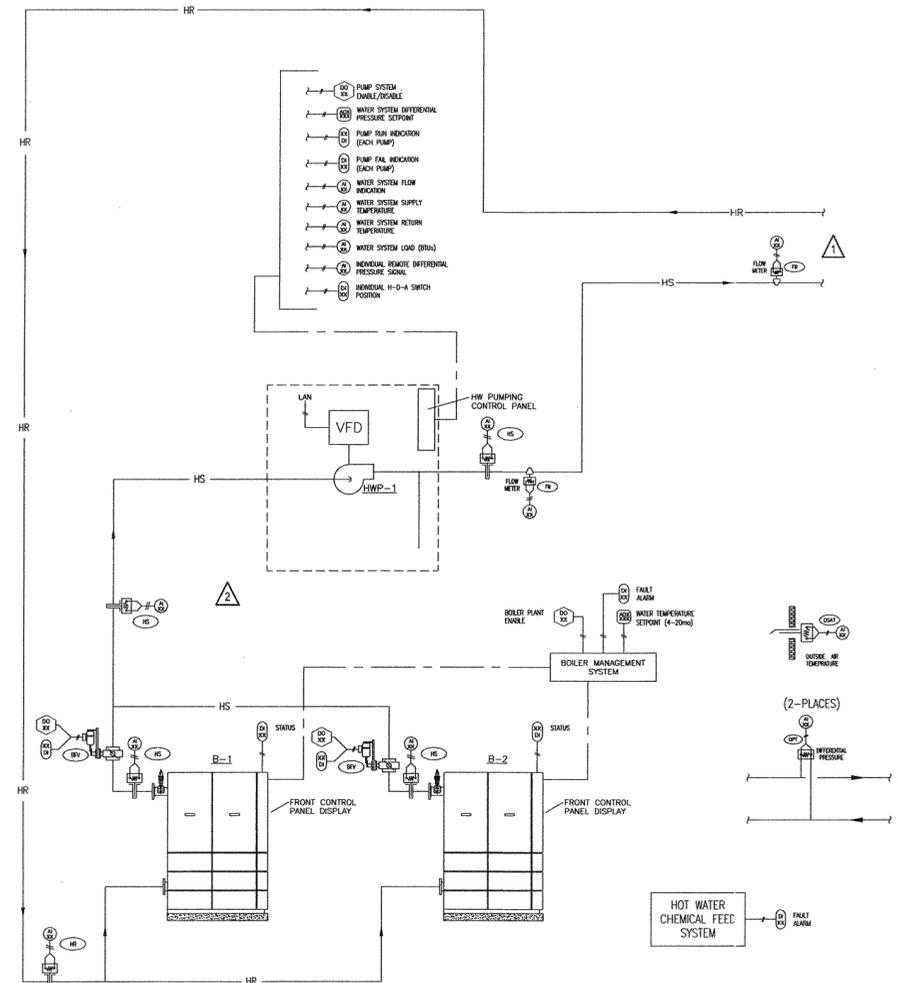
LITTLE ROCK, ARKANSAS

PSY PROJECT NUMBER:
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CONTENTS:
HVAC CONTROLS

SHEET NUMBER:

M403



1 HOT WATER CONTROL DIAGRAMS
M403 | M403 NO SCALE

Heating Water System

Fin Tube Radiation (Floors 1 through 4)

Fin tube radiation shall be served by silent two-way two-position valves. On a call from a space sensor the valve(s) serving the fin tube elements in that control zone shall open. When the sensor setpoint is satisfied, the valve(s) shall close. Valves shall be absolutely silent.

Ventilation Unit Preheat Coil

The two-position valve serving the Ventilation Unit Preheat Coil shall be fully opened at any time the outdoor temperature is 50F (adjustable) or less. The two-position valve serving the Ventilation Unit Preheat Coil shall be fully closed at any time the outdoor temperature is greater than 50F (adjustable). The integral face and bypass dampers shall modulate to maintain a leaving air temperature of 47F (adjustable). Sensor shall be Platinum RTD averaging type.

Ventilation Unit Reheat Coil

Water flow shall be modulated to maintain a mixed air temperature of 62F (adjustable) entering the cooling coil of the air handling units served by the ventilation unit. The air handling unit with the coldest mixed air temperature shall control. Sensors shall be Platinum RTD averaging type.

Heating Water Loop Temperature Reset Control

Heating supply water shall be circulated at 130F (adjustable) when the outdoor temperature is 65F (adjustable) and shall be evenly increased to 180F (adjustable) when the outdoor temperature is 15F (adjustable).

Heating Water Pumps

Heating Water Pumps shall be operated to achieve peak wire-to-water operating efficiency. The pump speed shall be controlled to match the differential pressure setpoint of XXXX ft wg (adjustable). Differential Pressure Sensors (2) shall be located as directed by the Engineer. Obtain specific instruction as to the actual location for the installation of the device and the taps into the piping.

Heating Water Boilers

Heating water boilers shall be operated as required to match the load. When the lead boiler reaches 90% of its capacity, the lag boiler shall be started. When each boiler is operating at 40% of its capacity, the lead boiler shall be stopped. Lead boiler duty shall be alternated to keep equal operating hours on each boiler. Differential operating time shall not exceed 25 hours. Boilers shall modulate their firing rate on their internal controls when operating. The boiler isolation valve associated with each boiler shall be opened before the boiler is enabled and shall be closed after confirmation that the boiler has been stopped.



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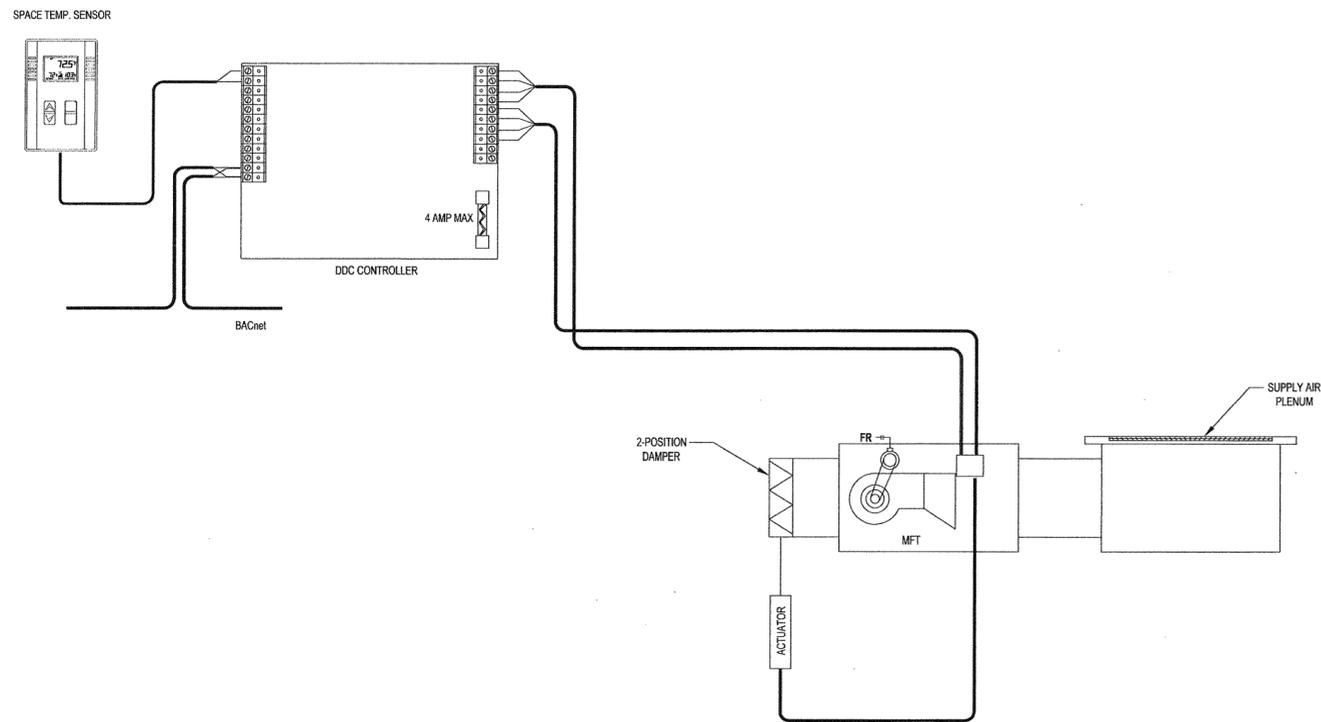
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HVAC CONTROLS
SHEET NUMBER:

M404



1 MODULAR FAN POWER TERMINALS "MFT"
M404 | M404 NO SCALE

SEQUENCES OF OPERATION

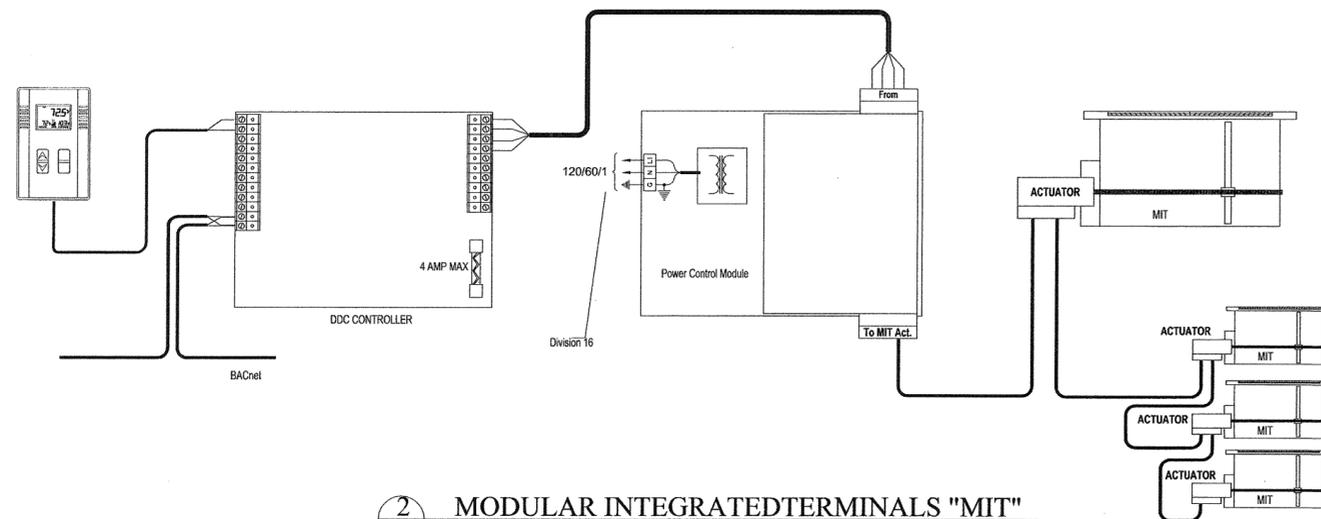
Occupied/Unoccupied Mode

The dedicated ddc controller for the zone's MFT network will place the MFT(s) into occupied mode based on user defined schedule or unoccupied override from zone digital thermostat interface (Microset).

Space Temperature Control

Cooling Mode:
When the space temperature rises above the current cooling setpoint (as sensed by digital thermostat), the controller shall deliver a drive open command to the PCM (power control module). The MFT control module shall open the 2-position damper prior to starting the fan, once the damper is 100% open the fan shall start. When the space temperature reaches the desired setpoint, the controller shall stop the fan and close the 2-position damper.

Heating Mode:
When the space temperature drops below the heating setpoint the 2-position hot water valve shall open when the space temperature reaches setpoint the valve shall close.



2 MODULAR INTEGRATED TERMINALS "MIT"
M404 | M404 NO SCALE

SEQUENCES OF OPERATION

Occupied/Unoccupied Mode

The dedicated ddc controller for the zone's MIT network will place the MIT(s) into occupied mode based on user defined schedule or unoccupied override from zone digital thermostat interface.

Space Temperature Control

Cooling Mode:
When the space temperature rises above the current cooling setpoint (as sensed by digital thermostat), the controller shall deliver a drive open command to the PCM (power control module). The PCM shall distribute this command to each of the MITs in the zone resulting in the opening of the MIT terminal to allow an increase in conditioned airflow. When the space temperature reaches the desired setpoint, the controller shall discontinue the drive open command stopping the MIT motor actuation. The controller signal shall be tri-state and based on a PI control algorithm relating space temperature and setpoint.

Heating Mode:
When the space temperature falls below the current heating setpoint (as sensed by digital thermostat), the controller shall deliver a drive closed command to the PCM (power control module). The PCM shall distribute this command to each of the MITs in the zone resulting in the closing of the MIT terminal to force a decrease in conditioned airflow. When the space temperature reaches the desired setpoint, the controller shall discontinue the drive closed command stopping the MIT motor actuation. If the space temperature does not reach the desired setpoint prior to the MIT(s) reaching minimum position, the MIT(s) shall be held at the minimum position.

DDC I/O Schedule

Point	Type	Description
IN-0	RS232 Input	Microset input (setpoint, space temp, override)
BO-0	Binary Output (24VAC)	Drive MIT open
BO-1	Binary Output (24VAC)	Drive MIT closed



SEQUENCE OF OPERATIONS:FAN COIL UNITS

The fan coil unit will be enabled and disabled by the BAS in accordance with a predefined time of day schedule.

Unoccupied

During un-occupied periods the fan will be off and the valves are closed. Should the space temperature rise above or drop below night setback setpoint the fan will be cycled on and the heating or cooling valve will open. When the space temperature rises above setpoint, the fan will cycle off and the valve closed. If a manual override switch mounted on the space thermostat is depressed, the fan coil units shall be individually referenced to the occupied mode for a temporary period.

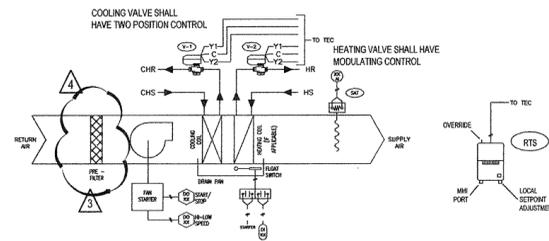
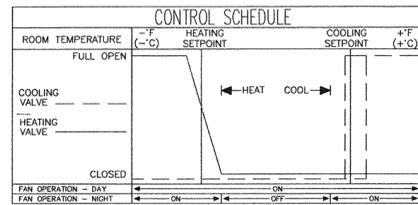
Occupied

When the unit is in the occupied mode the fan will run continuously and the heating valve will modulate to maintain setpoint. The cooling valve will fully open on a requirement for cooling and fully close when temperature reaches setpoint. Modulation of the cooling valve is prohibited. Fan speed shall be automatically selected by terminal equipment controller.

Alarms

A float switch located in the drain pan (auxiliary drain pan on concealed fan coils) shall turn the fan off and send an alarm to the BAS.

Note: Cooling coil control valve shall operate as a two position valve - full open or full closed. These valves shall not be included in the critical zone reset calculations.



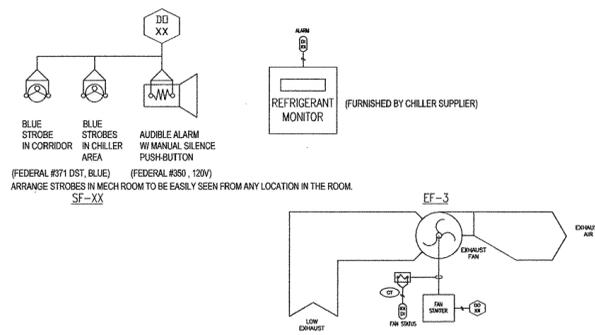
1 FAN COIL UNIT CONTROL

M405 | M405 NO SCALE

SEQUENCE OF OPERATIONS: REFRIGERANT EXHAUST SYSTEM

Emergency Mode

When the refrigerant sensor detects a refrigerant leak, an alarm shall be sent to the BAS. The BAS shall turn exhaust fan EF-3. An audible alarm will sound and strobes shall energize.

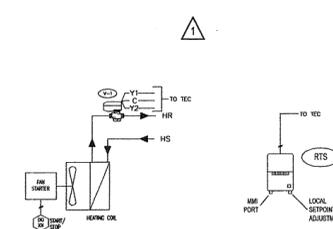


2 CHILLER ROOM VENTILATION CONTROL

M405 | M405 NO SCALE

SEQUENCE OF OPERATIONS: UNIT HEATERS

As space temperature falls below 65°F, the heating valve will modulate open. The space thermostat shall energize the fan as space temperature falls below setpoint.



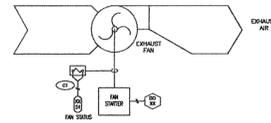
3 TYPICAL UNIT HEATER CONTROL

M405 | M405 NO SCALE

SEQUENCE OF OPERATION: TOILET AND GENERAL EXHAUST FANS

1. System Run

Exhaust fans shall be start/stopped on an owner defined schedule.



4 TOILET AND GENERAL EXHAUST FANS EF 7,8,9,10

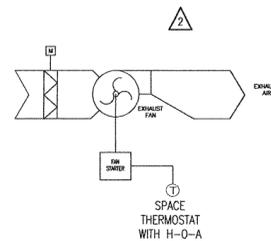
M405 | M405 NO SCALE

SEQUENCE OF OPERATION: EXHAUST FANS (T-STAT CONTROLLED)

1. System Run

Exhaust fans shall be start/stopped and the damper opened/closed by the space thermostat or the "hand" switch located at the space thermostat.

EF-4,5,6, Damper shall open when space temperature reaches 60°F, fan shall start when space temperature reaches 80°F.



5 EXHAUST FANS (T-STAT CONTROLLED) EF 1,2,6

M405 | M405 NO SCALE

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HEIFER INTERNATIONAL CENTER OFFICE BUILDING

LITTLE ROCK, ARKANSAS

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M405



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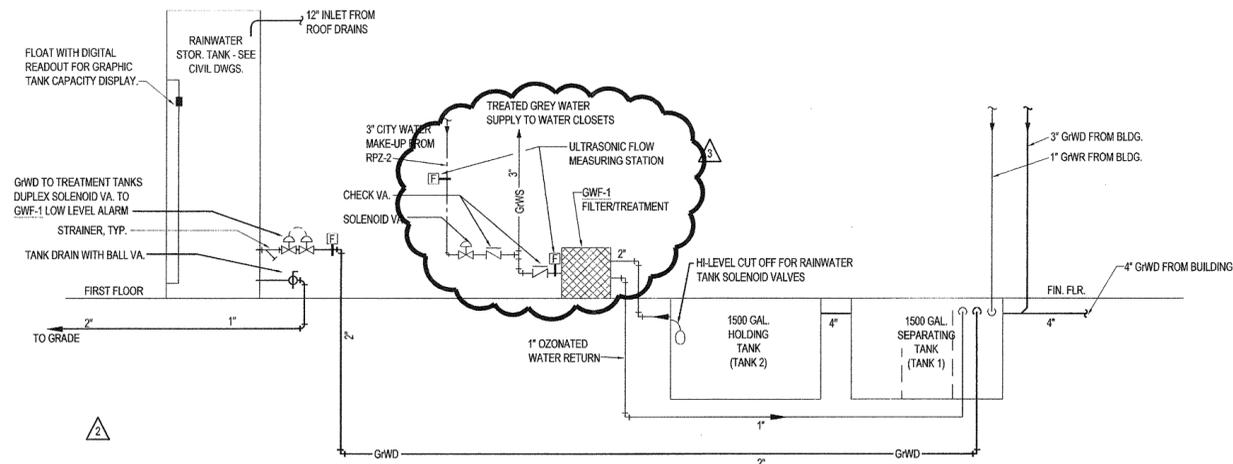
PSY PROJECT NUMBER:
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HVAC CONTROLS

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M406



SEQUENCE OF OPERATION:

NORMAL

GREY WATER FROM BUILDING (GWD) FLOWS TO SEPARATING / HOLDING TANKS. DISCHARGE FROM TANK. EFFLUENT IS THEN DRAWN OFF TO GW-1. THE GREY WATER SUPPLY (GWS) IS THEN PUMPED TO THE BUILDING WATER CLOSETS.

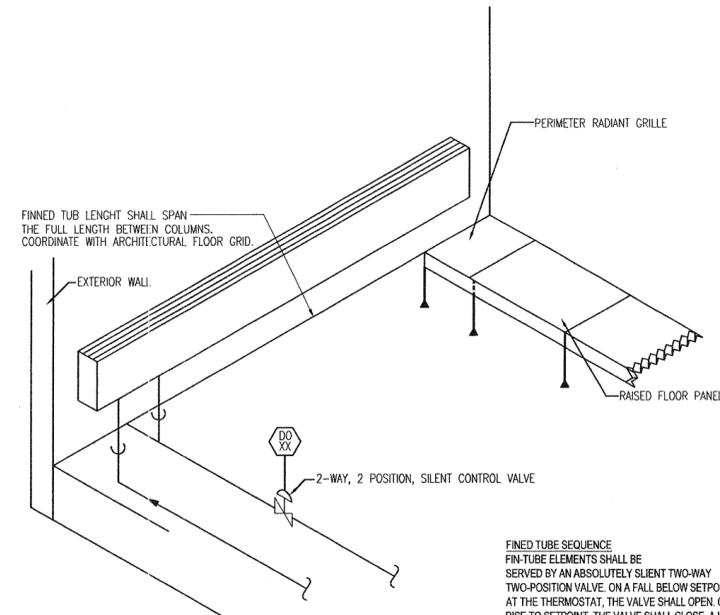
STANDBY #1

IF THE GREY WATER IN THE SYSTEM DROPS TO A MINIMUM LEVEL, AS DETECTED BY THE LOW LEVEL SWITCH IN GW-1, THEN THE SOLENOID SWITCH AT THE RAINWATER STORAGE TANK ENERGIZES TO ALLOW STORED RAINWATER TO ENTER TANK 1. THE SOLENOID VALVE WILL SHUT WHEN THE LOW LEVEL FLOAT IS SATISFIED.

STANDBY #2

IF THE LOW LEVEL SWITCH IN GW-1 REMAINS UNSATISFIED, THE SOLENOID VALVE AT THE CITY WATER CONNECTION WILL ENERGIZE TO ALLOW CITY WATER TO ENTER THE SYSTEM. THE SOLENOID VALVE WILL SHUT WHEN THE LOW LEVEL FLOAT IS SATISFIED.

1 GREY WATER PIPING SCHEMATIC
M-406 | M-406 NO SCALE



FINNED TUBE SEQUENCE

FIN-TUBE ELEMENTS SHALL BE SERVED BY AN ABSOLUTELY SILENT TWO-POSITION VALVE. ON A FALL BELOW SETPOINT AT THE THERMOSTAT, THE VALVE SHALL OPEN. ON RISE TO SETPOINT, THE VALVE SHALL CLOSE. A HOT WATER TEMPERATURE RESET SCHEDULE SHALL BE DEVELOPED THAT PROVIDES RESET OF WATER TEMPERATURE FROM 180° F TO A TO BE DETERMINED MINIMUM TEMPERATURE AS THE OUTDOOR TEMPERATURE VARIES FROM 65° F TO 15° F. ALL TEMPERATURES SHALL BE ADJUSTABLE. THE RATE OF REST WILL NOT BE LINEAR.

**2 HOT WATER FIN TUBE RADIATION PIPING
FED FROM BELOW RAISED FLOOR**
M-406 | M-406 NO SCALE



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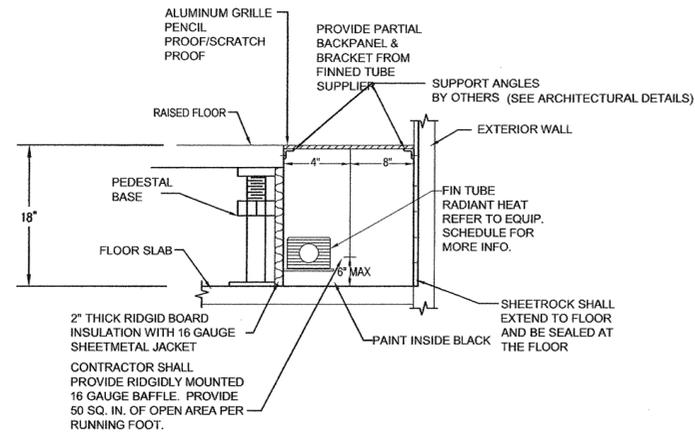
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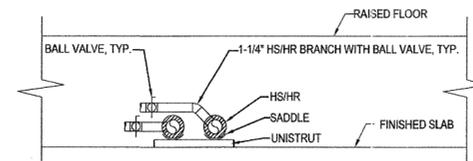
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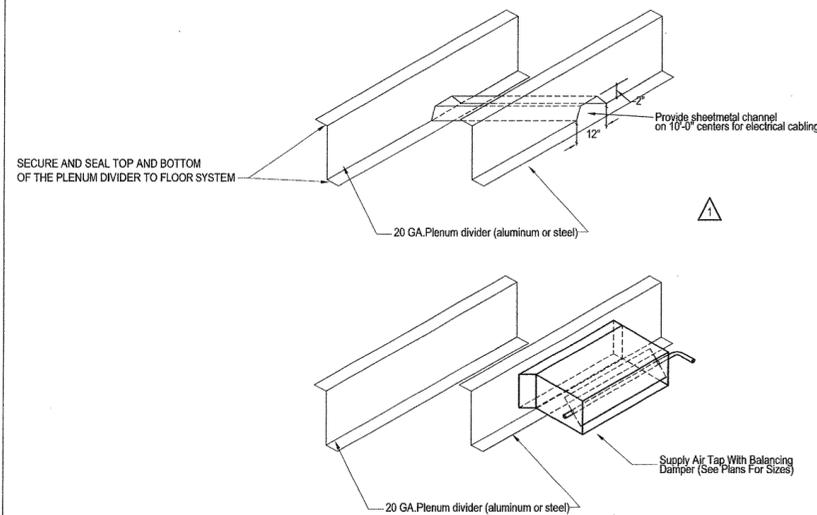
M205



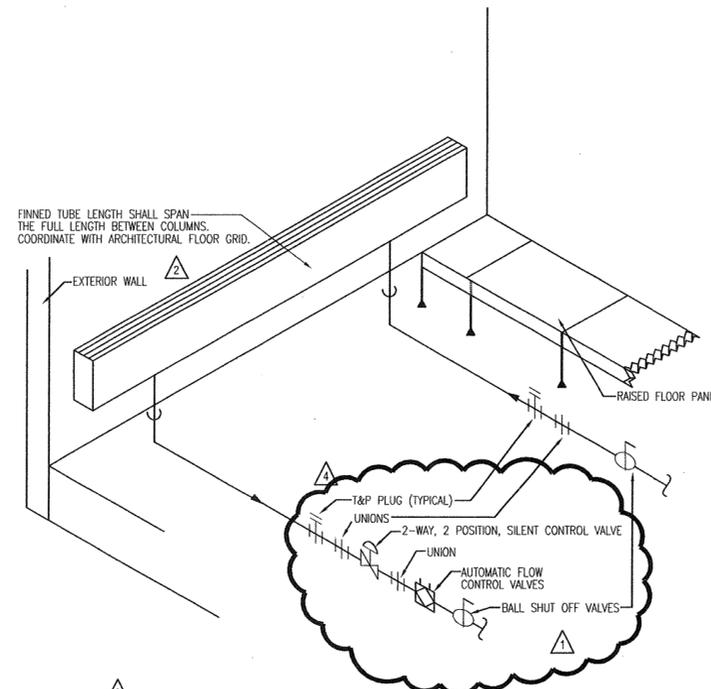
1 FIN TUBE RADIANT HEAT PANEL SECTION
M-205 | M-205 NO SCALE



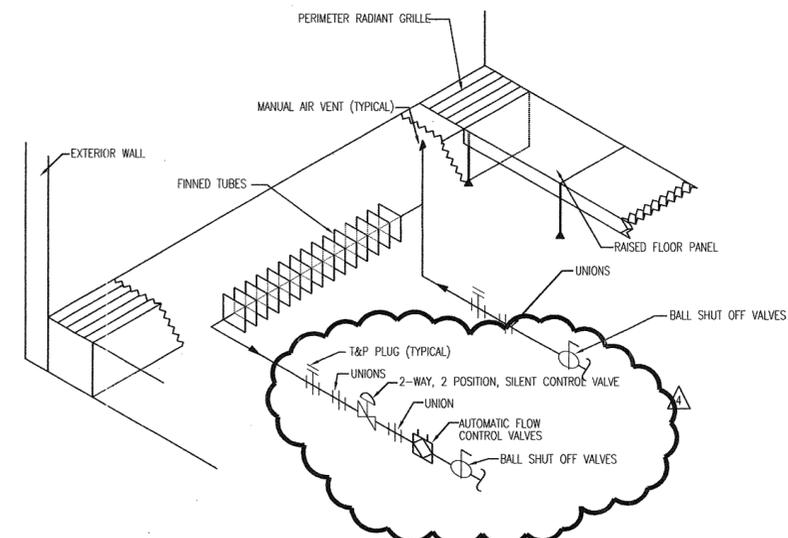
2 HOT WATER PIPING (UNDERFLOOR)
M-205 | M-205 NO SCALE



3 DUCTED PANEL AIR PLENUM
M-205 | M-205 NO SCALE



4 HOT WATER FIN TUBE RADIATION PIPING FED FROM BELOW RAISED FLOOR
M-205 | M-205 NO SCALE



5 HOT WATER FIN TUBE RADIATION PIPING FED FROM BELOW RAISED FLOOR
M-205 | M-205 NO SCALE

