

H.V.A.C. GENERAL NOTES

- IT IS NOT INTEND THAT THE PLANS SHOW ALL OFFSETS IN DUCTS, AND PIPES REQUIRED FOR INSTALLATION OF THE WORK. DETAILS AND SECTIONS ARE INCLUDED FOR SOME AREAS TO SHOW INTENDED LOCATION OF THE WORK. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND SUB-CONTRACTORS TO COORDINATE INSTALLATION OF THE WORK AND TO PROVIDE THE NECESSARY OFFSETS, TRANSFORMATIONS AND FITTINGS REQUIRED. DETAILS AND SECTIONS ARE SHOWN FOR THE CONTRACTORS CONVENIENCE AND SHALL NOT BE CONSIDERED COMPLETE IN EVERY DETAIL.
- SCALE IS APPROXIMATE. FABRICATE FROM FIELD MEASUREMENTS.
- PROVIDE FIRE STOPPING FOR ALL PIPES, DUCTS, AND OTHER OPENINGS. SEE SPECIFICATIONS.
- DUCT SIZES SHOWN ARE AIR PASSAGE SIZE.
- PROVIDE THERMOMETERS AT THE FOLLOWING LOCATIONS:
 - SUCTION AND DISCHARGE OF EACH NEW CIRCULATING PUMP.
 - PROVIDE ONE (1) THERMOMETER IN PIPING TO HEATING COILS AND CHILLED WATER COILS OF EACH AIR HANDLING UNIT.
 - ENTERING AND LEAVING SIDE OF CONVERTER.
 - ENTERING AND LEAVING SIDE OF BOILER.
- PROVIDE PRESSURE GAUGES AT THE FOLLOWING LOCATIONS:
 - SUCTION AND DISCHARGE OF EACH NEW CIRCULATING PUMP.
 - ENTERING AND LEAVING SIDE OF EACH HOT WATER COIL.
 - ENTERING AND LEAVING SIDE OF EACH CHILLED WATER COIL.
 - ENTERING AND LEAVING SIDE OF CONVERTER.
 - ENTERING AND LEAVING SIDE OF BOILER.
 - ENTERING AND LEAVING SIDE OF PRESSURE REDUCING VALVES.
- PROVIDE A MINIMUM OF 2'-0" LONG FLEXIBLE DUCT CONNECTION AT INLET SIDE OF TERMINAL BOXES. MAXIMUM FLEXIBLE DUCT 6'-0" LONG.
- PROVIDE BAFFLING IN MIXED AIR PLENUM OF AIR HANDLING UNITS AS MAY BE NECESSARY TO ASSURE MIXED AIR TEMPERATURE VARIATIONS OF NOT MORE THAN PLUS OR MINUS 20 F.
- SECURELY FASTEN FLEXIBLE DUCTS TO DIFFUSERS, AND TO INLET COLLAR OF ALL VARIABLE VOLUME BOXES, AND VARIABLE VOLUME REHEAT BOXES WITH DUCT TAPE AND 1/2" WIDE POSITIVE LOCKING STEEL STRAPS.
- PROVIDE ACCESS DOORS IN DUCTS WHERE INDICATED AND WHERE REQUIRED FOR SERVICING EQUIPMENT.
- PROVIDE MINIMUM 8 X 8 HINGED ACCESS DOORS IN DUCTS FOR INSPECTION OF MANUAL BALANCING DAMPERS, MOTORIZED DAMPERS, AND SPLITTER DAMPERS.
- INSTALL ALL TERMINAL BOXES AS HIGH AS POSSIBLE. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE EXACT LOCATION AND CO-ORDINATE BOX AND RELATED WORK WITH OTHER TRADES, EXISTING EQUIPMENT, PIPES, ETC..
- THERMOSTATS SHALL BE INSTALLED FOUR FEET SIX INCHES ABOVE FINISHED FLOOR. WHERE THERMOSTAT IS LOCATED WITH LIGHT SWITCH, BOTH DEVICES SHALL BE MOUNTED ON THE SAME VERTICAL CENTERLINE.
- RELIEF VALVES SHALL BE SET 15 PSI GREATER THAN THE REDUCED PRESSURE OF THE PRESSURE REDUCING VALVE.

H.V.A.C. LEGEND AND SYMBOLS

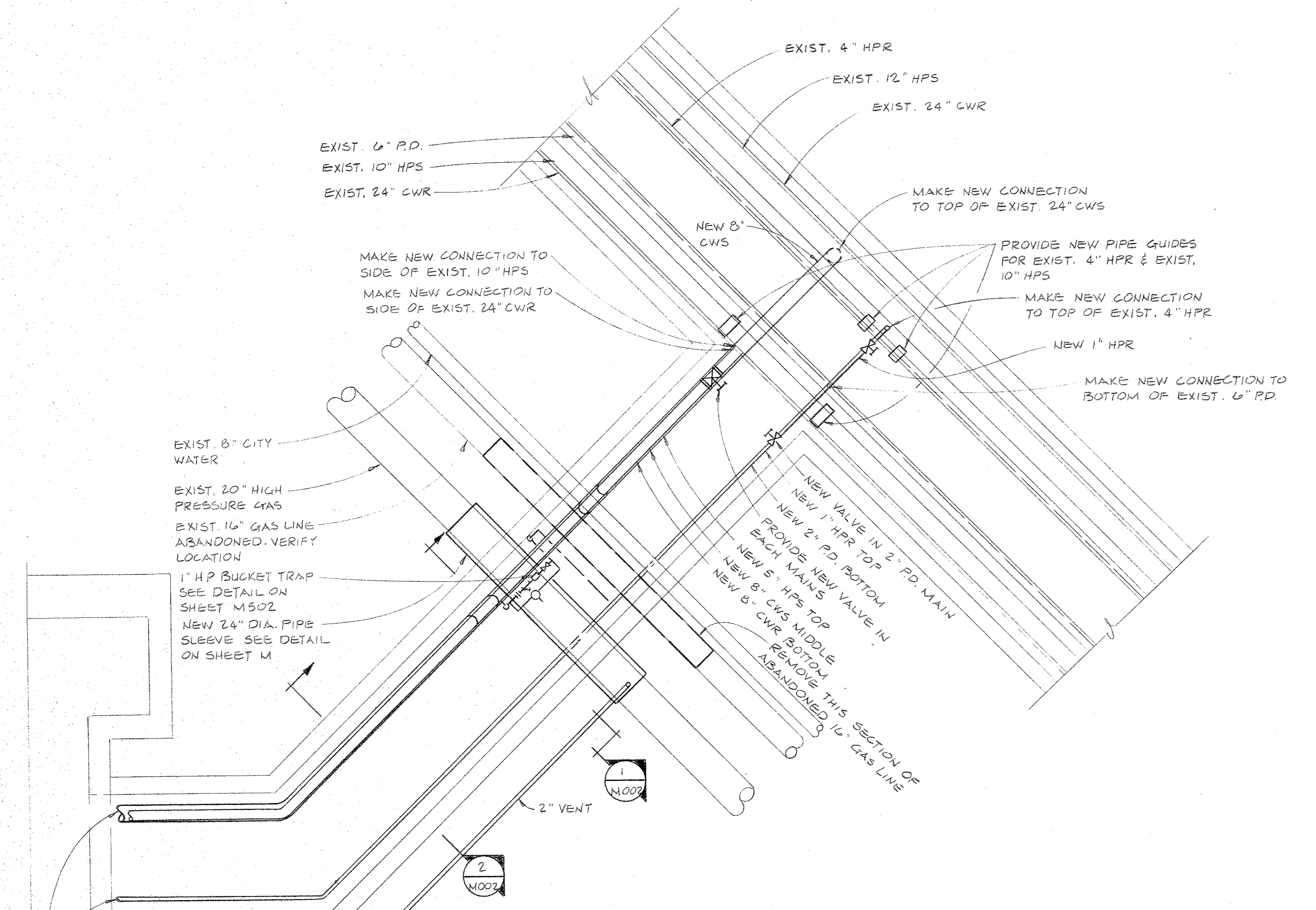
— HPS —	HIGH PRESSURE STEAM (125 PSI)		SECTION NUMBER
— HPR —	HIGH PRESSURE RETURN		SHEET NO. WHERE SECTION APPEARS ON PLAN OR SHEET NO. WHERE SECTION IS CUT
— MPS —	MEDIUM PRESSURE STEAM (60 PSI)		24X24 CRG W/ 22X8 DUCT
— MPR —	MEDIUM PRESSURE RETURN		24X24 CRG
— LPS —	LOW PRESSURE STEAM (10 PSI)		24X18 CRG W/ 22X8 DUCT
— LPR —	LOW PRESSURE RETURN		24X12 CRG W/ 22X6 DUCT
— CWS —	CHILLED WATER SUPPLY		THERMOSTAT
— CWR —	CHILLED WATER RETURN	V-1	VARIABLE VOLUME BOX
— HWS —	HOT WATER SUPPLY	VR-1	VARIABLE VOLUME REHEAT BOX
— HWR —	HOT WATER RETURN	VE-1	VARIABLE VOLUME EXHAUST BOX
— PHWS —	HOT WATER SUPPLY	AHU-6	AIR HANDLING UNIT NO. 6
— PHWR —	HOT WATER RETURN	SF-6	SUPPLY FAN IN AHU-6
— D —	CONDENSATE DRAIN LINE.	CC-6	COOLING COIL IN AHU-6
— PD —	PUMP DISCHARGE LINE	HC-6	HEATING COIL IN AHU-6
— V —	VENT LINE	PHC-6	PRE-HEAT COIL IN AHU-6
— E —	EXPANSION LINE	RHC-6A	REHEAT COIL NUMBER
	GATE VALVE (HORIZONTAL LINE)	P-1	PUMP NO. P - 1
	GATE VALVE (VERTICAL LINE)	CD	CEILING DIFFUSER
	BALANCING VALVE (HORIZONTAL LINE)	LD	LABORATORY DIFFUSER
	BALANCING VALVE (VERTICAL LINE)	WSR	WALL SUPPLY AIR REGISTER
	GLOBE VALVE	WSG	WALL SUPPLY AIR GRILLE
	CHECK VALVE	WRR	WALL RETURN AIR REGISTER
	THREE-WAY MIXING VALVE	WRG	WALL RETURN AIR GRILLE
	MOTOR OPERATED VALVE	WER	WALL EXHAUST AIR REGISTER
	PRESSURE REDUCING VALVE	WEG	WALL EXHAUST GRILLE
	PRESSURE RELIEF VALVE	CRR	CEILING RETURN AIR REGISTER
	EXISTING BALANCING COCK	CRG	CEILING RETURN AIR GRILLE
	EXISTING ORIFICE WITH MANOMETER CONNECTIONS	CER	CEILING EXHAUST AIR REGISTER
	STRAINER	MVD	MANUAL VOLUME DAMPER
	UNION	MOD	MOTOR OPERATED DAMPER
	THERMOMETER	SD	SPLITTER DAMPER
	PRESSURE GAUGE	FD	FIRE DAMPER
	DIRECTION OF FLOW	AD	ACCESS DOOR
	DIRECTION OF PITCH	CO	CLEANOUT
	AIR VENT	U.H.	CABINET UNIT HEATER
	LINE DOWN	N.T.S.	NOT TO SCALE
	LINE UP	SA-4	SOUND ATTENUATOR NUMBER
	FLEXIBLE DUCT CONNECTION	PRV-1	PRESSURE REDUCING VALVE NO. 1
	AIR VOLUME EXTRACTOR	ASV-1	AUTOMATIC STEAM VALVE NO. 1
	TURNING VANES	H-1	HUMIDIFIER NO. 1
	SPLITTER DAMPER		
	FLEXIBLE DUCT 2'-0" MIN./ 6'-0" MAX. LENGTH		
	FLEXIBLE DUCT 2'-0" MIN./ 6'-0" MAX. LENGTH		

The Paul C Lutz Building is a five (5) story building with 89,746 square feet of space that was constructed in 1995. The substructure consists of a reinforced concrete foundation with a slab on grade. The superstructure consists of load bearing concrete and structural steel framing with an exterior brick, and stone, veneer with the structural steel roof framing supporting a combination of BUR and metal roofing systems.

LEGEND AND GENERAL NOTES

SCALE: NONE

REVISIONS 1 2 3 4 5		DATE		UNIVERSITY OF LOUISVILLE ACADEMIC BUILDING PHASE FIVE	
DATE 12-17-93		DRAWN BY M. B. D.		RECORD DATE	
CHECKED BY J. H. R.		PROJ. ARCH 10,211		UNIVERSITY FILE NO.	
A & E FILE NO.		UNIVERSITY OF LOUISVILLE OFFICE OF FACILITIES MANAGEMENT LOUISVILLE, KENTUCKY 40292 (502) 588-6167		DRAWING NO. M001	
AGENCY AUTHORIZATION		APPROVAL FOR PROGRAM CONCEPT ONLY		DATE	



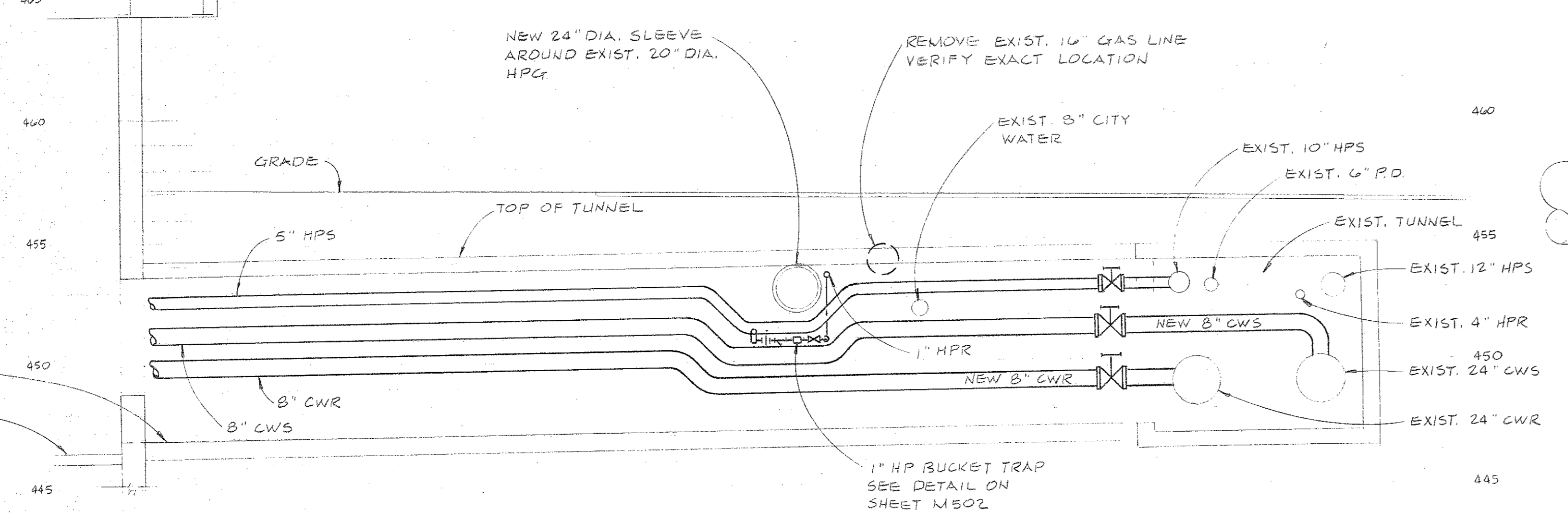
TUNNEL PLAN
SCALE 1/4" = 1'-0"

MECHANICAL RM. 002

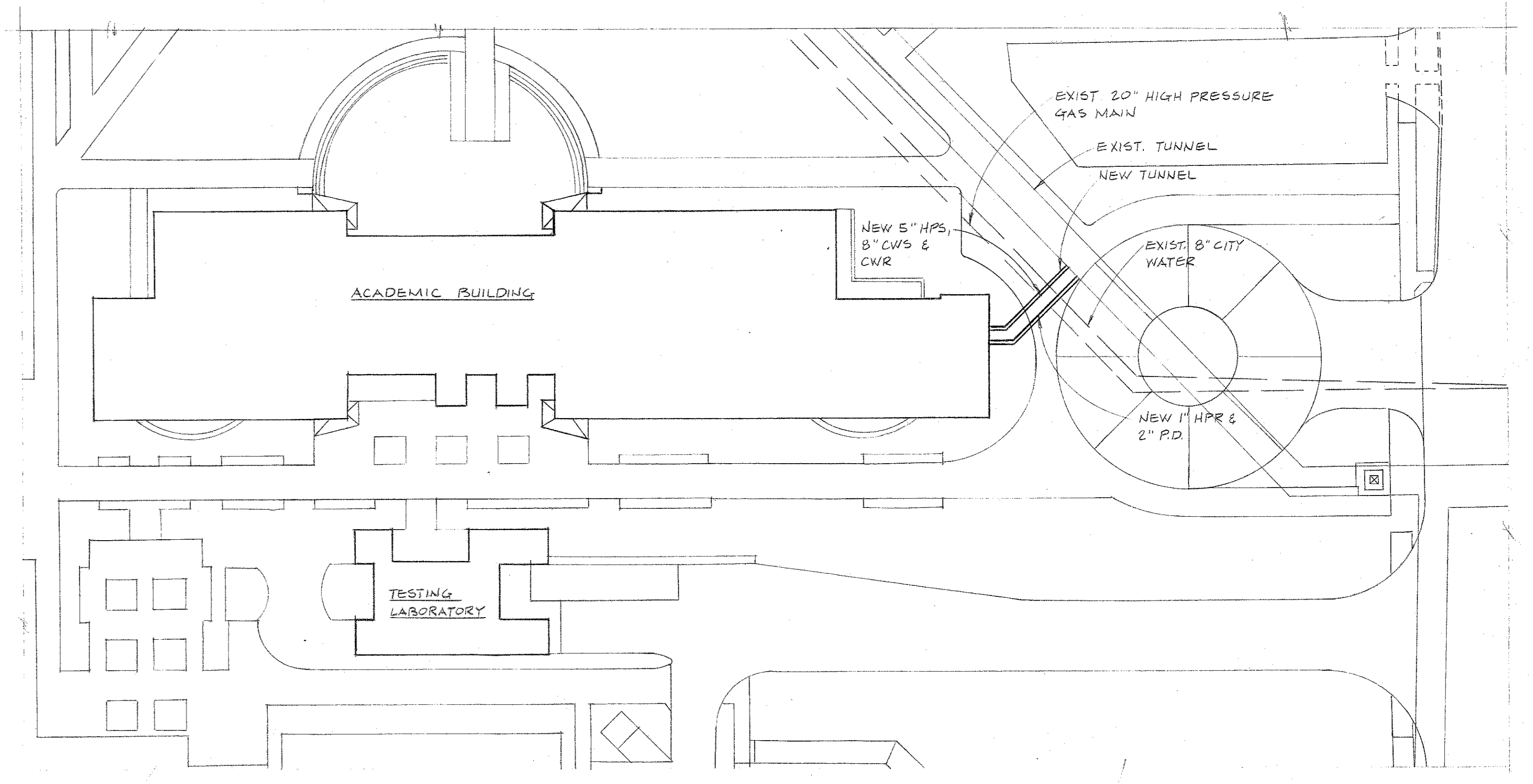
FIRST FLOOR

MECHANICAL RM. 002

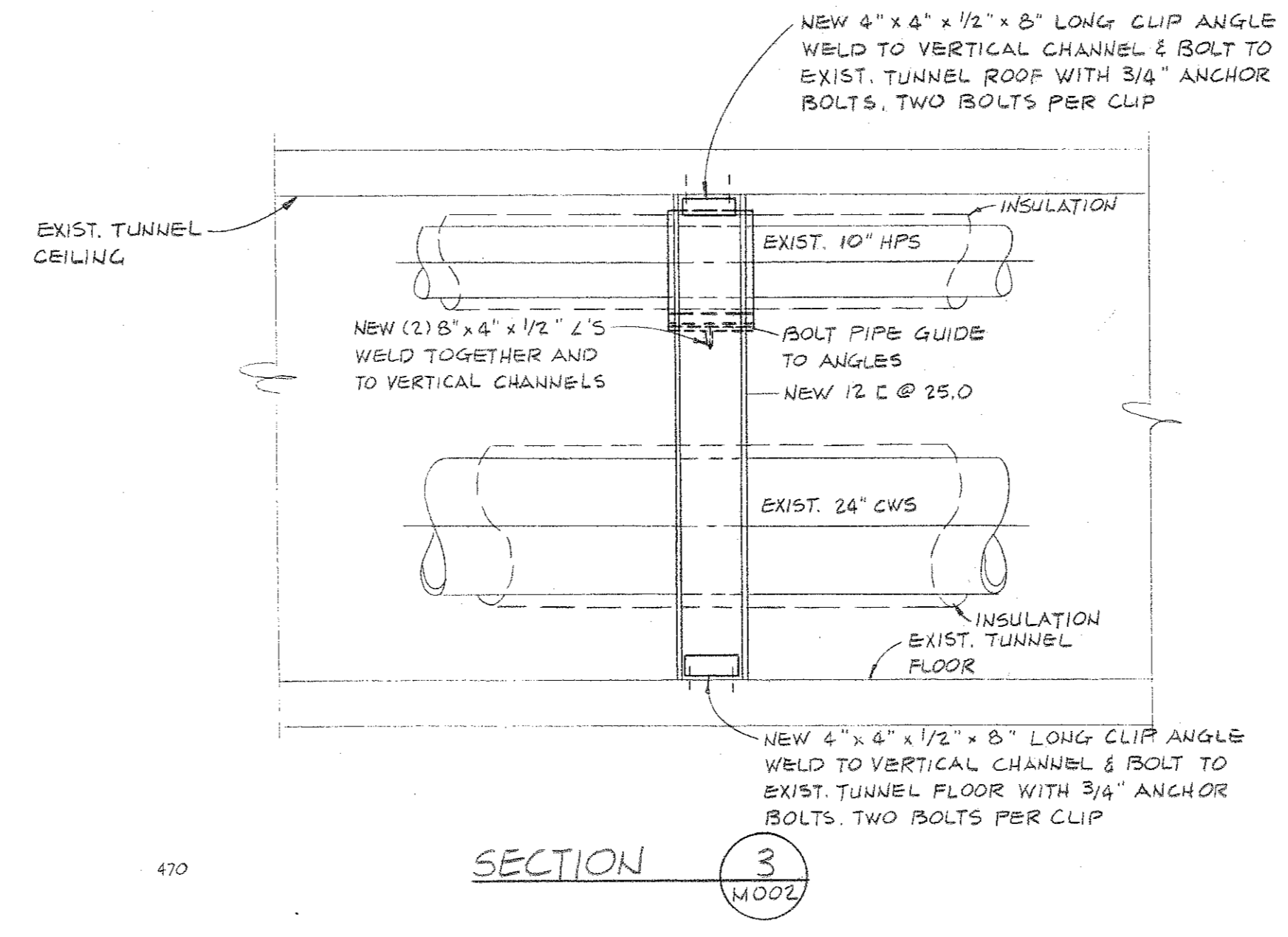
BOTTOM OF TUNNEL BASEMENT FLOOR



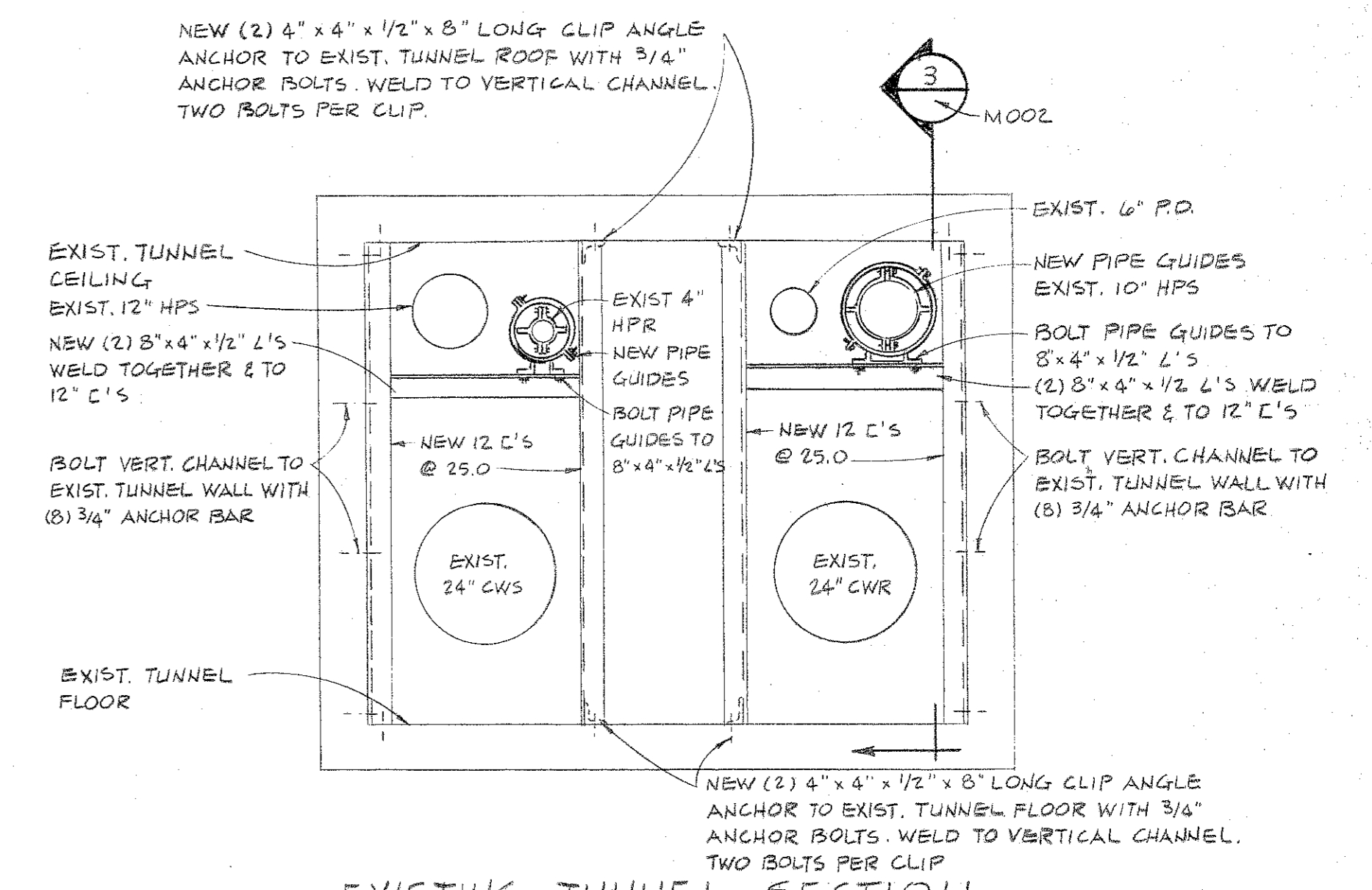
PROFILE OF TUNNEL
HORIZ. SCALE 1/4" = 1'-0"
VERT. SCALE 1/4" = 1'-0"



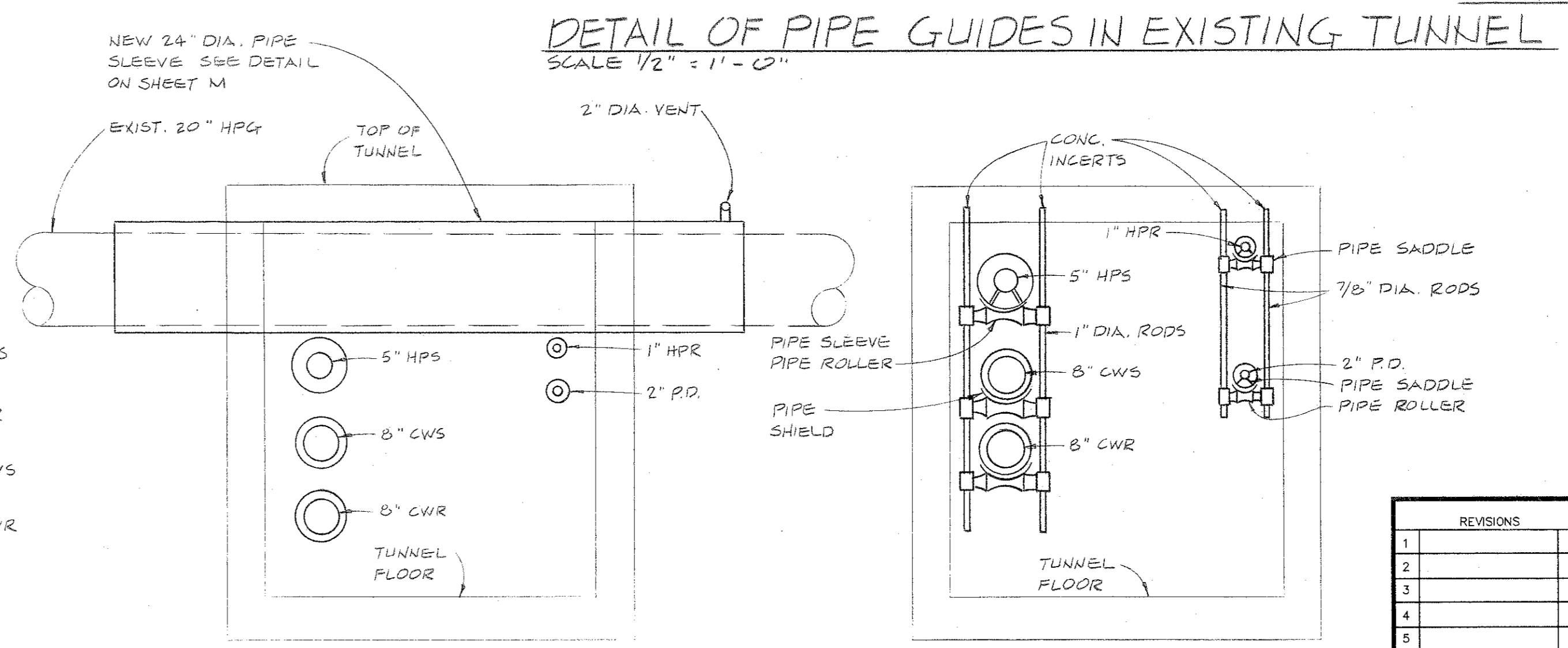
PART SITE PLAN
SCALE 1" = 30'-0"



SECTION 3
SCALE 1/2" = 1'-0"



EXISTING TUNNEL SECTION



SECTION 1
SCALE 1/2" = 1'-0"

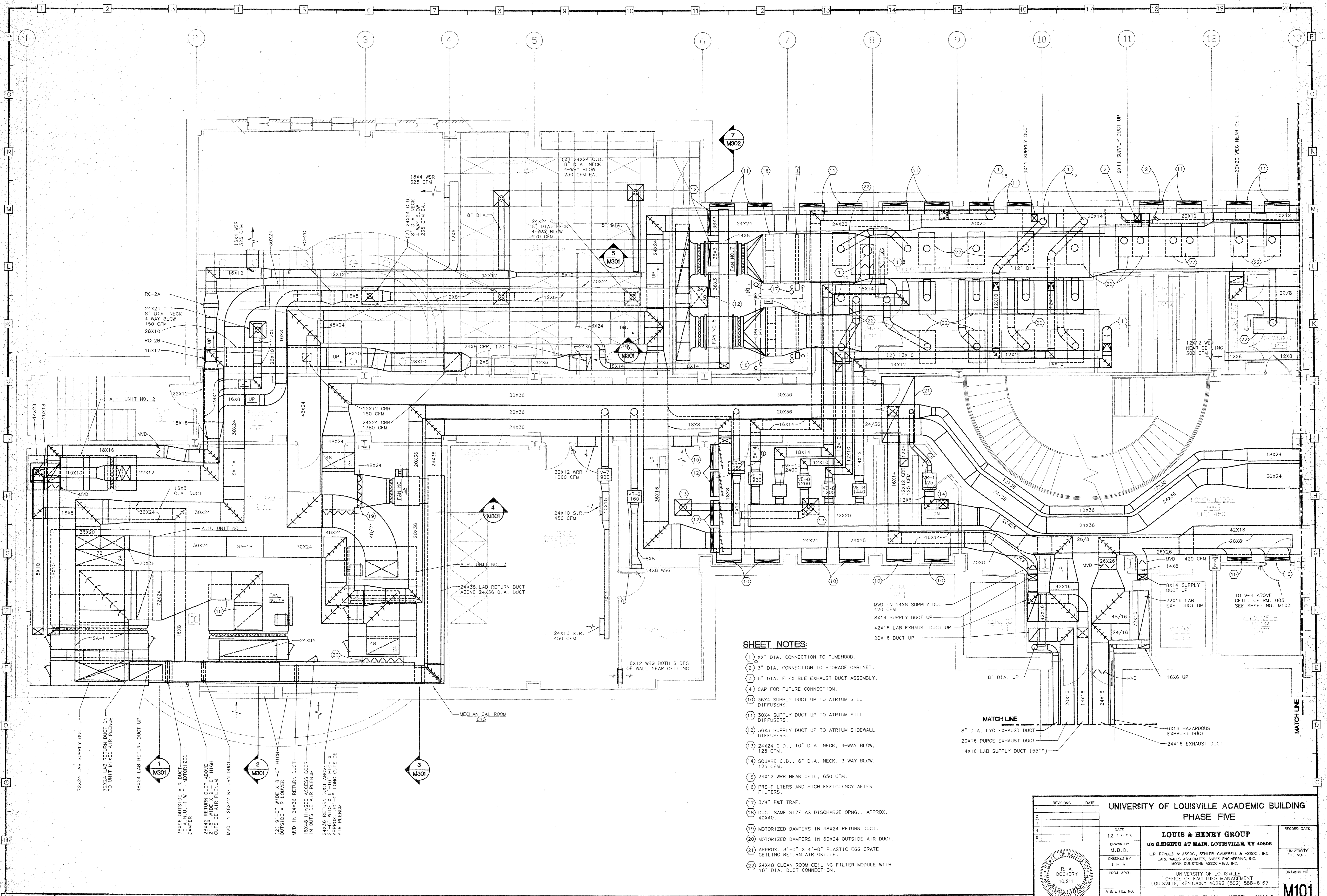
SECTION 2
SCALE 1/2" = 1'-0"

REVISIONS		DATE	UNIVERSITY OF LOUISVILLE ACADEMIC BUILDING PHASE FIVE	
1			DATE	RECORD DATE
2			DATE	RECORD DATE
3			DATE	RECORD DATE
4			DATE	RECORD DATE
5			DATE	RECORD DATE

DATE 12-17-93 DRAWN BY M.B.D. CHECKED BY J.H.R. PROJ. ARCH. R. A. DOOKERY 10.211 A & E FILE NO.	101 S. HIGHWAY AT MAIN, LOUISVILLE, KY 40208 E.R. RONALD & ASSOC., SENLER-CAMPBELL & ASSOC., INC. EARL WALLS ASSOCIATES, SKIES ENGINEERING, INC. MONK DUNSTONE ASSOCIATES, INC.	UNIVERSITY FILE NO. UNIVERSITY OF LOUISVILLE OFFICE OF FACILITIES MANAGEMENT LOUISVILLE, KENTUCKY 40292 (502) 588-6167	DRAWING NO. M002
AGENCY AUTHORIZATION	APPROVAL FOR PROGRAM CONCEPT ONLY	DATE	PRINCIPAL IN CHARGE

PIPE TUNNEL PLAN AND DETAILS

SCALE: NONE



SHEET NOTES:

- 1) XX" DIA. CONNECTION TO FUMEHOOD.
- 2) 3" DIA. CONNECTION TO STORAGE CABINET.
- 3) 6" DIA. FLEXIBLE EXHAUST DUCT ASSEMBLY.
- 4) CAP FOR FUTURE CONNECTION.
- 10) 36X4 SUPPLY DUCT UP TO ATRIUM SILL DIFFUSERS.
- 11) 36X4 SUPPLY DUCT UP TO ATRIUM SILL DIFFUSERS.
- 12) 36X3 SUPPLY DUCT UP TO ATRIUM SIDEWALL DIFFUSERS.
- 13) 24X24 C.D., 10" DIA. NECK, 4-WAY BLOW, 125 CFM.
- 14) SQUARE C.D., 6" DIA. NECK, 3-WAY BLOW, 125 CFM.
- 15) 24X12 WRR NEAR CEIL., 650 CFM.
- 16) PRE-FILTERS AND HIGH EFFICIENCY AFTER FILTERS.
- 17) 3/4" F&T TRAP.
- 18) DUCT SAME SIZE AS DISCHARGE OPNG., APPROX. 40X40.
- 19) MOTORIZED DAMPERS IN 48X24 RETURN DUCT.
- 20) MOTORIZED DAMPERS IN 60X24 OUTSIDE AIR DUCT.
- 21) APPROX. 8'-0" X 4'-0" PLASTIC EGG CRATE CEILING RETURN AIR GRILLE.
- 22) 24X48 CLEAN ROOM CEILING FILTER MODULE WITH 10" DIA. DUCT CONNECTION.

MATCH LINE

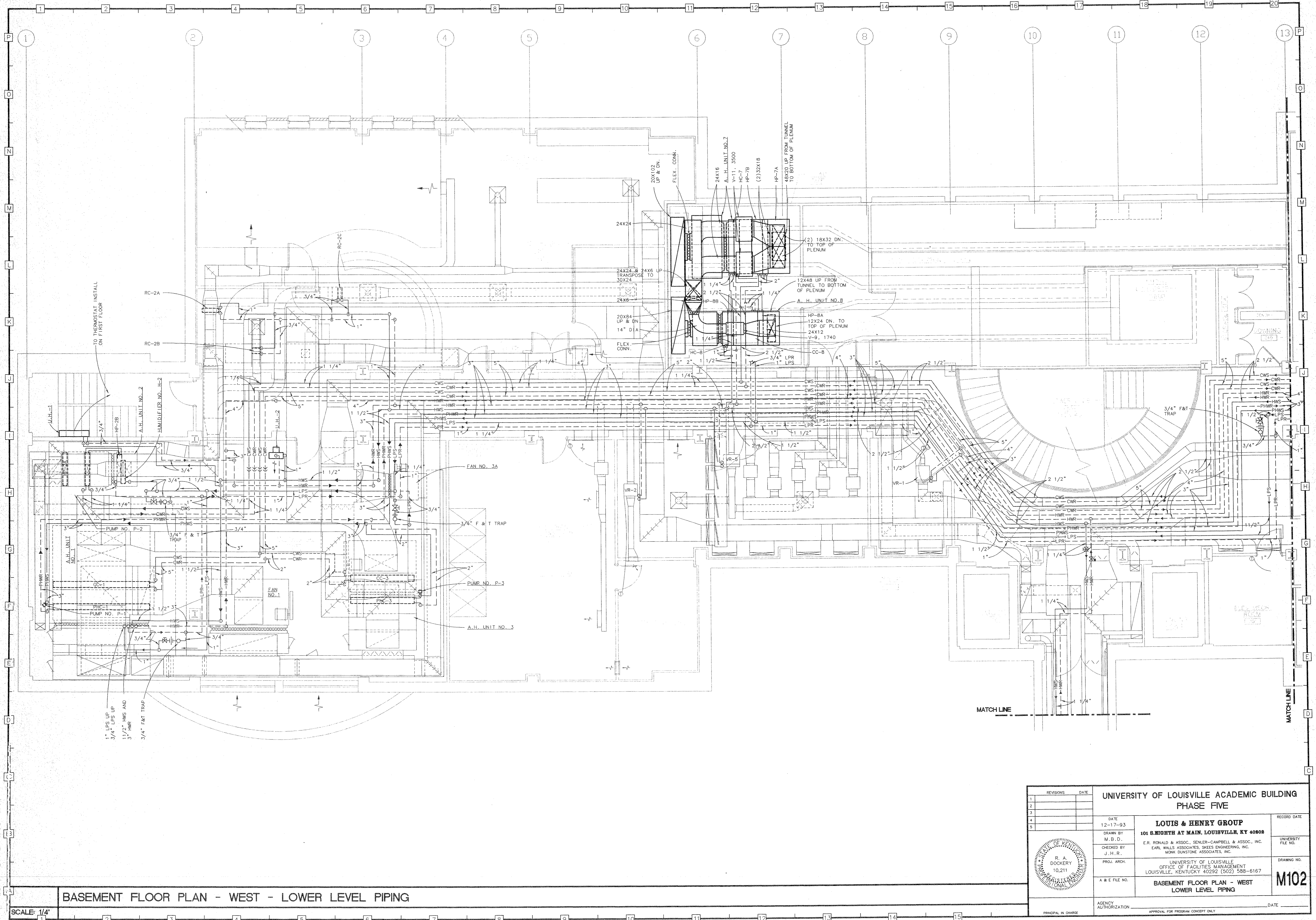
8" DIA. LYC EXHAUST DUCT
 20X16 PURGE EXHAUST DUCT
 14X16 LAB SUPPLY DUCT (55°F)
 8X14 SUPPLY DUCT UP
 42X16 LAB EXHAUST DUCT UP
 20X16 DUCT UP
 24X16 EXHAUST DUCT
 6X14 HAZARDOUS EXHAUST DUCT

BASEMENT FLOOR PLAN - WEST - H.V.A.C.

SCALE: 1/4"

REVISIONS		DATE	UNIVERSITY OF LOUISVILLE ACADEMIC BUILDING PHASE FIVE	
1			DATE 12-17-93	RECORD DATE
2			DRAWN BY M. B. D.	UNIVERSITY FILE NO.
3			CHECKED BY J. H. R.	DRAWING NO. M101
4			PROJ. ARCH. R. A. DOCKERY 10.211	AGENCY AUTHORIZATION
5			A & E FILE NO. BASEMENT FLOOR PLAN - WEST - H.V.A.C.	DATE
PRINCIPAL IN CHARGE			APPROVAL FOR PROGRAM CONCEPT ONLY	

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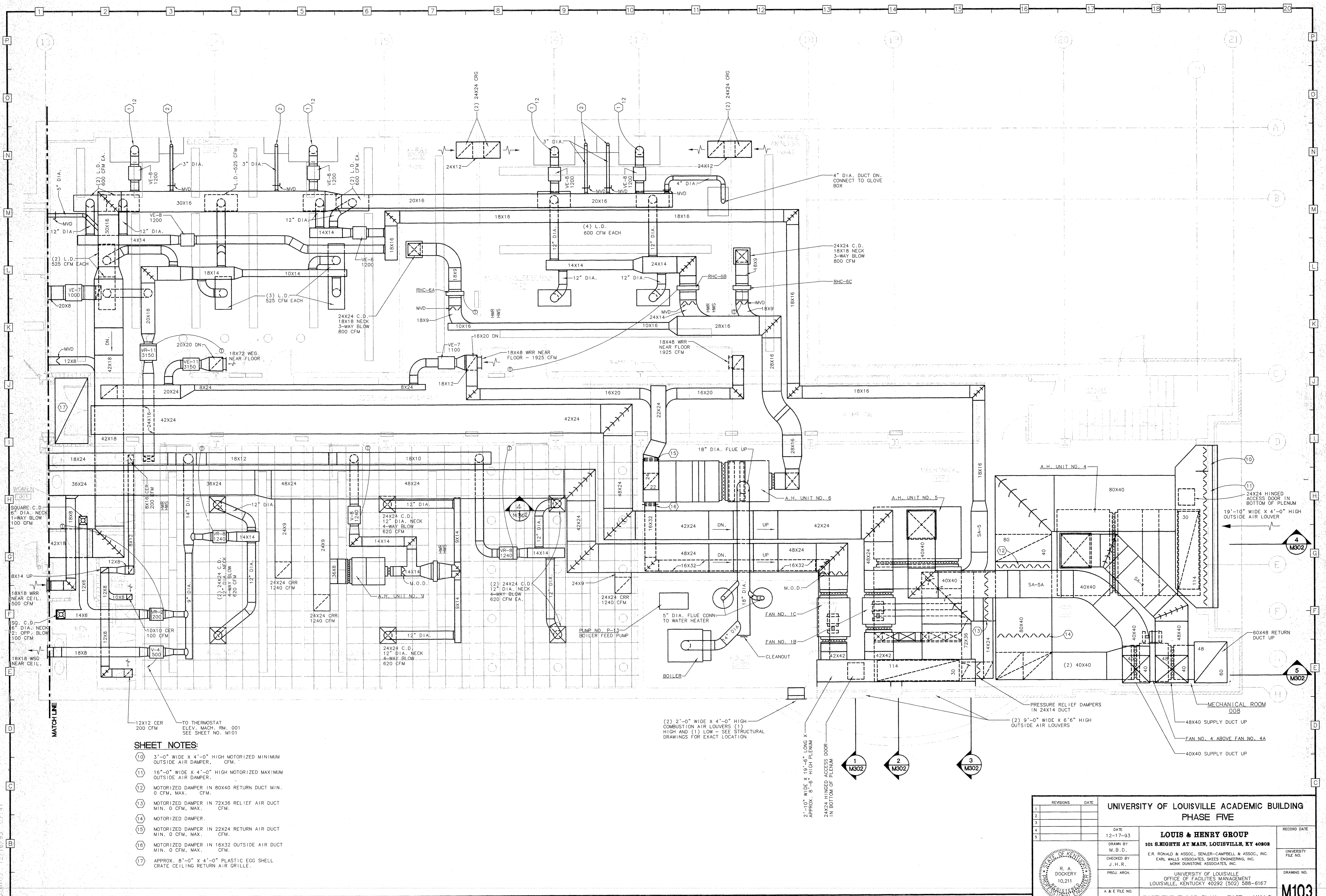
BASEMENT FLOOR PLAN - WEST - LOWER LEVEL PIPING

SCALE: 1/4"

REVISIONS		DATE	UNIVERSITY OF LOUISVILLE ACADEMIC BUILDING PHASE FIVE	
1				
2				
3				
4				
5				
		DATE	RECORD DATE	
		12-17-93		
		DRAWN BY	LOUIS & HENRY GROUP	
		M.B.D.	101 S. EIGHTH AT MAIN, LOUISVILLE, KY 40202	
		CHECKED BY	E.R. RONALD & ASSOC., SENLER-CAMPBELL & ASSOC., INC.	
		J.H.R.	EARL WALLS ASSOCIATES, SKEES ENGINEERING, INC.	
		PROJ. ARCH.	UNIVERSITY OF LOUISVILLE	
		10,211	OFFICE OF FACILITIES MANAGEMENT	
		A & E FILE NO.	LOUISVILLE, KENTUCKY 40292 (502) 588-6167	
			BASEMENT FLOOR PLAN - WEST	
			LOWER LEVEL PIPING	
		AGENCY AUTHORIZATION	APPROVAL FOR PROGRAM CONCEPT ONLY	
		PRINCIPAL IN CHARGE	DATE	

M102

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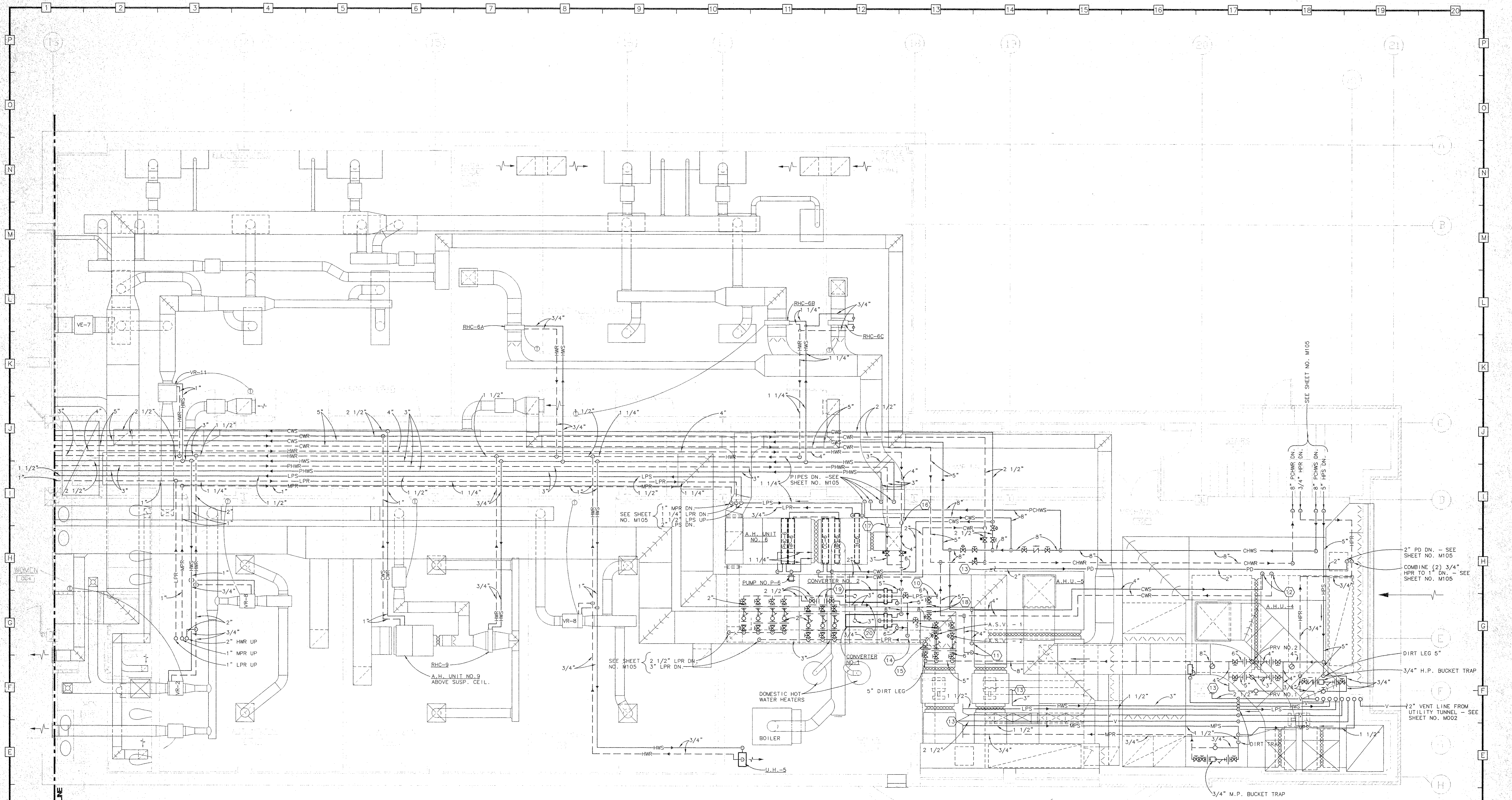
- SHEET NOTES:**
- (10) 3'-0" WIDE X 4'-0" HIGH MOTORIZED MINIMUM OUTSIDE AIR DAMPER, CFM.
 - (11) 16'-0" WIDE X 4'-0" HIGH MOTORIZED MAXIMUM OUTSIDE AIR DAMPER.
 - (12) MOTORIZED DAMPER IN 80X40 RETURN DUCT MIN. 0 CFM, MAX. CFM.
 - (13) MOTORIZED DAMPER IN 72X36 RELIEF AIR DUCT MIN. 0 CFM, MAX. CFM.
 - (14) MOTORIZED DAMPER.
 - (15) MOTORIZED DAMPER IN 22X24 RETURN AIR DUCT MIN. 0 CFM, MAX. CFM.
 - (16) MOTORIZED DAMPER IN 16X32 OUTSIDE AIR DUCT MIN. 0 CFM, MAX. CFM.
 - (17) APPROX. 8'-0" X 4'-0" PLASTIC EGG SHELL CRATE CEILING RETURN AIR GRILLE.

BASEMENT FLOOR PLAN - EAST - H.V.A.C.

SCALE: 1/4"

REVISIONS	DATE	UNIVERSITY OF LOUISVILLE ACADEMIC BUILDING PHASE FIVE	
1		DATE 12-17-93	RECORD DATE
2		DRAWN BY M.B.D.	UNIVERSITY FILE NO.
3		CHECKED BY J.H.R.	DRAWING NO. M103
4		PROJ. ARCH. R.A. DOCKERY 10,211	AGENCY AUTHORIZATION
5		A & E FILE NO. BASEMENT FLOOR PLAN - EAST - H.V.A.C.	DATE
PRINCIPAL IN CHARGE		APPROVAL FOR PROGRAM CONCEPT ONLY	

302*01*023*Lutz Hall-Orig*12-1993*Mech-HVAC*M-103-BSMT Fl. Pl-East*B.D.*TIF



- SHEET NOTES:**
- 10 6" LPS - SEE SHEET NO. M105.
 - 11 4" CWS AND CWR DN. TO CC-5.
 - 12 4" CWS AND CWR DN. TO CC-4.
 - 13 FOR CONTINUATION OF PIPES SEE SHEET NO. M105.
 - 14 6" HWS DN. TO AIR SEPARATOR TANK - SEE SHEET NO. M105.
 - 15 3/4" F&T TRAP.
 - 16 1" HWR DN. - SEE SHEET NO. M105.
 - 17 4" PHWR DN. - SEE SHEET NO. M105.
 - 18 6" LPS VALVED CROSS CONNECTION LINE BETWEEN LPS MAINS WITH SPOOL PIECE. SEE DETAIL ON SHEET NO. M502.
 - 19 2 1/2" LPR VALVED CROSS CONNECTION LINE BETWEEN LPR MAINS WITH SPOOL PIECE. SEE DETAIL ON SHEET NO. M502.
 - 20 LPR TO F & T TRAPS - SEE SCHEMATIC PIPING DIAGRAM ON SHEET NO. M502.

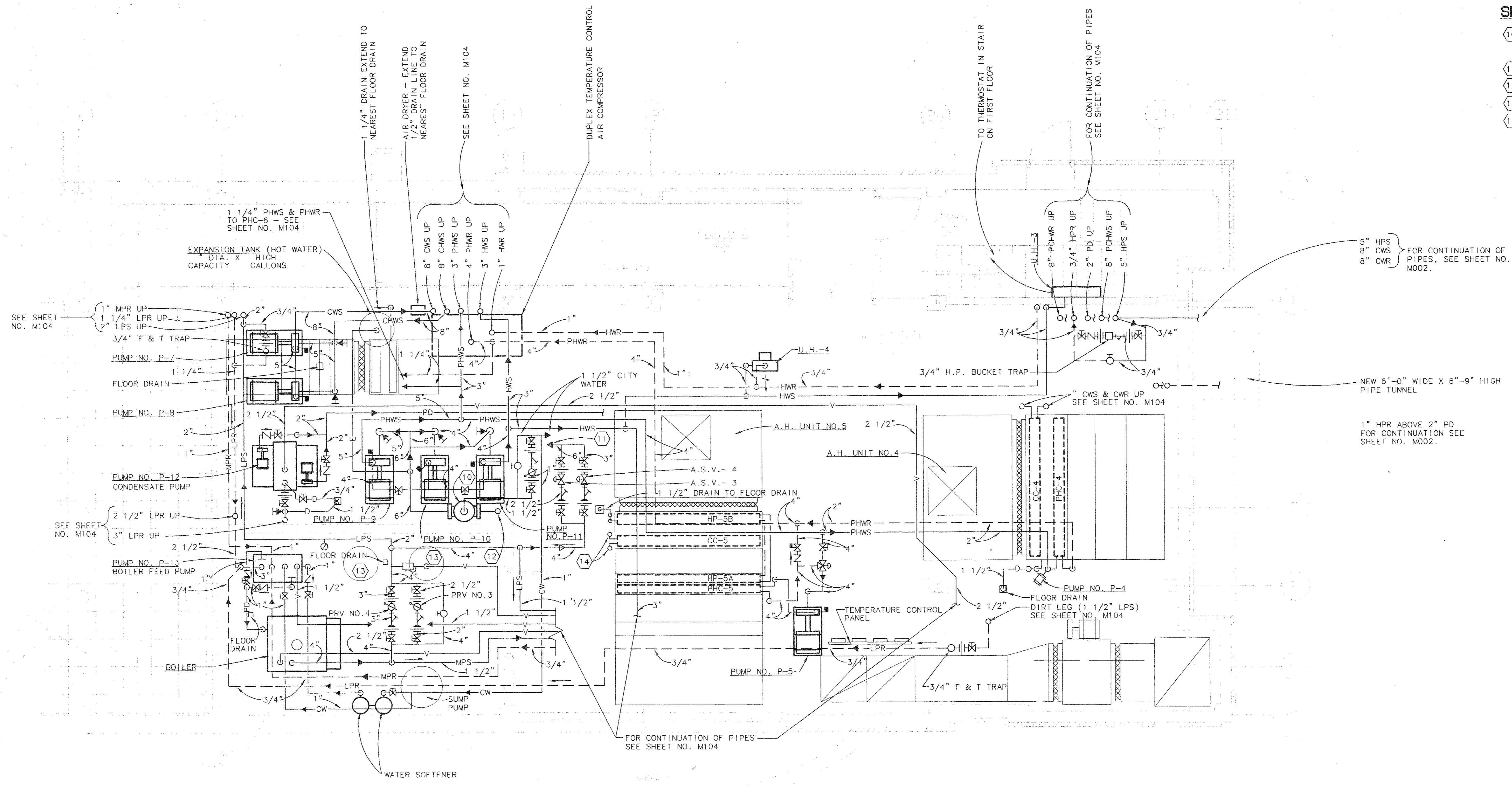
UPPER LEVEL PLAN
 SCALE: 1/4" = 1'-0"
 NORTH

BASEMENT FLOOR PLAN - MECHANICAL ROOM - EAST - UPPER LEVEL PIPING

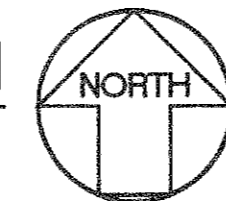
REVISIONS		DATE	UNIVERSITY OF LOUISVILLE ACADEMIC BUILDING PHASE FIVE	
1			DATE	12-17-93
2			DRAWN BY	M. B. D.
3			CHECKED BY	J. H. R.
4			PROJ. ARCH.	R. A. DOCKERY 10.211
5			AGENCY AUTHORIZATION	UNIVERSITY OF LOUISVILLE OFFICE OF FACILITIES MANAGEMENT LOUISVILLE, KENTUCKY 40292 (502) 589-6167
			RECORD DATE	
			UNIVERSITY FILE NO.	
			DRAWING NO.	M104
			AGENCY AUTHORIZATION	APPROVAL FOR PROGRAM CONCEPT ONLY
			DATE	

SHEET NOTES:

- ⑩ AIR SEPARATOR TANK (HOT WATER) CAPACITY 535 GPM (TANK SHALL HAVE MINIMUM 6" FLANGED INLET AND OUTLET.)
- ⑪ 6" LPS TO CONVERTER NO. 2 - SEE SHEET NO. M104.
- ⑫ 6" HWS FROM CONVERTERS - SEE SHEET NO. M104.
- ⑬ DOMESTIC HOT WATER HEATER.
- ⑭ 4" CWS AND CWR UP - SEE SHEET NO. M104.



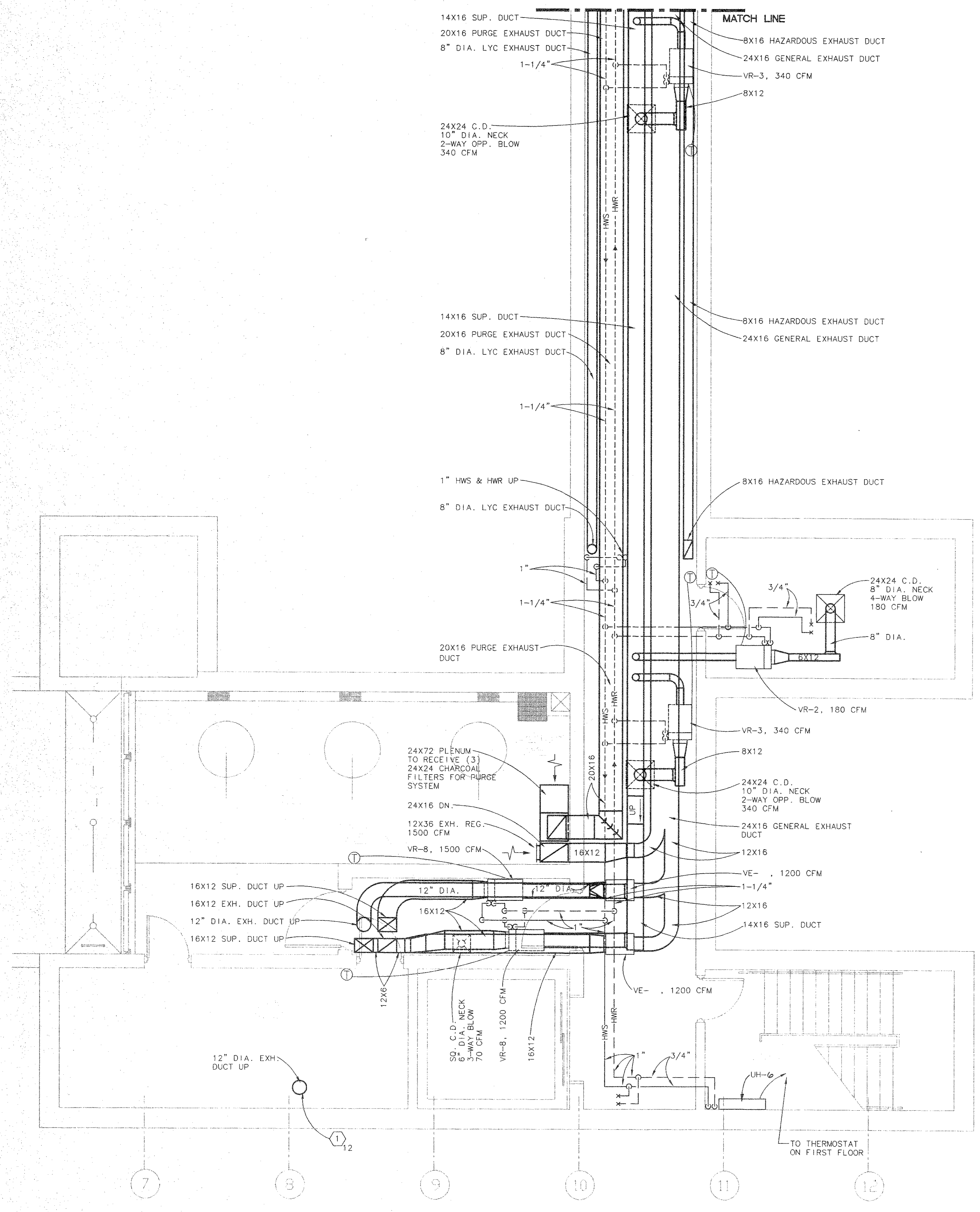
LOWER LEVEL PLAN
 SCALE: 1/4" = 1'-0"



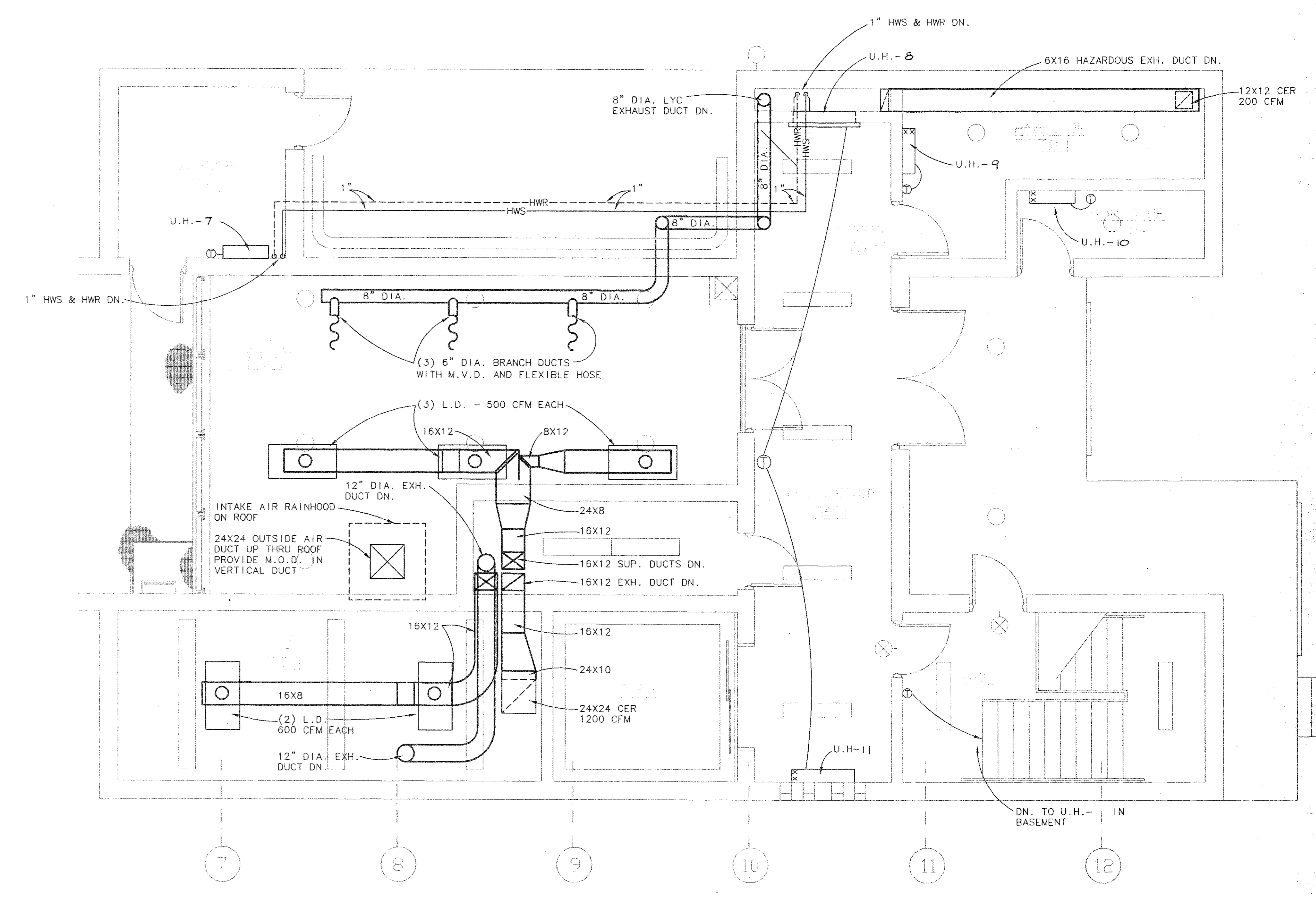
PART BASEMENT FLOOR PLAN - MECHANICAL ROOM - EAST - LOWER LEVEL PIPING

SCALE 1/4"

REVISIONS	DATE	UNIVERSITY OF LOUISVILLE ACADEMIC BUILDING PHASE FIVE		
1		DATE	12-17-93	RECORD DATE
2		DRAWN BY	M.B.D.	UNIVERSITY FILE NO.
3		CHECKED BY	J.H.R.	DRAWING NO.
4		PROJ. ARCH.	R. A. DOCKERY 10,211	M105
5		A & E FILE NO.	101 S. HIGHWAY AT MAIN, LOUISVILLE, KY 40902	
		AGENCY AUTHORIZATION	OFFICE OF FACILITIES MANAGEMENT LOUISVILLE, KENTUCKY 40292 (502) 588-6167	DATE
		PRINCIPAL IN CHARGE	APPROVAL FOR PROGRAM CONCEPT ONLY	



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

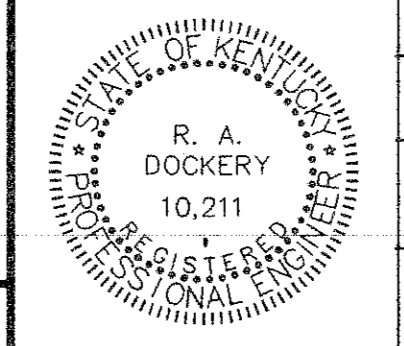


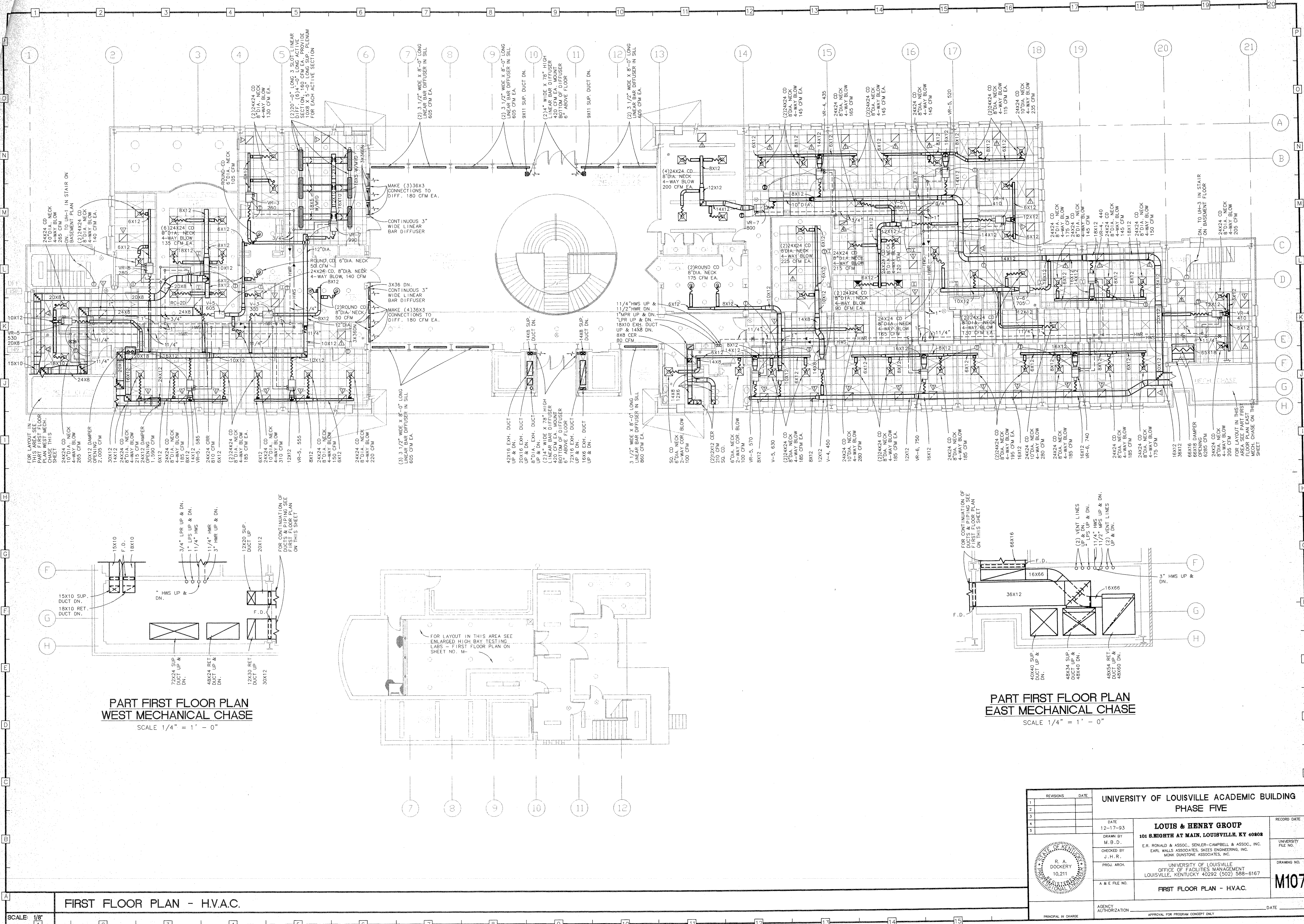
FIRST FLOOR PLAN
SCALE: 1/4" = 1'-0"

HIGH BAY TESTING LABS - BASEMENT AND FIRST FLOORS

SCALE: 1/4"

REVISIONS	DATE	UNIVERSITY OF LOUISVILLE ACADEMIC BUILDING PHASE FIVE		
1		DATE	12-17-93	RECORD DATE
2		DRAWN BY	M.B.D.	UNIVERSITY FILE NO.
3		CHECKED BY	J.H.R.	DRAWING NO.
4		PROJ. ARCH.	R. A. DOCKERY 10.211	M106
5		A & E FILE NO.	HIGH BAY TESTING LABS - BASEMENT AND FIRST FLOORS	
AGENCY AUTHORIZATION		APPROVAL FOR PROGRAM CONCEPT ONLY		
PRINCIPAL IN CHARGE		DATE		





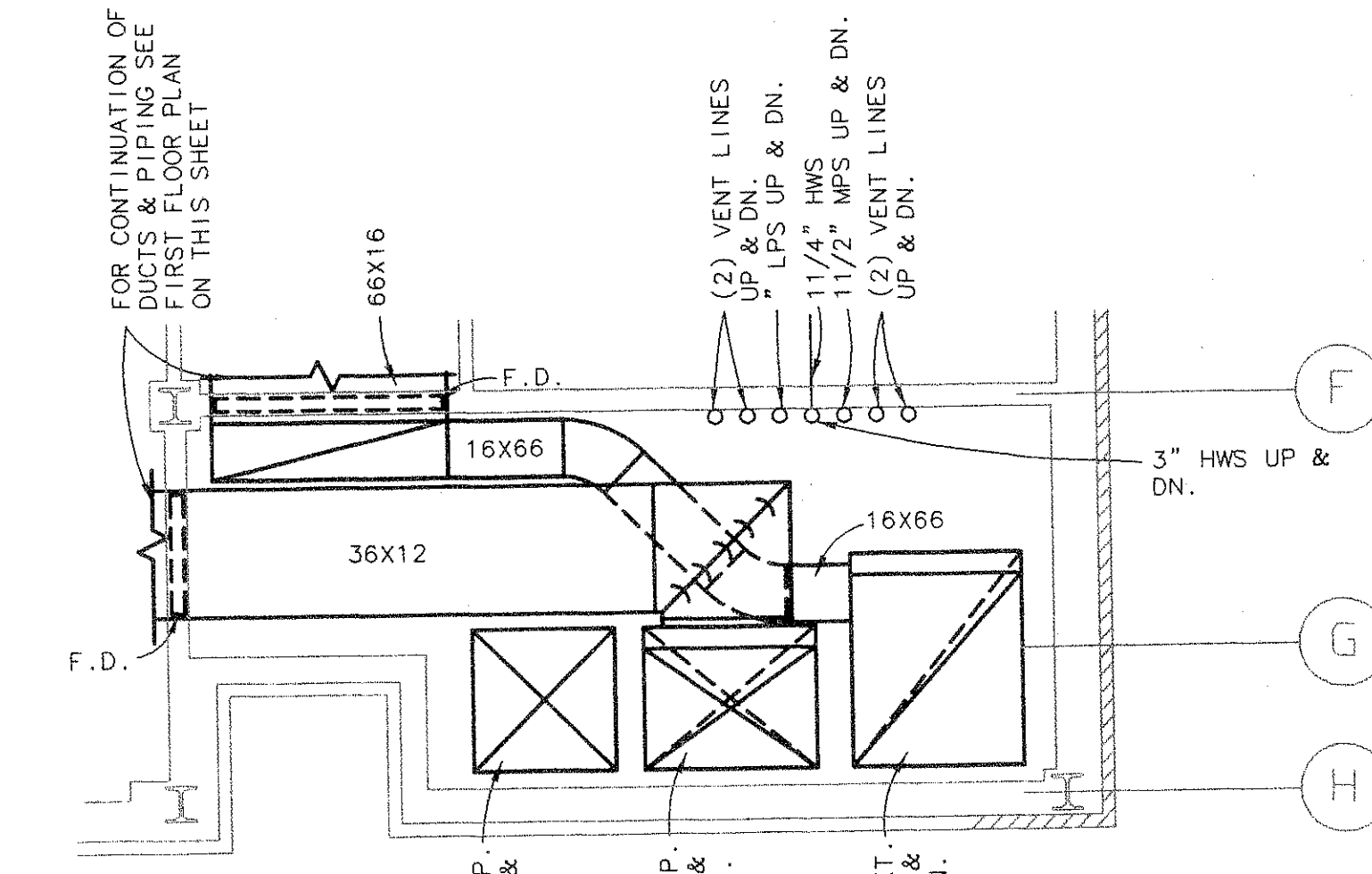
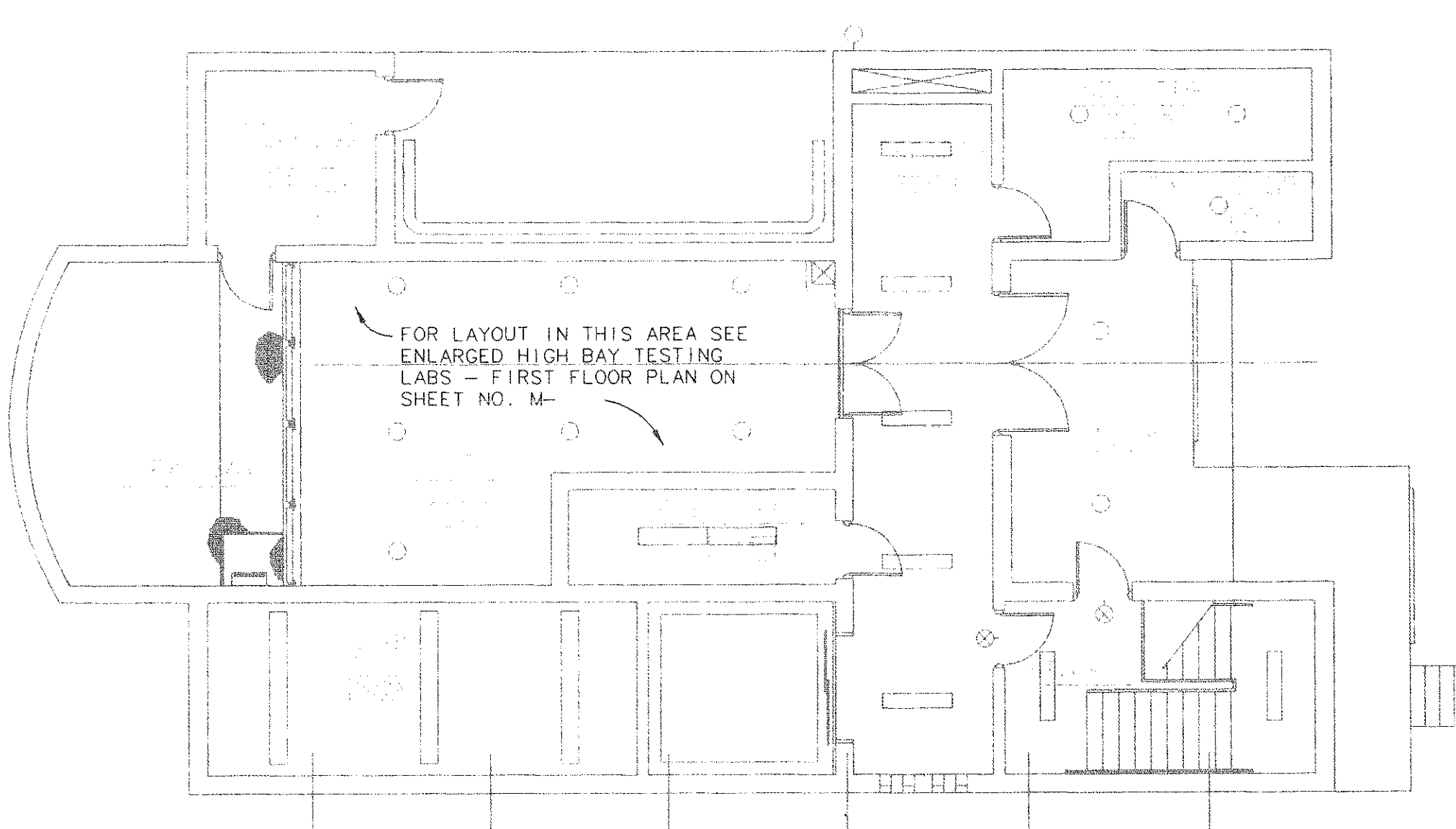
FOR LAYOUT IN THIS AREA SEE PLAN WEST MECH. SHEET THIS

24X24 CD NECK 4-WAY BLOW 285 CFM

30X12 DAMPER OPENING 2,005 CFM

30X12 18X12 8\"/>

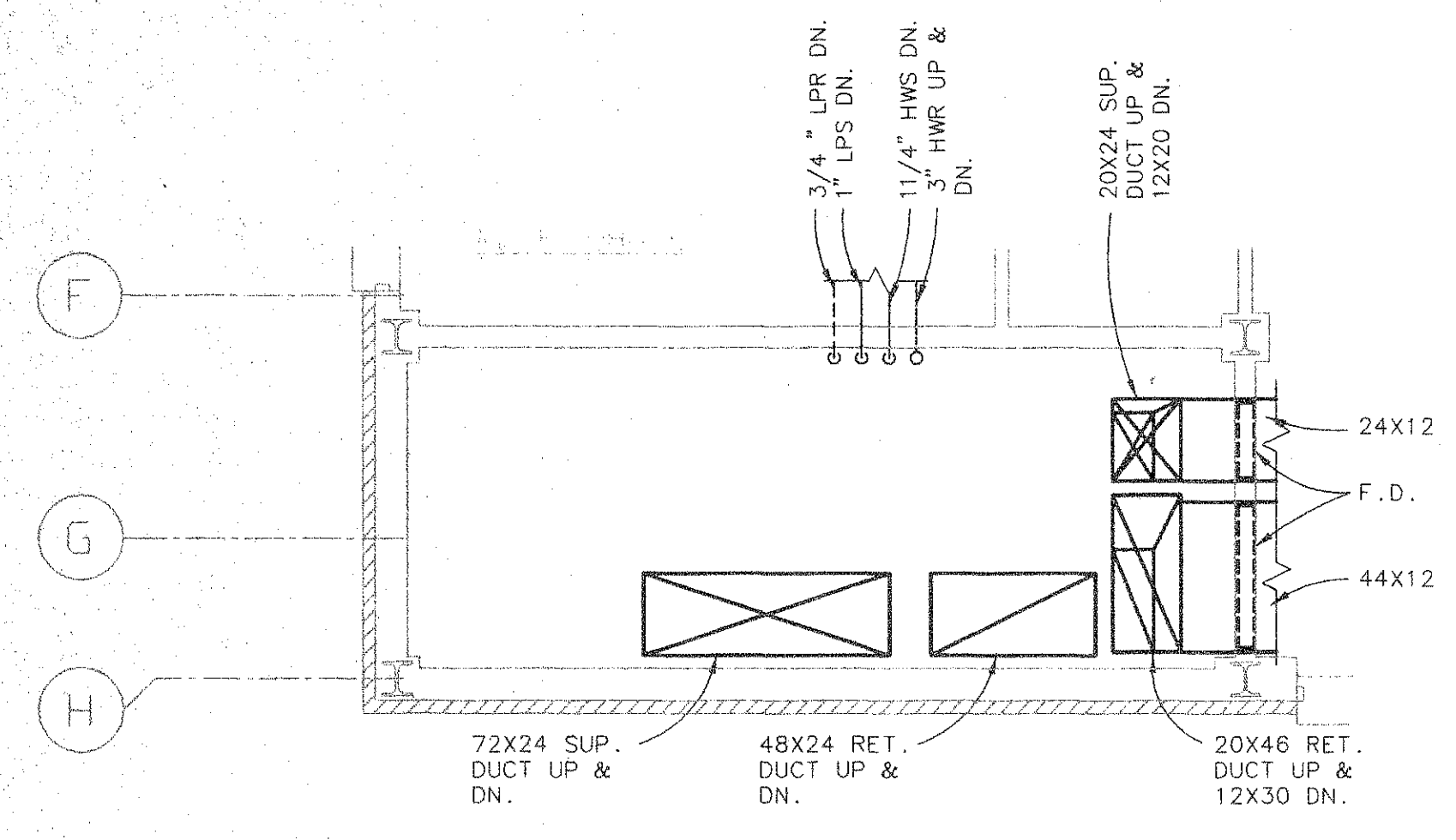
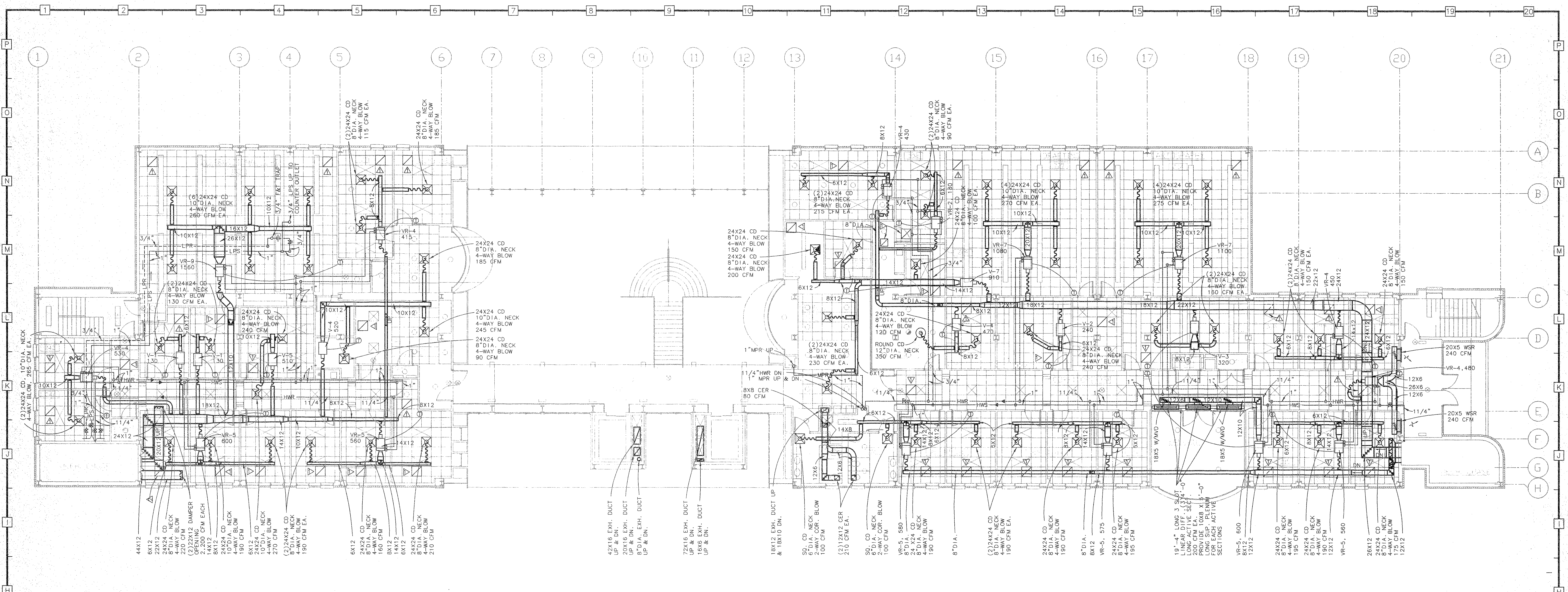
PART FIRST FLOOR PLAN WEST MECHANICAL CHASE
SCALE 1/4" = 1' - 0"



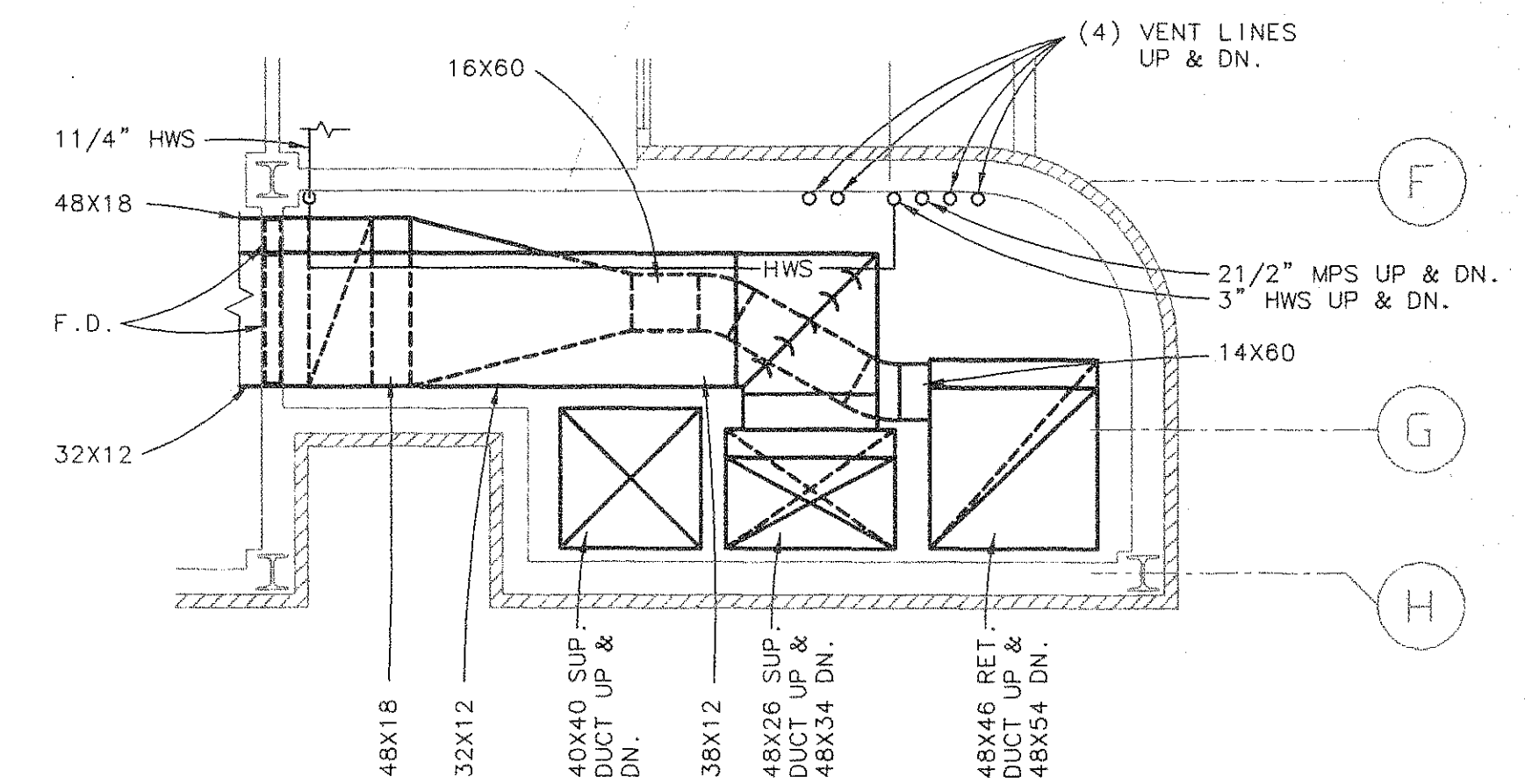
PART FIRST FLOOR PLAN EAST MECHANICAL CHASE
SCALE 1/4" = 1' - 0"

REVISIONS		DATE	UNIVERSITY OF LOUISVILLE ACADEMIC BUILDING PHASE FIVE	
1				
2				
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4				
5				

DATE	12-17-93	RECORD DATE	
DRAWN BY	M. B. D.	UNIVERSITY FILE NO.	
CHECKED BY	J. H. R.	DRAWING NO.	M107
PRJ. ARCH.	R. A. DOCKERY 10.211		
A & E FILE NO.			
AGENCY AUTHORIZATION		DATE	
PRINCIPAL IN CHARGE		APPROVAL FOR PROGRAM CONCEPT ONLY	



**PART SECOND FLOOR PLAN
WEST MECHANICAL CHASE**
SCALE 1/4" = 1' - 0"

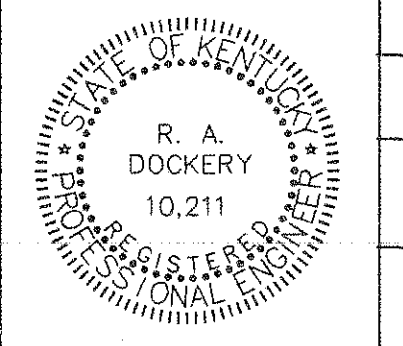


**PART SECOND FLOOR PLAN
EAST MECHANICAL CHASE**
SCALE 1/4" = 1' - 0"

SECOND FLOOR PLAN - H.V.A.C.

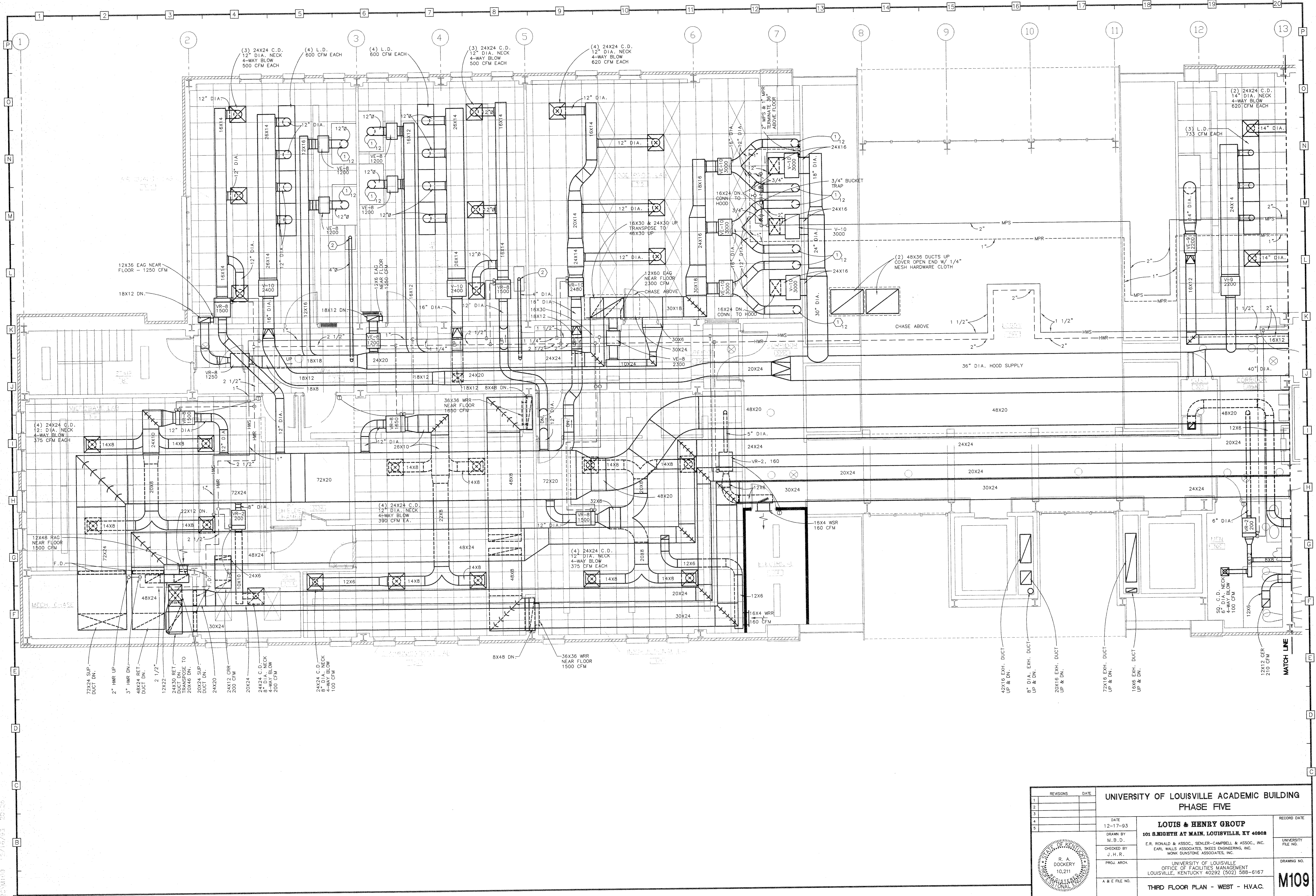
SCALE: 1/8"

REVISIONS	DATE	UNIVERSITY OF LOUISVILLE ACADEMIC BUILDING PHASE FIVE	
1		DATE 12-17-93	RECORD DATE
2		DRAWN BY M.B.D.	UNIVERSITY FILE NO.
3		CHECKED BY J.H.R.	DRAWING NO. M108
4		PROJ. ARCH. R.A. DOCKERY 10.211	AGENCY AUTHORIZATION
5		A & E FILE NO.	DATE
		APPROVAL FOR PROGRAM CONCEPT ONLY	



LOUIS & HENRY GROUP
101 S. BIGHTS AT MAIN, LOUISVILLE, KY 40008
E.R. RONALD & ASSOC., SENLER-CAMPBELL & ASSOC., INC.
EARL WALLS ASSOCIATES, SKEES ENGINEERING, INC.
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UNIVERSITY OF LOUISVILLE
OFFICE OF FACILITIES MANAGEMENT
LOUISVILLE, KENTUCKY 40292 (502) 588-6167
SECOND FLOOR PLAN - H.V.A.C.

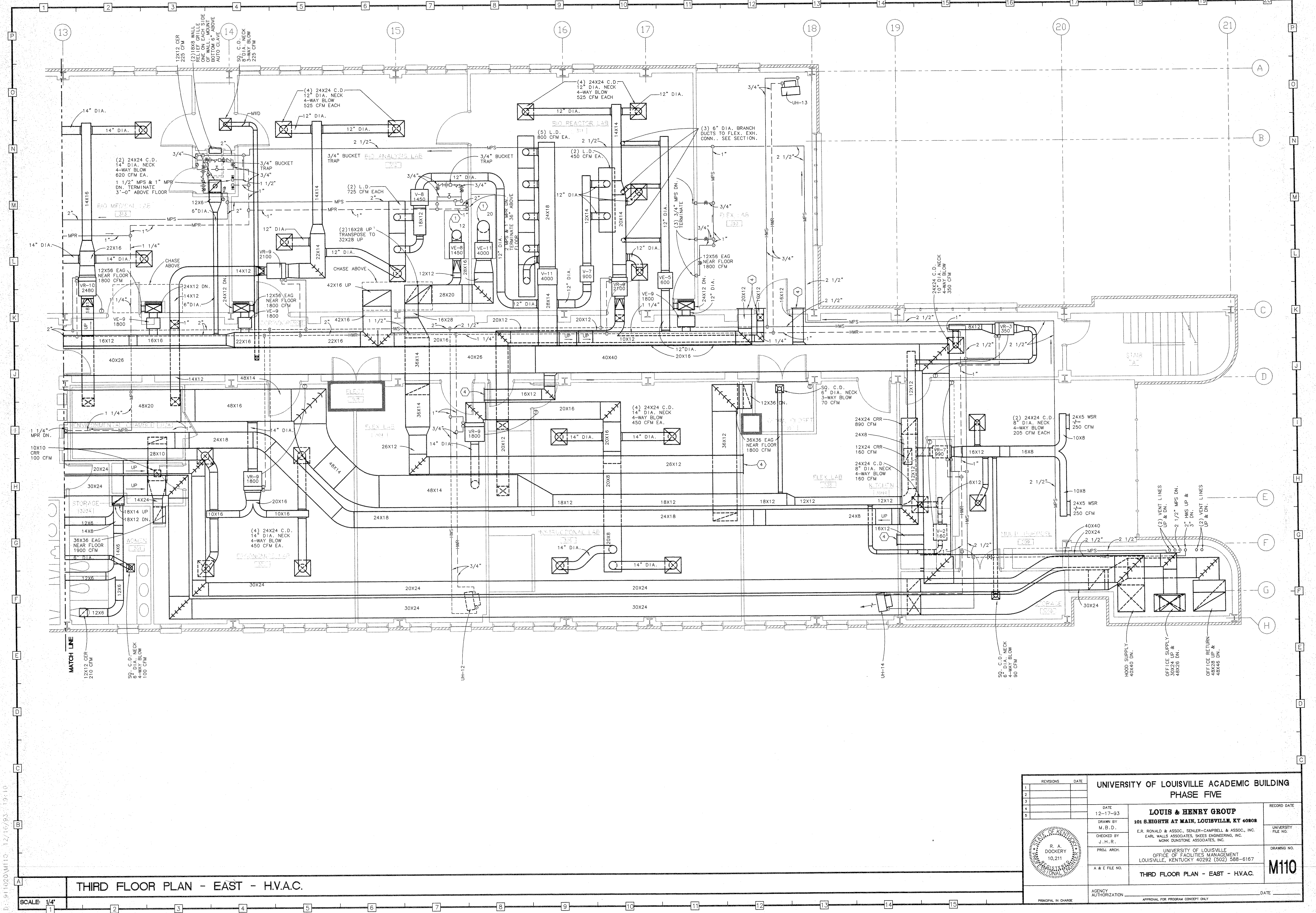


THIRD FLOOR PLAN - WEST - H.V.A.C.

SCALE: 1/4"

REVISIONS	DATE	UNIVERSITY OF LOUISVILLE ACADEMIC BUILDING PHASE FIVE	
1		DATE	RECORD DATE
2		12-17-93	
3		DRAWN BY	UNIVERSITY FILE NO.
4		M.B.D.	
5		CHECKED BY	DRAWING NO.
		J.H.R.	M109
PRIN. ARCH.		UNIVERSITY OF LOUISVILLE OFFICE OF FACILITIES MANAGEMENT LOUISVILLE, KENTUCKY 40292 (502) 588-6167	
A & E FILE NO.		THIRD FLOOR PLAN - WEST - HVAC.	
AGENCY AUTHORIZATION		DATE	
PRINCIPAL IN CHARGE		APPROVAL FOR PROGRAM CONCEPT ONLY	

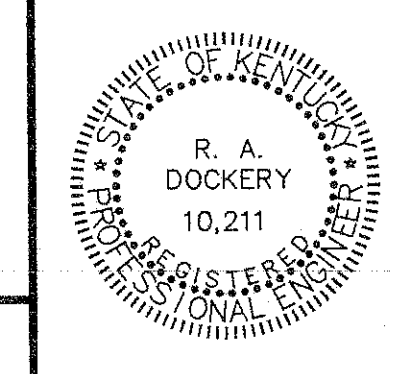
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THIRD FLOOR PLAN - EAST - H.V.A.C.

SCALE: 1/4"

REVISIONS		DATE	UNIVERSITY OF LOUISVILLE ACADEMIC BUILDING PHASE FIVE	
1			DATE	12-17-93
2			DRAWN BY	M.B.D.
3			CHECKED BY	J.H.R.
4			PROJ. ARCH.	R. A. DOCKERY 10,211
5			A & E FILE NO.	THIRD FLOOR PLAN - EAST - H.V.A.C.
			AGENCY AUTHORIZATION	APPROVAL FOR PROGRAM CONCEPT ONLY

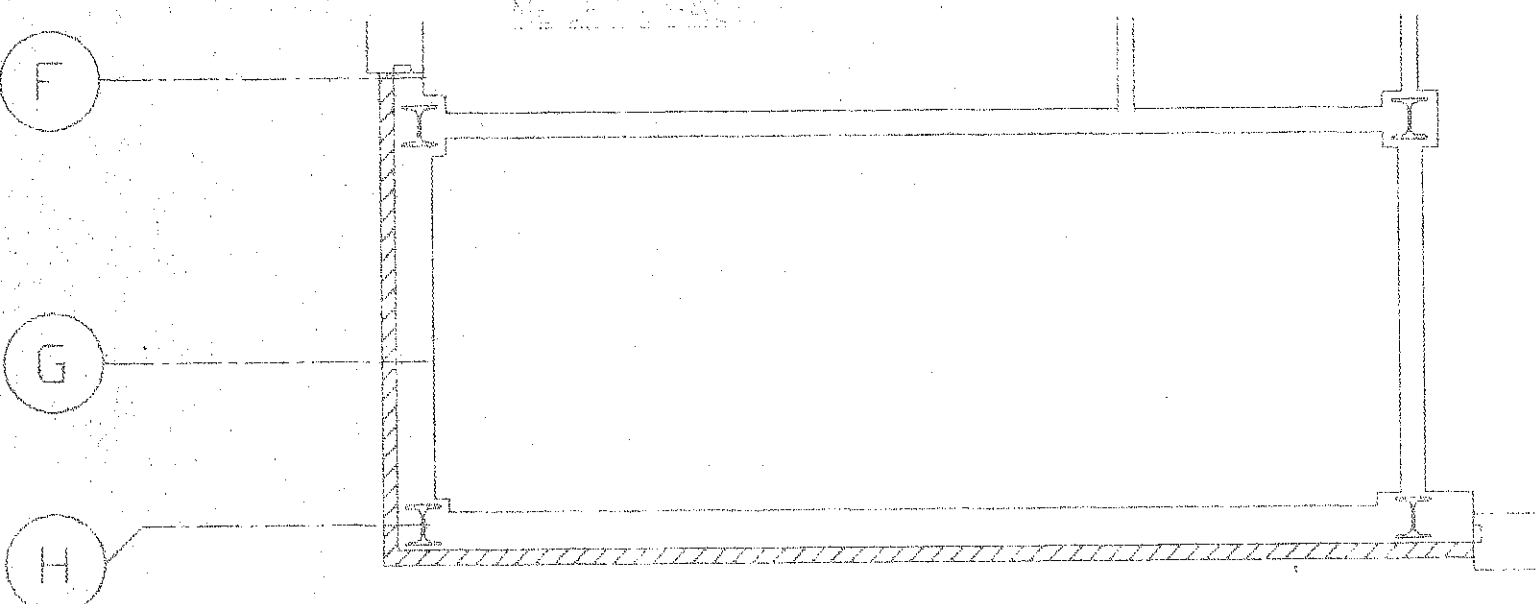
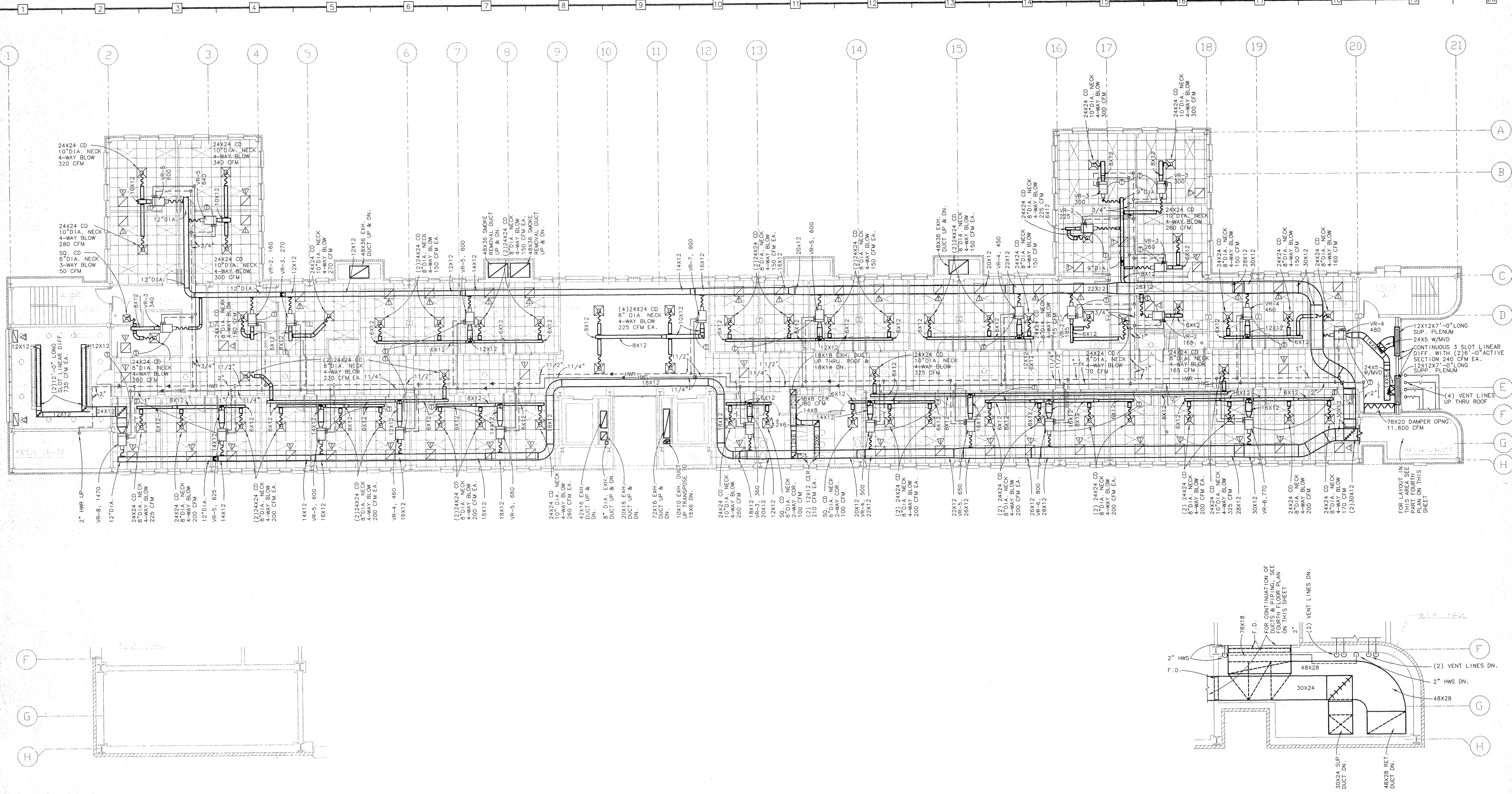


LOUIS & HENRY GROUP
 101 S. EIGHTH AT MAIN, LOUISVILLE, KY 40208
 E.R. RONALD & ASSOC., SENLER-CAMPBELL & ASSOC., INC.
 EARL WALLS ASSOCIATES, SKEELS ENGINEERING, INC.
 MORGANSTONE ASSOCIATES, INC.

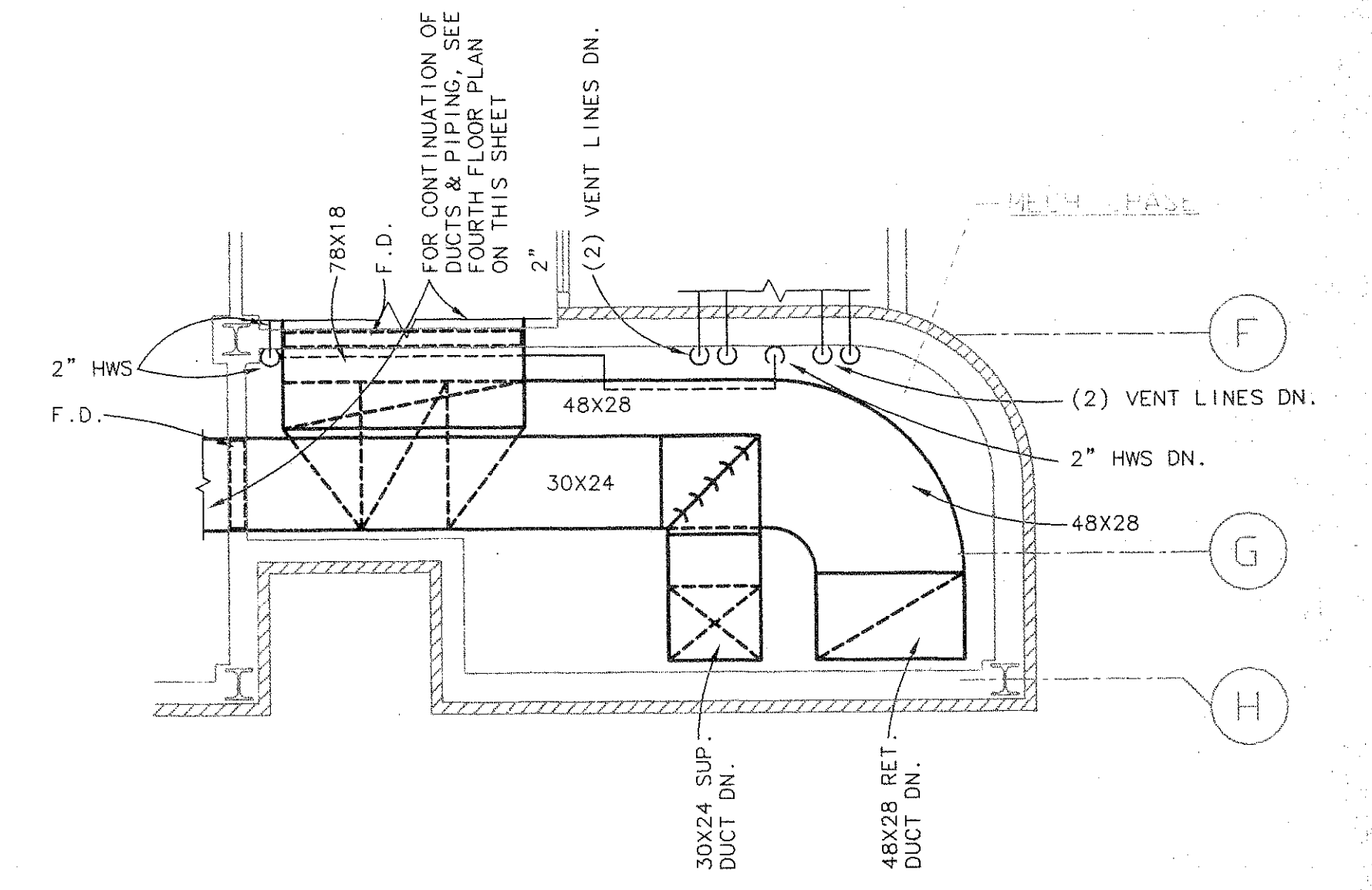
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 LOUISVILLE, KENTUCKY 40292 (502) 588-6167

M110

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**PART FOURTH FLOOR PLAN
WEST MECHANICAL CHASE**
SCALE: 1/4" = 1'-0"

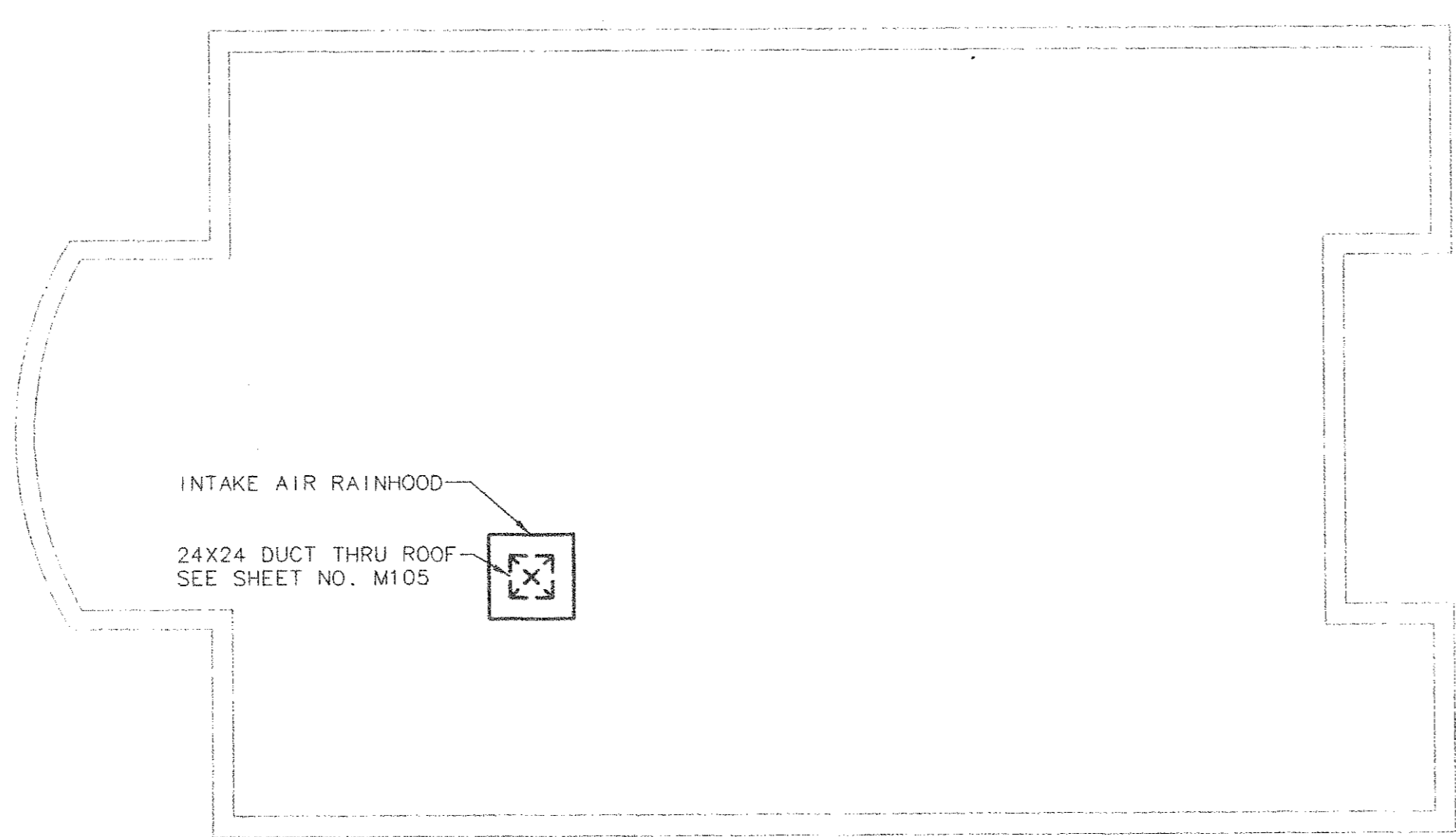
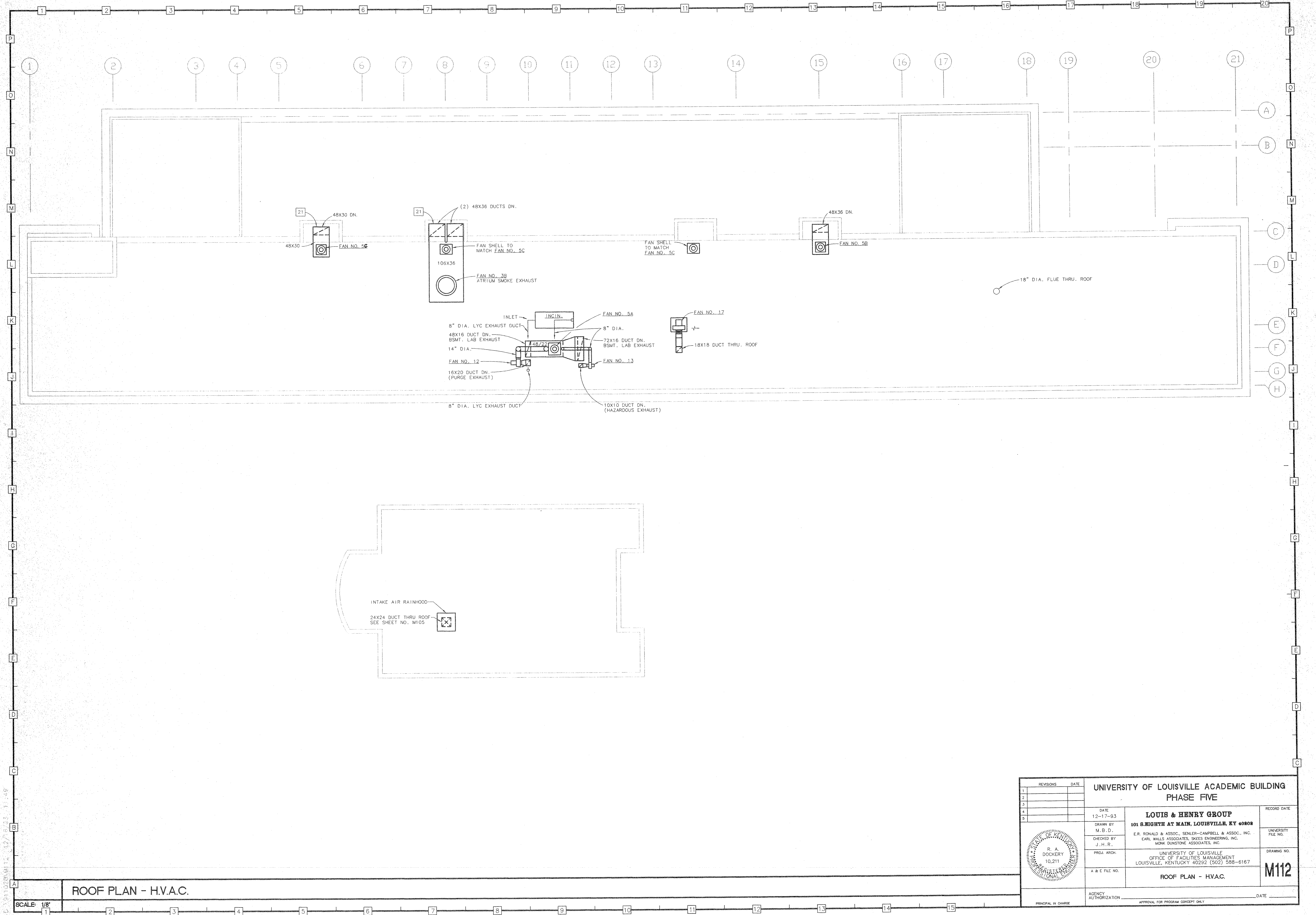


**PART FOURTH FLOOR PLAN
EAST MECHANICAL CHASE**
SCALE: 1/4" = 1'-0"

FOURTH FLOOR PLAN - H.V.A.C.

REVISIONS		DATE	UNIVERSITY OF LOUISVILLE ACADEMIC BUILDING PHASE FIVE	
1			DATE	12-17-93
2			DRAWN BY	M.B.D.
3			CHECKED BY	J.H.R.
4			PROJ. ARCH.	UNIVERSITY OF LOUISVILLE OFFICE OF FACILITIES MANAGEMENT LOUISVILLE, KENTUCKY 40232 (502) 588-6167
5			A & E FILE NO.	FOURTH FLOOR PLAN - HVAC.
		DATE 12-17-93 DRAWN BY M.B.D. CHECKED BY J.H.R. PROJ. ARCH. UNIVERSITY OF LOUISVILLE OFFICE OF FACILITIES MANAGEMENT LOUISVILLE, KENTUCKY 40232 (502) 588-6167	RECORD DATE UNIVERSITY FILE NO. DRAWING NO. M111	
PRINCIPAL IN CHARGE		AGENCY AUTHORIZATION	DATE	

SCALE 1/8"



ROOF PLAN - H.V.A.C.

SCALE: 1/8"

REVISIONS	DATE	UNIVERSITY OF LOUISVILLE ACADEMIC BUILDING PHASE FIVE	
1		DATE	RECORD DATE
2		12-17-93	
3		LOUIS & HENRY GROUP 101 S. EIGHTH AT MAIN, LOUISVILLE, KY 40208 E.R. RONALD & ASSOC., SENLER-CAMPBELL & ASSOC., INC. EARL WALLS ASSOCIATES, SKES ENGINEERING, INC. MARK DUNSTON ASSOCIATES, INC.	
4			
5		DRAWN BY M.B.D.	UNIVERSITY FILE NO.
		CHECKED BY J.H.R.	
		PROJ. ARCH. R. A. DOCKERY 10,211	DRAWING NO. M112
		A & E FILE NO.	ROOF PLAN - HVAC.
		AGENCY AUTHORIZATION	APPROVAL FOR PROGRAM CONCEPT ONLY
		PRINCIPAL IN CHARGE	DATE

GENERAL NOTES

- 1. OVERRIDE SHALL BE FROM CENTRAL COMPUTER. INDIVIDUAL OVERRIDE SHALL BE ACCOMPLISHED BY OCCUPANT TELEPHONING THE CENTRAL COMPUTER OPERATOR.
2. FOR ALL HOODS, ACCEPTABLE LEVEL OF FLOW IN EXHAUST DUCT SHALL ACTIVATE GREEN LIGHT ON HOOD. UNACCEPTABLE LEVEL (INCLUDING OFF) SHALL ACTIVATE RED LIGHT.
3. FIRESTATS/FREEZESTATS.

1. AHU #1 - LABS

- I. GENERAL
A. MONITOR ONLY POINTS
1. CWR TEMP
B. SUPPLY FAN RUNS CONTINUOUSLY, SPEED VARIES TO MAINTAIN DUCT STATIC PRESSURE.
C. OA DAMPER MODULATES AND SPEED OF RETURN FAN #1A VARIES, TO MAINTAIN A MINIMUM OA:
MIN OA = SUM OF FLOW AT TERMINAL DEVICES SERVED BY THIS AHU AND USING CONTROL SEQUENCE #14
FLOW FROM THIS AHU TO AHU #7
FLOW FROM THIS AHU TO AHU #8
PRESET AMOUNT (MAY BE POSITIVE OR NEGATIVE)
AT UNIT: SA FLOW = RA FLOW + OA FLOW
SA FLOW IS MEASURED, RA FLOW IS VARIED (BY SPEED OF RA FAN #1A) TO MAINTAIN FORMULA ABOVE.
D. OCCUPIED/UNOCCUPIED SCHEDULE FOR AHU #1 IS SHARED BY ALL TERMINAL DEVICES AND ZONE CONTROLS SERVED BY AHU #1.
II. OCCUPIED MODE
A. DISCHARGE TEMPERATURE IS RESET FROM VAV/RH TERMINAL DEVICES (SEQUENCE #16) AND VAV/RH W/ROOM PRESSURE CONTROL TERMINAL DEVICES (SEQUENCE #14) SERVED BY AHU #1. HUMIDITY SENSOR IN RETURN DUCT CAN OVERRIDE DISCHARGE TEMPERATURE RESET.
B. IF OA TEMP IS ABOVE 65°
1. MAINTAIN MIN OA AS DESCRIBED ABOVE.
2. RELIEF FAN #1B IS OFF
3. HW COIL IS OFF
4. CW COIL VALVE MODULES TO MAINTAIN DISCHARGE TEMP.
C. IF OA TEMP IS BELOW 65°
1. MAINTAIN MIN OA AS DESCRIBED ABOVE.
2. OA DAMPER MODULATES, SPEED OF RETURN FAN 1A VARIES AND SPEED OF RELIEF FAN 1B VARIES TO MAINTAIN DISCHARGE TEMPERATURE.
SA FLOW = RA FLOW + OA FLOW
RELIEF FLOW = OA FLOW - MIN OA FLOW (AS DEFINED ABOVE)
= SA FLOW - RA FLOW - MIN OA FLOW
3. IF OA DAMPER IS 100% PEN, FURTHER COOLING SHALL BE PROVIDED BY MODULATING THE CW VALVE TO MAINTAIN DISCHARGE TEMPERATURE. (OA DAMPER REMAINS 100% OPEN)
4. IF RELIEF FAN #1B IS OFF (OA IS THEREFORE AT MINIMUM) AND FURTHER HEATING IS REQUIRED TO MAINTAIN DISCHARGE TEMPERATURE, HW COIL PUMP SHALL BE ON AND HW COIL VALVE SHALL MODULATE TO MAINTAIN DISCHARGE TEMPERATURE. IF OA TEMP IS BELOW 40°, HW PUMP SHALL BE ON AND HW COIL VALVE SHALL MODULATE TO MAINTAIN DISCHARGE TEMPERATURE (MIN 50°). THE LATTER IS AN OVERRIDE OF THE FORMER.
III. UNOCCUPIED MODE
A. CW COIL VALVE IS OFF
B. ALL OTHER FUNCTIONS REMAIN THE SAME AS OCCUPIED.
IV. OVERRIDE
A. OVERRIDE BY ANY TERMINAL DEVICE SERVED BY THIS AHU SHALL CAUSE AHU TO OVERRIDE ONLY THE TERMINAL DEVICE(S) ON OVERRIDE SHALL CHANGE TO OCCUPIED CONTROL. OTHER DEVICES SHALL REMAIN ON UNOCCUPIED CONTROL.
B. AT AHU CHANGE TO OCCUPIED CONTROL, MAY NEED PRESSURE BYPASS

2. AHU #2 - SLIDE LIBRARY/PRINT ROOM

- I. GENERAL
A. MONITOR ONLY POINTS:
1. SUPPLY DUCT PRESSURE (FAN STATUS)
2. CWR TEMP
B. SUPPLY FAN SHALL NOT RESTART FOR 15 MINUTES AFTER CYCLING OFF.
II. OCCUPIED MODE
A. SUPPLY FAN OPERATES CONTINUOUSLY.
B. OA DAMPER IS OPEN.
C. DISCHARGE TEMP IS RESET FROM TERMINAL REHEAT STATUS.
D. DISCHARGE TEMP IS MET BY MODULATING CW VALVE.
E. DISCHARGE TEMP IS OVERRIDEN BY ANY SPACE HUMIDISTAT CALLING FOR DEHUMIDIFICATION.
F. IF CW VALVE IS CLOSED AND HUMIDIFICATION IS REQUIRED BY ANY SPACE HUMIDISTAT, MODULE LPS VALVE TO HUMIDIFIER.
G. HIGH LIMIT HUMIDISTAT IN DUCT SHALL OVERRIDE LPS VALVE CONTROL.
H. EACH REHEAT COIL VALVE MODULATES TO MAINTAIN SPACE TEMP (OCC SETTING)
III. UNOCCUPIED MODE
A. NORMAL
1. OA DAMPER IS CLOSED
2. FAN IS OFF
3. ALL VALVES ARE CLOSED
B. IF ANY SPACE THERMOSTAT OR SPACE HUMIDISTAT IS NOT SATISFIED (UNOCC SETTINGS)
a. OA DAMPER REMAINS CLOSED
b. SUPPLY FAN STARTS
1. IF HUMIDITY IS LOW:
a. LPS MODULATES
b. WHEN HUMIDISTAT IS SATISFIED, FAN CYCLES OFF.
2. IF HUMIDITY IS HIGH:
a. CW VALVE MODULATES
b. RH VALVES MODULE TO MAINTAIN SPACE TEMP.
c. WHEN CW VALVE MODULATES CLOSED, FAN CYCLES OFF.
3. IF TEMP IS LOW:
a. RH VALVES MODULATE
b. WHEN ALL VALVES MODULATES TO CLOSED, FAN CYCLES OFF
4. IF TEMP IS HIGH:
a. CW VALVE MODULES TO MAINTAIN DISC TEMP.
b. RH VALVES MODULATE TO MAINTAIN SPACE TEMP.
c. WHEN CW VALVE MODULATES CLOSED, FAN CYCLES OFF.
IV. OVERRIDE
-- CHANGES SET POINT OF THE OVERRIDE ZONE TO OCCUPIED, OTHER ZONE REMAINS AT UNOCCUPIED SETPOINT.
-- PLACES THE AHU IS OCCUPIED MODE.

3. AHU #3 - ATRIUM

- I. GENERAL
A. MONITOR ONLY POINTS
1. CWR TEMP
DISCHARGE TEMP
B. SUPPLY FAN SHALL NOT RESTART FOR 15 MINUTES AFTER CYCLING OFF.
C. RELIEF FAN 3B RUNS WHENEVER RELIEF DAMPER IS OPEN. (BOTH IN EAST MECH RM)
II. OCCUPIED MODE
A. SUPPLY FAN RUNS
B. IF OA TEMP IS ABOVE 65°
1. RA, OA & RELIEF DAMPERS MODULATE TO MAINTAIN MIN. OA (BY TEMP. CALC.) (RELIEF = OA - RET)
2. CW COIL VALVE MODULATES TO MAINTAIN SPACE TEMP. (DAY SETTING)
C. IF OA TEMP IS BELOW 65°
1. RA, OA, & RELIEF DAMPERS MODULATE TO MAINTAIN SPACE TEMP. (BUT NOT BELOW MIN. OA)
2. IF OA DAMPER IS 100% OPEN (AND RA 100% CLOSED) FURTHER COOLING SHALL BE PROVIDED BY MODULATING THE CW COIL VALVE.
3. IF OA IS AT MIN. & FURTHER HEATING IS REQUIRED, HW VALVE SHALL MODULATE TO MAINTAIN SPACE TEMP.
III. UNOCCUPIED MODE
A. NORMAL - ALL ITEMS OFF
B. IF SPACE TEMP. IS BELOW UNOCCUPIED SETTING OF SPACE THERMOSTAT
1. RELIEF AIR DAMPER REMAINS CLOSED
2. OA DAMPER REMAINS CLOSED
3. RA DAMPER OPENS
4. CW VALVE REMAINS CLOSED
5. SUPPLY FAN STARTS
6. HW VALVES MODULATES
7. WHEN HW VALVE IS FULLY CLOSED, SUPPLY FAN CYCLES OFF.
IV. OVERRIDE CHANGES FROM UNOCCUPIED TO OCCUPIED MODE.
V. SMOKE EVACUATION MODE
A. SUPPLY FAN RUNS
B. HW VALVE IS FULL OPEN
C. OA DAMPER IS OPEN
D. FREEZE STAT IS DISABLED.
E. RETURN DAMPER IS CLOSED
F. SUPPLY FAN 3A RUNS (DISCH. DAMPER OPENS) (SUPPLY AIR ENTERS ATRIUM THRU RETURN GRILLE)
G. EXHAUST FAN 3 C RUNS (DAMPER OPENS) (ON ROOF)

4. AHU #4 - OFFICES

- I. GENERAL
A. MONITOR ONLY POINTS
1. CWR RETURN TEMP.
B. WHENEVER SUPPLY FAN RUNS, RETURN FAN #4 ALSO RUNS. SUPPLY FAN SPEED VARIES TO MAINTAIN DUCT PRESSURE. RETURN FAN SPEED VARIES TO MAINTAIN A PRESET DIFFERENTIAL BETWEEN SUPPLY FLOW AND RETURN FLOW.
C. OCCUPIED/UNOCCUPIED SCHEDULE FOR AHU IS SHARED BY ALL TERMINAL DEVICES AND ZONE CONTROLS SERVED BY THIS AHU. HUMIDITY SENSOR IN RA DUCT CAN OVERRIDE DISCH. TEMP. RESET.
II. OCCUPIED MODE
A. DISCHARGE TEMP. IS RESET FROM VAV/RH TERMINAL DEVICES (SEQUENCE #12) SERVED BY THIS AHU.
B. IF OA TEMP. IS ABOVE 65°
1. RA, OA, AND RELIEF DAMPERS MODULATE TO MAINTAIN MINIMUM % OA. (CALCULATED FROM RA, OA, AND MIXED AIR TEMP.)
2. CW COIL VALVE MODULATES TO MAINTAIN DISCHARGE TEMPERATURE.
C. IF OA TEMP. IS BELOW 65°
1. RA, OA, AND RELIEF DAMPERS MODULATE TO MAINTAIN DISCH. TEMP.
2. IF OA DAMPER IS 100% OPEN (AND RA IS 100% CLOSED) FURTHER COOLING SHALL BE PROVIDED BY MODULATING THE CW COIL VALVE TO MAINTAIN DISCH. TEMP. (OA DAMPERS REMAIN 100% OPEN).
III. UNOCCUPIED MODE
A. OA DAMPER - CLOSED
B. RA DAMPER - OPEN
C. RELIEF DAMPER - CLOSED
D. CW COIL VALVES - OFF
E. DISCH. TEMP. CONTROL - DISABLED.
F. IF OA TEMP. IS ABOVE 40°
1. SUPPLY FAN IS OFF.
G. IF OA TEMP IS BELOW 40°
1. SUPPLY FAN IS ON
2. ZONE UNOCCUPIED CONTROLS (#13) ARE ENABLED.
IV. OVERRIDE
A. OVERRIDE BY ANY TERMINAL DEVICE SERVED BY THIS AHU SHALL CAUSE AHU TO OVERRIDE ONLY THE TERMINAL DEVICE(S) ON OVERRIDE SHALL CHANGE TO OCCUPIED CONTROL. OTHER DEVICES SHALL REMAIN ON UNOCCUPIED CONTROL.
B. AT AHU:
SUPPLY FAN SHALL RUN

5. AHU #5 - HOOD SUPPLY AIR

- I. GENERAL
A. MONITOR ONLY POINTS
1. CWR TEMP
2. DISCHARGE TEMP
B. SUPPLY FAN RUNS CONTINUOUSLY
C. FILTER FAN #17 RUNS CONTINUOUSLY
II. OCCUPIED MODE
A. SPACE TEMP (OCCUPIED SETTING) IS MAINTAINED BY MODULATING EITHER HW COIL VALVE OR CW COIL VALVE, BUT NOT BOTH SIMULTANEOUSLY.
B. SPACE HUMIDITY (OCCUPIED SETTING) IS MAINTAINED BY MODULATING CW COIL VALVE AND LPS VALVE, BUT NOT BOTH SIMULTANEOUSLY. IF SPACE HUMIDISTAT CAUSES CW COILED VALVE TO OPEN, HW COIL VALVE WILL BE ALLOWED TO MODULATE SIMULTANEOUSLY, TO MAINTAIN SPACE TEMPERATURE SETTING.
C. IF ANY HOOD IS ON:
1. ITS RESPECTIVE EXHAUST DAMPER SHALL MODULE TO MAINTAIN PRESET CFM (BY FLOW MEASUREMENT).
2. VAV SUPPLY FROM AHU #1 SHALL MODULATE TO MATCH HOOD FLOW FROM SPACE (BY FLOW MEASUREMENT) +A PRESET DIFFERENTIAL AMOUNT.
3. SPACE EXHAUST SHALL BE OFF.
D. IF NO HOOD IS ON
1. VAV SUPPLY FROM AHU #1 SHALL BE AT PRESET FLOW RATE
2. SPACE EXHAUST SHALL MAINTAIN A PRESET DIFFERENTIAL AMOUNT ABOVE (BELOW) VAV SUPPLY FROM AHU #1
III. UNOCCUPIED MODE
SAME AS OCCUPIED MODE EXCEPT USE UNOCCUPIED SETTINGS.
IV. OVERRIDE
CHANGES FROM UNOCCUPIED MODE TO OCCUPIED MODE.

II. WHEN AHU IS ON

- A. OA DAMPER SHALL OPEN
B. DISCHARGE TEMPERATURE SHALL BE MAINTAINED WITHIN A PRESET RANGE.
1. IF HEATING IS REQUIRED
a. PREHEAT COIL PUMP SHALL RUN
b. HW VALVE SHALL OPEN
c. HW COILED FACE AND BY-PASS DAMPERS SHALL MODULATE
d. CW COIL VALVES SHALL BE OFF
2. IF COOLING IS REQUIRED
a. CW COIL VALVE SHALL MODULATE
b. HW COIL SHALL BE OFF
c. HW PUMP SHALL BE OFF
d. HW COIL FACE AND BY-PASS DAMPERS SHALL BOTH BE OPEN
III. WHEN AHU IS OFF
A. OA DAMPER SHALL BE CLOSED
B. IF OA TEMPERATURE IS ABOVE 40 - ALL DEVICES SHALL BE OFF.
C. IF OA TEMP IS BELOW 40 - HW COIL PUMP SHALL BE ON AND HW COIL VALVE SHALL BE OPEN.

6. AHU #6 - MATERIALS RESEARCH

- I. GENERAL
A. MONITOR ONLY POINTS
1. CWR TEMP
2. SUPPLY FAN RUNS CONTINUOUSLY
C. HIGH LIMIT DUCT HUMIDISTAT CAN OVERRIDE LPS VALVE.
II. OCCUPIED MODE
A. SPACE THERMOSTATS MODULATE RESPECTIVE REHEAT COIL VALVES TO MAINTAIN SPACE AT OCCUPIED SETTING.
B. CW COIL VALVE MODULES TO MAINTAIN DISCHARGE TEMPERATURE.
C. SPACE HUMIDISTAT CAN OVERRIDE CW COIL VALVE FOR DEHUMIDIFICATION.
D. SPACE HUMIDISTAT CAN MODULATE LPS VALVE FOR HUMIDIFICATION.
E. IF NO HOODS ARE "ON":
1. SPACE EXHAUST IS OPEN TO OCCUPIED SETTING.
2. MINIMUM OA DAMPER IS OPEN TO OCCUPIED SETTING.
3. RETURN DAMPER IS OPEN TO OCCUPIED SETTING.
F. IF ONE OR MORE HOODS ARE "ON":
1. SPACE EXHAUST IS CLOSED.
2. MINIMUM OA DAMPER IS CLOSED.
3. RETURN DAMPER IS OPEN.
4. HOOD SUPPLY DAMPER MODULATES TO MAINTAIN FLOW FROM AHU #5. (FLOW 5)
5. HOOD DAMPER OF "ON" HOOD(S) OPENS TO PRESET FLOW RATE.
III. UNOCCUPIED MODE
A. SPACE THERMOSTATS MODULATE RESPECTIVE REHEAT COIL VALVES TO MAINTAIN SPACE AT UNOCCUPIED SETTING.
B. CW COIL VALVE IS OFF FOR COOLING.
C. SPACE HUMIDISTAT CAN MODULATE CW COIL VALVE FOR DEHUMIDIFICATION.
D. SPACE HUMIDISTAT CAN MODULE LPS VALVE FOR HUMIDIFICATION.
E. IF NO HOODS ARE "ON":
1. SPACE EXHAUST IS OPEN TO UNOCCUPIED SETTING.
2. MIN OA DAMPER IS OPEN TO UNOCCUPIED SETTING.
3. RETURN DAMPER IS OPEN TO UNOCCUPIED SETTING.
F. IF ONE OR MORE HOODS ARE "ON":
SAME AS FOR OCCUPIED MODE.
IV. OVERRIDE
CHANGE MODE FROM "UNOCCUPIED" TO "OCCUPIED".

7. AHU #7 MICROELECTRONICS LAB

- I. GENERAL
A. MONITOR ONLY POINTS
1. CWR TEMP
2. DISCHARGE TEMP
B. SUPPLY FAN RUNS CONTINUOUSLY
C. FILTER FAN #17 RUNS CONTINUOUSLY
II. OCCUPIED MODE
A. SPACE TEMP (OCCUPIED SETTING) IS MAINTAINED BY MODULATING EITHER HW COIL VALVE OR CW COIL VALVE, BUT NOT BOTH SIMULTANEOUSLY.
B. SPACE HUMIDITY (OCCUPIED SETTING) IS MAINTAINED BY MODULATING CW COIL VALVE AND LPS VALVE, BUT NOT BOTH SIMULTANEOUSLY. IF SPACE HUMIDISTAT CAUSES CW COILED VALVE TO OPEN, HW COIL VALVE WILL BE ALLOWED TO MODULATE SIMULTANEOUSLY, TO MAINTAIN SPACE TEMPERATURE SETTING.
C. IF ANY HOOD IS ON:
1. ITS RESPECTIVE EXHAUST DAMPER SHALL MODULE TO MAINTAIN PRESET CFM (BY FLOW MEASUREMENT).
2. VAV SUPPLY FROM AHU #1 SHALL MODULATE TO MATCH HOOD FLOW FROM SPACE (BY FLOW MEASUREMENT) +A PRESET DIFFERENTIAL AMOUNT.
3. SPACE EXHAUST SHALL BE OFF.
D. IF NO HOOD IS ON
1. VAV SUPPLY FROM AHU #1 SHALL BE AT PRESET FLOW RATE
2. SPACE EXHAUST SHALL MAINTAIN A PRESET DIFFERENTIAL AMOUNT ABOVE (BELOW) VAV SUPPLY FROM AHU #1
III. UNOCCUPIED MODE
SAME AS OCCUPIED MODE EXCEPT USE UNOCCUPIED SETTINGS.
IV. OVERRIDE
CHANGES FROM UNOCCUPIED MODE TO OCCUPIED MODE.

8. AHU #8 PHOTOLITHOGRAPHY LAB

- I. GENERAL
A. MONITOR ONLY POINTS
1. CWR TEMP
2. DISCHARGE TEMP
B. SUPPLY FAN RUNS CONTINUOUSLY
C. FILTER FAN #17 RUNS CONTINUOUSLY
II. OCCUPIED MODE
A. SPACE HUMIDITY (OCCUPIED SETTING) IS MAINTAINED BY MODULATING EITHER HW COIL VALVE OR CW COIL VALVE, BUT NOT BOTH SIMULTANEOUSLY.
B. SPACE TEMP (OCCUPIED SETTING) IS MAINTAINED BY MODULATING CW COIL VALVE AND LPS VALVE, BUT NOT BOTH SIMULTANEOUSLY. IF SPACE HUMIDISTAT CAUSES CW COILED VALVE TO OPEN, HW COIL VALVE WILL BE ALLOWED TO MODULATE SIMULTANEOUSLY, TO MAINTAIN SPACE TEMPERATURE SETTING.
C. IF THE HOOD IS ON:
1. ITS RESPECTIVE EXHAUST DAMPER SHALL MODULE TO MAINTAIN PRESET CFM (BY FLOW MEASUREMENT).
2. VAV SUPPLY FROM AHU #1 SHALL MODULATE TO MATCH HOOD FLOW FROM SPACE (BY FLOW MEASUREMENT) +A PRESET DIFFERENTIAL AMOUNT.
3. SPACE EXHAUST SHALL BE OFF.
D. IF NO HOOD IS ON
1. VAV SUPPLY FROM AHU #1 SHALL BE AT PRESET FLOW RATE
2. SPACE EXHAUST SHALL MAINTAIN A PRESET DIFFERENTIAL AMOUNT ABOVE (BELOW) VAV SUPPLY FROM AHU #1.
III. UNOCCUPIED MODE
SAME AS OCCUPIED MODE EXCEPT USE UNOCCUPIED SETTINGS.
IV. OVERRIDE
CHANGES FROM UNOCCUPIED MODE TO OCCUPIED MODE.

9. NOT USED.

10. NOT USED.

11. VAV TERMINAL BOX

- I. GENERAL
OCCUPIED/UNOCCUPIED SIGNAL COMES FROM RESPECTIVE AHU OR CENTRAL COMPUTER.
II. OCCUPIED MODE
AIR VOLUME IS MODULATED IN RESPONSE TO ROOM THERMOSTAT.
III. UNOCCUPIED MODE
TERMINAL BOX IS CLOSED.
IV. OVERRIDE
CHANGES MODE FROM UNOCCUPIED TO OCCUPIED MODE.

12. VAV - RH TERMINAL BOX

- I. GENERAL
OCCUPIED/UNOCCUPIED SIGNAL COMES FROM RESPECTIVE AHU OR CENTRAL COMPUTER.
II. OCCUPIED MODE
A. AIR VOLUME IS MODULATED IN RESPONSE TO ROOM THERMOSTAT.
B. IF AIR VOLUME IS AT PRESET MINIMUM (BY DAMPER POSITIONS, UNLESS INDICATED TO BE BY FLOW MEASUREMENT) AND FURTHER HEATING IS REQUIRED, HW VALVE IS MODULATED.
III. UNOCCUPIED MODE
AIR VOLUME IS AT MINIMUM.
HW VALVE IS FULL OPEN OF FULL CLOSED IN RESPONSE TO ZONE NIGHT THERMOSTAT.
IV. OVERRIDE
CHANGE MODE FROM "OCCUPIED" TO "UNOCCUPIED".

13. ZONE UNOCCUPIED CONTROL

- I. GENERAL
OCCUPIED/UNOCCUPIED SIGNAL COMES FROM RESPECTIVE AHU OR CENTRAL COMPUTER.
II. SATISFIED ZONE UNOCCUPIED THERMOSTAT BY CYCLING RESPECTIVE RH COIL VALVES IN THE ZONE FROM FULL OPEN WITH AIR FLOW AT MINIMUM TO BOTH FULL CLOSED.

14. VAV - RH TERMINAL BOX WITH ROOM PRESSURE CONTROL

- I. GENERAL
A. RETURN AIR VOLUME IS MAINTAINED OVER (OR UNDER) SUPPLY AIR VOLUME BY A PRESET AMOUNT (BY FLOW MEASUREMENT).
B. OCCUPIED/UNOCCUPIED SIGNAL COMES FROM AHU #1 OR FROM CENTRAL COMPUTER.
II. OCCUPIED MODE
SUPPLY AIR VOLUME IS MODULATED IN RESPONSE TO OCCUPIED SETTING OF ROOM THERMOSTAT.
IF SUPPLY AIR VOLUME IS AT PRESET MINIMUM FOR OCCUPIED MODE (BY FLOW MEASUREMENT) AND HEATING IS REQUIRED, HW VALVE IS MODULATED.
III. UNOCCUPIED MODE
SUPPLY AIR VOLUME IS MAINTAINED AT PRESET MINIMUM FOR UNOCCUPIED MODE.
HW VALVE IS MODULATED IN RESPONSE TO UNOCCUPIED SETTING OF THERMOSTAT.
IV. OVERRIDE
CHANGES FROM UNOCCUPIED TO OCCUPIED MODE.

15. HOODS

- NOTES: "HOODS" MAY BE ANY TYPE OF EXHAUST DEVICE INCLUDING FUME HOODS, CANOPY HOOD, FLEXIBLE EXHAUST CONNECTIONS, ETC.
EACH HOOD WILL BE EQUIPPED WITH AN ON/OFF SWITCH BY THE MANUFACTURER (EXCEPT FLEXIBLE EXHAUST CONNECTIONS, THEN CONTRACTOR SHALL PROVIDE SWITCH).
IN "ON" POSITION - HOOD VAV EXHAUST DAMPER SHALL MODULE TO MAINTAIN PRESET FLOW (BY FLOW MEASUREMENT).
IN "OFF" POSITION - HOOD VAV DAMPER SHALL BE CLOSED.
HOOD SUPPLY AIR VAV DAMPER SHALL MODULE TO MAKE SUPPLY AIR FLOW = SUM OF ALL HOOD EXHAUST FLOWS IN THE ROOM.

16. VAV - RH TERMINAL BOX FOR NON "LAB" AREAS ON LAB AHU

- I. GENERAL
OCCUPIED/UNOCCUPIED SIGNAL COMES FROM AHU #1 OR CENTRAL COMPUTER.
II. OCCUPIED
A. AIR VOLUME IS MODULATED IN RESPONSE TO ROOM THERMOSTAT (OCCUPIED SETTING).
B. IF AIR VOLUME IS AT PRESET MINIMUM AND FURTHER HEATING IS REQUIRED, HW VALVE IS MODULATED.
III. UNOCCUPIED
A. NORMAL - AIR VOLUME IS CLOSED AND HW VALVE IS CLOSED.
B. IF UNOCCUPIED SETTING OF ROOM THERMOSTAT REQUIRES HEAT, AIR VOLUME DAMPER OPENS TO PRESET MINIMUM AND HW VALVE MODULATES TO MAINTAIN UNOCCUPIED SETTING. IF HW VALVE IS FULLY CLOSED, AIR VOLUME DAMPER IS CLOSED.

17. LAB IN LARGE SCALE TESTING

- I. GENERAL
OCCUPIED/UNOCCUPIED SIGNAL COMES FROM AHU #1 OR SEPARATE SCHEDULE.
II. OCCUPIED MODE
A. IF HOOD IS NOT "ON"
OF ROOM THERMOSTAT.
2. IF SUPPLY AIR VOLUME IS AT PRESET MINIMUM (BY FLOW MEASUREMENT) AND HEATING IS REQUIRED, HW VALVE IS MODULATED.
3. ROOM EXHAUST IS MAINTAINED AT PRESET DIFFERENTIAL FROM SUPPLY BY MODULATING SPACE EXHAUST DAMPER.
4. HOOD DAMPER IS CLOSED.
B. IF HOOD IS ON
1. SPACE EXHAUST DAMPER IS CLOSED.
2. HOOD DAMPER MODULATES TO MAINTAIN PRESET FLOW RATE.

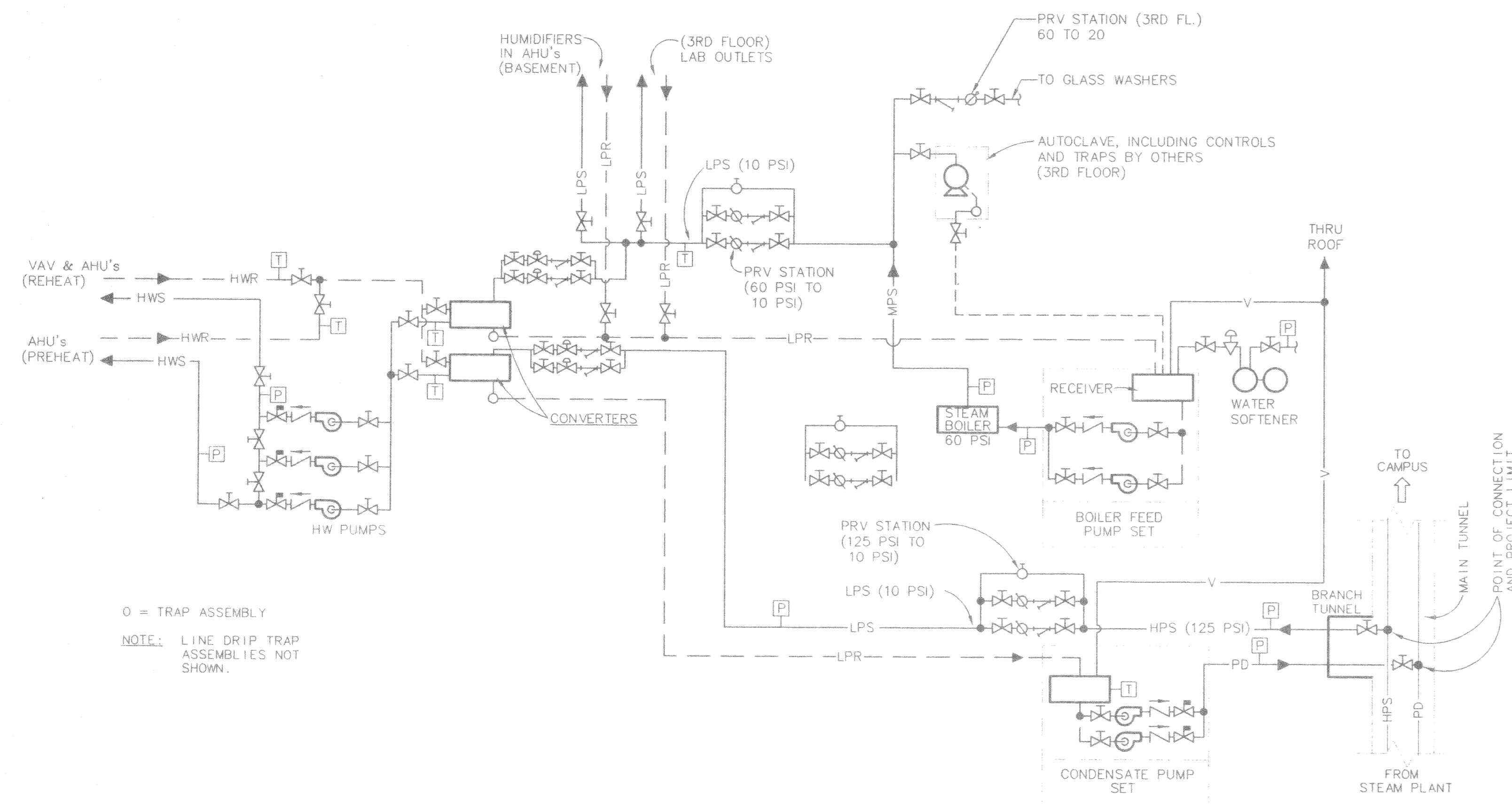
18. HIGH BAY AREA OF LARGE SCALE TESTING

- I. GENERAL
3. SPACE SUPPLY VAV DEVICE MODULATES SUPPLY VOLUME TO BE A PRESET OCCUPIED/UNOCCUPIED SIGNAL COMES FROM AHU #1 OR SEPARATE SCHEDULE.
II. OCCUPIED MODE
A. SUPPLY AIR VOLUME IS MODULATED IN RESPONSE TO OCCUPIED SETTING OF ROOM THERMOSTAT.
B. IF SUPPLY AIR VOLUME IS AT PRESET MINIMUM (BY FLOW MEASUREMENT) AND HEATING IS REQUIRED, HW VALVE IS MODULATED.
C. ROOM EXHAUST DIFFERENTIAL IS MAINTAINED AT PRESET VALUE BY MODULATING SPACE EXHAUST DAMPER. IF EXHAUST FAN #11 IS ON, THE DIFFERENTIAL IS REDUCED BY THE AMOUNT OF FLOW TO EF #11.
III. UNOCCUPIED MODE
SAME AS OCCUPIED MODE EXCEPT THERMOSTAT AND SUPPLY MINIMUM FLOW ARE UNOCCUPIED VALUES.
IV. OVERRIDE
CHANGES FROM UNOCCUPIED TO OCCUPIED MODE.

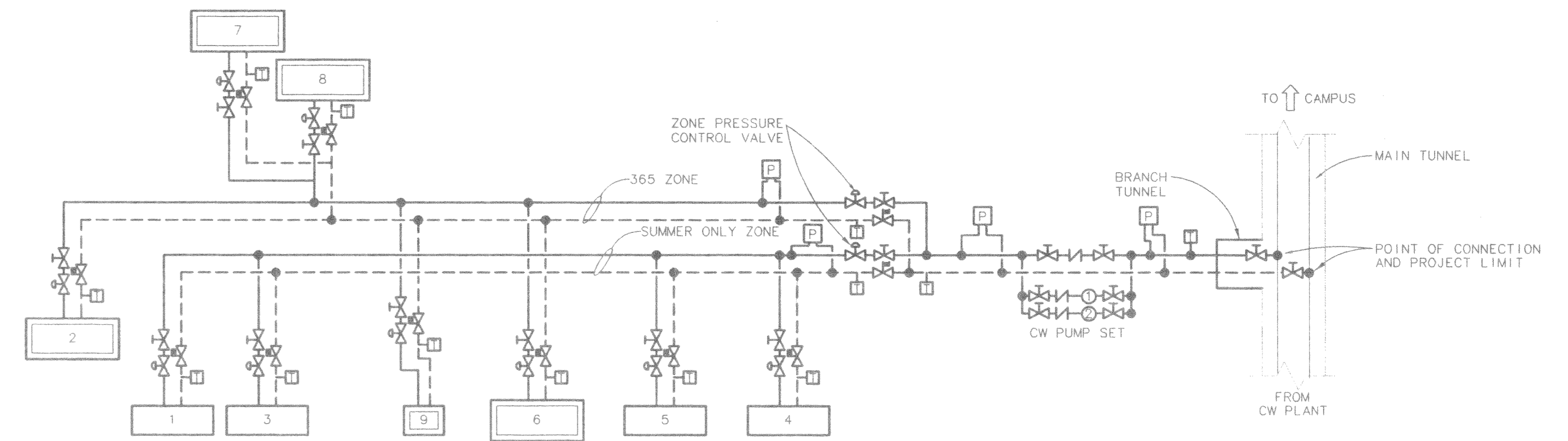
19. PURGE - HIGH BAY AREA - LARGE SCALE TESTING

- A MONITOR MOUNTED NEAR THE CEILING SHALL MONITOR FOR METHANE.
A MONITOR MOUNTED NEAR THE FLOOR SHALL MONITOR FOR HYDROGEN SULFIDE.
IF EITHER MONITOR REACHES ITS FIRST ALARM LEVEL AN AUDIO AND VISUAL ALARM SHALL OCCUR IN THE ROOM, IN THE CAMPUS SECURITY OFFICE AND AT THE CAMPUS ENERGY MANAGEMENT OFFICE.
IF EITHER MONITOR REACHES ITS SECOND ALARM LEVEL, EFF #12 SHALL START AND THE OA TO DAMPERS IN THE SPACE SHALL OPEN. THIS EVENT SHALL CAUSE A SECOND AND DISTINCT AUDIO AND VISUAL ALARM AT THE SAME THREE LOCATIONS.
EACH ALARM AT EACH LOCATION SHALL BE MANUALLY SILENCEABLE AND MANUALLY RESETTABLE.

UNIVERSITY OF LOUISVILLE ACADEMIC BUILDING PHASE FIVE
REVISIONS DATE
1 2 3 4 5
DATE: 12-17-93
LOUIS & HENRY GROUP
101 SIGHT AT MAIN, LOUISVILLE, KY 40202
DRAWN BY: M.B.D.
CHECKED BY: J.H.R.
PROJ. ARCH: UNIVERSITY OF LOUISVILLE OFFICE OF FACILITIES MANAGEMENT LOUISVILLE, KENTUCKY 40292 (502) 588-6167
A & E FILE NO.: 911020
CONTROL SEQUENCES
M202
AGENCY AUTHORIZATION: _____ DATE: _____
PRINCIPAL IN CHARGE: _____ APPROVAL FOR PROGRAM CONCEPT ONLY: _____



STEAM AND HOT WATER PIPING SCHEMATIC
NO SCALE



CHILLED WATER PUMPING SYSTEM
NO SCALE

STEAM AND HOT WATER SYSTEMS

NOTE: THE FOLLOWING EQUIPMENT SHALL HAVE INDEPENDENT CONTROLS PROVIDED BY THE EQUIPMENT MANUFACTURER:

- STEAM BOILER
 - BOILER FEED PUMP SET
 - CONDENSATE PUMP SET
 - WATER SOFTENER SYSTEM
 - PRESSURE REDUCING STATIONS
1. MONITOR ONLY POINTS
 - A. CENTRAL STEAM & HIGH PRESSURE RETURN
 - INCOMING STEAM PRESSURE
 - PRESSURE DOWNSTREAM OF PRV
 - TEMPERATURE IN CONDENSATE RECEIVER
 - CONDENSATE PUMP SET ALARM
 - PD PRESSURE
 - B. BUILDING STEAM SYSTEM
 - PRESSURE LEAVING WATER SOFTENER
 - BOILER FEED PUMP SET DISCHARGE PRESSURE
 - BOILER FEED PUMP SET ALARM
 - STEAM PRESSURE LEAVING BOILER
 - PRESSURE DOWNSTREAM OF PRV
 - C. HOT WATER SYSTEMS
 - PRESSURE IN HOT WATER SUPPLY TO PREHEAT SYSTEM
 - PRESSURE IN HOT WATER SUPPLY TO REHEAT SYSTEM
 - RETURN TEMPERATURE IN PREHEAT SYSTEM
 - RETURN TEMPERATURE IN REHEAT SYSTEM
 2. REHEAT SYSTEMS (2)

PROVIDE FOR RESET OF HOT WATER SYSTEM TEMPERATURE FROM OUTDOOR TEMPERATURE.

CHILLED WATER PUMPING SYSTEM

1. MONITOR ONLY POINTS
 - INCOMING CW LINES
 - CWS TEMP
 - PRESSURE DIFFERENTIAL FOR EACH ZONE
 - CWR TEMP
 - FOR COMMON PUMP DISCHARGE
 - PRESSURE DIFFERENTIAL
2. CONTROL VALVES FOR INDIVIDUAL AHU'S SHALL CONTROL PER THE AHU SEQUENCE.
3. ZONE PRESSURE CONTROL VALVES (ZPCV) SHALL MODULATE TO MAINTAIN A PRESET PRESSURE DIFFERENTIAL IN THEIR RESPECTIVE ZONE PIPING IF THAT ZONE IS ACTIVE. IF INACTIVE, ZPCV SHALL BE CLOSED.
4. IF ANY ACTIVE ZPCV IS 90% OPEN FOR A PRESET TIME, THE NEXT HIGHER STEP OF THE CW PUMPING SET SHALL BE ACTIVATED. IF THE ZPCV WITH THE HIGHEST % OPEN IS BELOW 50% OPEN FOR A PRESET TIME, THE NEXT LOWER STEP OF THE CW PUMPING SET SHALL BE ACTIVATED.
5. STEPS OF THE CW PUMPING SET
 - 1) BOTH PUMPS OFF (FLOW IS THRU CHECK VALVE)
 - 2) PUMP #1 ON, PUMP #2 OFF
 - 3) PUMP #1 ON, PUMP #2 ON

STEAM AND CHILLED WATER SCHEMATIC

SCALE: NONE

REVISIONS	DATE	UNIVERSITY OF LOUISVILLE ACADEMIC BUILDING PHASE FIVE	
1		DATE	RECORD DATE
2		12-17-93	
3		DRAWN BY	UNIVERSITY FILE NO.
4		M.B.D.	
5		CHECKED BY	DRAWING NO.
		J.H.R.	M203
		PROJ. ARCH.	AGENCY AUTHORIZATION
		R. A. DOCKERY 10,211	APPROVAL FOR PROGRAM CONCEPT ONLY
		A & E FILE NO.	DATE

SEE 1994 SET

AIR HANDLER UNIT SCHEDULE										
MARK	AHU-1	AHU-2	AHU-3	AHU-4	AHU-5	AHU-6	AHU-7	AHU-8	AHU-9	
TYPE	HORIZ. DRAW-THRU (VAV)	VERT. DRAW-THRU (CV)	HORIZ. DRAW-THRU (CV)	HORIZ. DRAW-THRU (VAV)	HORIZ. DRAW-THRU (VAV)	HORIZ. DRAW-THRU (CV)	HORIZ. DRAW-THRU (CV)	HORIZ. DRAW-THRU (CV)	HORIZ. DRAW-THRU (CV)	HORIZ. DRAW-THRU (CV)
LOCATION	MECH. RM. 015 (WEST)	MECH. RM. 015 (WEST)	MECH. RM. 015 (WEST)	MECH. RM. 008 (EAST)	MECH. RM. 008 (EAST)	MECH. RM. 008 (EAST)	MECH. RM. 013 (WEST)	MECH. RM. 013 (WEST)	MECH. RM. 013 (WEST)	ROOM 006 (EAST) ABOVE CELL
DUTY	LAB SUPPLY	RM. 014, 140	ATRIUM SUPPLY	OFFICE SUPPLY	HOOD MAKE-UP	MAT. RES. LAB	MICRO-ELECTRONICS 011	PHOTO-LITHOGRAPHY 011B	COMP. VISION RM. 006	
SUPPLY FAN	CFM (TOTAL/MIN O.A.)	40,000/23,900	2,700/270	10,000/1,000	34,500/5,175	27,000/27,000	4,150/2,700	7,000/---	3,000/---	1,240/310
T.S.P./E.S.P. (IN. WTR.)	5.5/ 3.00	3.0/ 1.00	3.0/ 1.0	5.5/ 3.25	6.0/ 3.0	3.0/ 1.10	3.5/ 0.75	3.5/ 0.75	1.5/ 0.30	
WHEEL DIA. (IN.)	40	12 1/4	22	36 1/2	36 1/2	16 1/2	18 1/4	15	12	
MAX. OUTLET VEL. (F.P.M.)	2200	1,550	1,700	2,200	1,800	1,400	1,700	1,700	1,200	
TYPE	AIR FOIL	FORWARD CURVED	FORWARD CURVED	AIR FOIL	AIR FOIL	FORWARD CURVED	FORWARD CURVED	FORWARD CURVED	FORWARD CURVED	
CHILLED WATER COIL SECTION										
MARK										
BHP										0.51
MOTOR HP	60	3	10	50	40	5	7 1/2	5	3/4	
ELEC (V/Hz)	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60
CAPACITY (MBH) TOT/SEN	2,425/1390	85/64.5	300/240	1,170/860	1,360/586	290/149	7,000	3,000	50/33.6	1,240
AIR SIDE										
CFM	40,000	2,700	10,000	34,500	27,000	4,150	7,000	3,000	1,240	
ENT. DB/WB °F	87.0/72.5	68.5/58.5	77.0/64.5	78.0/65.2	80.0/74.0	79.5/70.0	52.6/52.6	52.6/52.6	80.0/67.0	
LVG. DB/WB °F	55.0/	46.5/46.5	55.0/54.2	55.0/54.0	60.0/59.5	46.5/46.5	46.5/46.5	46.5/46.5	55.0/54.0	
MAX. FACE VEL. (FPM)	500	450	500	500	450	450	450	450	450	
PD (IN W.G.)	1.10	---	---	---	---	---	---	---	---	
WATER SIDE										
EWT/ΔT °F	45/15	45/15	45/15	45/15	45/15	45/15	45/15	45/15	45/15	
MAX. WATER ΔP (FT)	15	---	---	---	---	---	---	---	---	
GPM	323.0	11.3	40	156.0	181	38.7	---	---	7.0	
COIL DATA										
MIN. TOTAL FACE AREA FT²	80.0	6.0	20.0	69.0	60.0	9.22	15.6	6.7	2.75	
NO. OF INDIV. COILS	3	1	1	3	2	1	1	1	1	
MIN. NO. OF ROWS	8	---	---	---	---	---	---	---	---	
MAX. FINS PER INCH	8	8	8	8	8	8	8	8	8	
HOT WATER COIL SECTION										
MARK		HP-2A			HP-5A	HP-6A	HP-7A	HP-8A		
CAPACITY (MBH)	1,175	---	405	562	2,190	150	225	65	---	
AIR SIDE										
CFM (EACH)	40,000	---	10,000	34,500	27,000	4,150	7,000	3,000	---	
ENT. °F	28.0	---	63.0	40.0	0	21.7	55.0	55.0	---	
LVG. °F	55.0	---	100.0	55.0	75	55.0	85.0	75.0	---	
MAX. FACE VEL. (FPM)	500	---	500	500	450	450	450	450	---	
PD (IN W.G.)	0.25	---	0.25	0.25	0.35	0.25	0.25	0.25	---	
WATER SIDE										
EWT/ΔT °F	200/30	---	200/30	200/30	200/30	200/30	200/30	200/30	200/30	
MAX. ΔP (FT)	7	---	7	7	7	7	7	7	---	
GPM	78.3	---	27.0	146.0	10.0	15.2	4.4	4.4	---	
COIL DATA										
MIN. TOTAL FACE AREA FT²	80	---	20.0	69.0	60.0	9.22	15.6	6.7	---	
NO. OF INDIV. COILS	3	---	1	3	2	1	1	1	---	
MIN. NO. OF ROWS	1	---	1	2	2	1	1	1	---	
MAX. FINS PER INCH	8	---	8	8	8	8	8	8	---	
HEAT PIPE COIL SECTION										
MARK		HP-2B			HP-5B	HP-6B	HP-7B	HP-8B		
CAPACITY (MBH)	---	---	---	---	---	---	---	---	---	
AIR SIDE										
CFM	---	2,700	---	---	27,000	4,150	7,000	3,000	---	
ENT. DB/WB	---	77.0/61.8	---	---	95.0/78.0	88.0/72.5	59.0/56.0	59.0/56.0	---	
LVG. DB/WB	---	68.5/58.5	---	---	80.0/74.0	79.5/70.0	52.6/52.6	52.6/52.6	---	
MAX. FACE VEL. (FPM)	---	450	---	---	450	450	450	450	---	
PD (IN W.G.)	---	0.25	---	---	0.60	0.25	0.75	0.75	---	
WATER SIDE										
EWT/ΔT °F	---	---	---	---	---	---	---	---	---	
MAX. ΔP (FT)	---	---	---	---	---	---	---	---	---	
GPM	---	---	---	---	---	---	---	---	---	
COIL DATA										
MIN. TOTAL FACE AREA FT²	---	6.0	---	---	60	9.22	15.6	6.7	---	
NO. OF INDIV. COILS	---	1	---	---	2	1	1	1	---	
MIN. NO. OF ROWS	---	12	---	---	14	12	14	14	---	
MAX. FINS PER INCH	---	---	---	---	---	---	---	---	---	
PRE-FILTERS										
TYPE	2" PLEATED THROWAWAY	2" PLEATED THROWAWAY	2" PLEATED THROWAWAY	2" PLEATED THROWAWAY	2" PLEATED THROWAWAY	2" PLEATED THROWAWAY	2" PLEATED THROWAWAY	2" PLEATED THROWAWAY	2" PLEATED THROWAWAY	
NUMBER/ SIZE	(24) 24X24X2 (6WX4H)	AS REQUIRED	AS REQUIRED	AS REQUIRED	(15) 24X24X2 (5WX3H)	AS REQUIRED	(9) 24X24X2 (3WX3H)	(6) 24X24X2 (3WX3H)	(3) 24X12X2 (3WX1H)	
EFFICIENCY (ASHRAE 52-76)	25%	25%	25%	25%	25%	25%	25%	25%	25%	
PRESSURE DROP (INIT/ FINAL)	0.30/0.50	0.15/0.50	0.15/0.50	0.15/0.50	0.15/0.50	0.15/0.50	0.30/0.50	0.15/0.50	0.30/0.50	
AFTER FILTERS										
TYPE	HIGH EFF. EXTENDED SURFACE	---	---	---	---	HIGH EFF. EXTENDED SURFACE	HIGH EFF. EXTENDED SURFACE	HIGH EFF. EXTENDED SURFACE	HIGH EFF. EXTENDED SURFACE	
NUMBER/ SIZE	(24) 24X24X12 (6WX4H)	---	---	---	---	(15) 24X24X12 (5WX3H)	(9) 24X24X12 (5WX3H)	(6) 24X24X12 (3WX2H)	(3) 24X12X12 (3WX1H)	
EFFICIENCY (ASHRAE 52-76)	90%	---	---	---	---	90%	---	90%	---	
PRESSURE DROP (INIT/ FINAL)	0.65/1.10	---	---	---	---	0.65/1.10	---	0.65/1.10	0.65/1.10	
REMARKS						FILTER SIZE BASED ON FAN NO. 7 - 17,600 CFM		FILTER SIZE BASED ON FAN NO. 8 - 13,500 CFM		

1. V.A.V. IN SCHEDULE INDICATES VARIABLE AIR VOLUME.
 2. C.V. IN SCHEDULE INDICATES CONSTANT VOLUME.

MARK	NO.1
LOCATION	MECH. RM. 008A
TYPE	
OPER. PRESS. (PSIG)	60
HORSEPOWER	50
GROSS OUTPUT	BTUH 1,680,000
FIRING RATE	LBS. STEAM/ HR. 1,730
BURNER	HP
REMARKS	FORCE DRAFT BLOWER

MARK	P-12
LOCATION	MECH. RM. 008
TYPE	DUPLEX
CAPACITY	GPM 52.5
	DISCHARGE 138 FT.
	EDR 35,000
	HP 2 @ 5 EACH
MOTOR	RPM 1,750
	V/g/Hz 480/3/60
	GALLONS 60
RECEIVER	SIZE 22" DIA. X 38" LONG
REMARKS	

MARK		NO. 1	NO. 2
LOCATION		MECH. RM. 008	MECH. RM. 008
STEAM			
INPUT (#/HR)	---	7,995	4,800
INLET PRESSURE	---	10	10
WATER			
FLOW RATE (GPM)	---	517	310
PRESS. DROP (FT)	---	5	5
# OF PASSES	---	2	2
FOULING FACTOR	---	0.001	0.001
EWT / LWT (°F)	---	170/200	170/200
MIN. HEATING SURFACE FT²	---	388	227
REMARKS			

MARK	P-13
LOCATION	MECH. RM. 008A
TYPE	DUPLEX
RECEIVER	CAPACITY 50 GAL.
	SIZE ---
PUMPS	NUMBER 2
	CAPACITY 11.0 GPM
	DISCH. PRES. 175
	HP 2
	RPM 3,450
	ELECTRICAL 480/3/60
REMARKS	

MARK	NO. 1A	NO. 1B	NO. 1C	NO. 3A	NO. 3B	NO. 4	NO. 4A	NO. 5A	NO. 5B	NO. 5C	NO. 7	NO. 8	NO. 11	NO. 12	NO. 13	NO. 17
LOCATION	MECH. RM. 015	MECH. RM. 008	MECH. RM. 008	MECH. RM. 015	ROOF	MECH. RM. 008	MECH. RM. 008	ROOF	ROOF	ROOF	MECH. RM. 013	MECH. RM. 013	ROOF	ROOF	ROOF	ROOF
DUTY	RETURN AIR AHU-1	ATRIUM RELIEF	LAB RELIEF/RETURN	RETURN AIR AHU-3	ATRIUM SMOKE	RETURN AIR AHU-4	RETURN AIR AHU-4	LAB EXHAUST	LAB EXHAUST	LAB EXHAUST	MICRO-ELECT RM.011	PHOTO-LITH RM.011B	INCINERATOR EXH.	PURGE	HAZARDOUS EXH.	GENERAL EXHAUST
TYPE	CABINET	INLINE CENTRIFUGAL	INLINE CENTRIFUGAL	INLINE CENTRIFUGAL		INLINE CENTRIFUGAL	INLINE CENTRIFUGAL	INDUCED DILUTION	INDUCED DILUTION	INDUCED DILUTION	TUB. CENTRIF.	TUB. CENTRIF.		UTILITY SET	UTILITY SET	UTILITY SET
CFM	16,100	10,000	16,100	10,000	40,000	16,500	16,500	22,000	17,500	17,500	17,600	13,500	1,200	3,200	500	2,500
SP (IN)	1.15	0.75	1.75	1.00	---	1.60	1.60	---	---	---	4.00	4.00	---	---	0.625	0.90
WHEEL DIA	30"	---	36 1/2	---	---	---	---	---	---	---	36 1/2	33	---	---	9	---
MAX. OUTLET VEL. (FPM)	1,500	900	1,200	900	---	1,000	1,000	---	---	---	1,300	1,300	---	---	1,200	1,350
MOTOR HP	7 1/2	5	10	7 1/2	7 1/2	10	-10	25	20	20	25	20	1 1/2	3	1/6	3/4
VOLT/g/Hz	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60
REMARKS	AIR FOIL OR FORWARD CURVED WHEEL													BACKWARD INCLINED WHEEL	BACKWARD INCLINED WHEEL	

REVISIONS	DATE	UNIVERSITY OF LOUISVILLE ACADEMIC BUILDING PHASE FIVE
1		LOUIS & HENRY GROUP 101 S. NIGHTH AT MAIN, LOUISVILLE, KY 40208 R. RONALD & ASSOC., SENLER-CAMPBELL & ASSOC., INC. EARL WALLS ASSOCIATES, SKEES ENGINEERING, INC. MONK DUNSTONE ASSOCIATES, INC.
2		
3		
4		
5		
DRAWN BY	DATE	RECORD DATE
M.B.D.	12-17-93	
CHECKED BY		UNIVERSITY FILE NO.
J.H.R.		
PROJ. ARCH.		DRAWING NO.
R.A. DOCKERY	10,211	M401
A & E FILE NO.		DRAWING TITLE
		H.V.A.C. EQUIPMENT SCHEDULES
AGENCY AUTHORIZATION	DATE	APPROVAL FOR PROGRAM CONCEPT ONLY

VARIABLE VOLUME REHEAT BOX SCHEDULE table with columns for MARK, VR-1 through VR-11, and rows for CFM RANGE, HEATED CFM RANGE, COIL DATA, MIN. INLET SIZE, MAX. PD IN. W.G., MAX. NOISE CRITERIA, and REMARKS.

- 1. SOUND LEVEL REFERENCE 10^-12 WATTS, BASED ON RSS CALIBRATION EFFECTIVE 5-30-68. RSS STANDS FOR "REFERENCE SOUND SOURCE".
2. N.C. LEVEL BASED ON RDB ROOM EFFECT PLUS 10 DB CEILING TRANSMISSION LOSS IN EACH OCTAVE BAND. N.C. LEVEL BASED ON INLET STATIC PRESSURE OF 1.0 INCH W.G..
3. ENTERING WATER TEMPERATURE 200°F, 30°F WATER TEMPERATURE DROP.
4. MAXIMUM AIR PRESSURE DROP (BOX AND COIL) DOES NOT INCLUDE LOSSES DOWNSTREAM OF VARIABLE VOLUME BOX.
5. NUMBER OF ROWS FOR HEATING COIL SHALL BE DETERMINED BY UNIT MANUFACTURER.
6. CFM RANGE IN SCHEDULE IS FOR BOX SELECTION ONLY. ROOM THERMOSTAT SHALL MODULATE VOLUME CONTROL IN THE BOX FROM MAXIMUM CFM SHOWN ON PLANS TO 50% SHUT-OFF.
7. ALL PIPE ROUNDS SHALL BE 3/4" FOR BOXES 1 THRU 9, BOXES 10 AND 11 SHALL BE 1".

VARIABLE AIR VOLUME BOX SCHEDULE table with columns for MARK, V-1 through V-11, and rows for CFM RANGE, MINIMUM INLET SIZE, MAXIMUM NOISE CRITERIA, and REMARKS.

- 1. SOUND LEVEL REFERENCE 10^-12 WATTS, BASED ON RSS CALIBRATION EFFECTIVE 5-30-68. RSS STANDS FOR "REFERENCE SOUND SOURCE".
2. N.C. LEVEL BASED ON RDB ROOM EFFECT PLUS 10 DB CEILING TRANSMISSION LOSS IN EACH OCTAVE BAND. N.C. LEVEL BASED ON INLET STATIC PRESSURE OF 1.0 INCH W.G..
3. MAXIMUM AIR PRESSURE DROP THRU THE BOX AT MAXIMUM CFM SHALL NOT EXCEED 0.50 INCHES W.C.. THIS PRESSURE DROP INCLUDES LOSSES DOWNSTREAM OF THE VARIABLE VOLUME BOX.

VARIABLE VOLUME EXHAUST BOX SCHEDULE table with columns for MARK, VE-1 through VE-11, and rows for CFM RANGE, MINIMUM INLET SIZE, MAXIMUM NOISE CRITERIA, and REMARKS.

- 1. SOUND LEVEL REFERENCE 10^-12 WATTS, BASED ON RSS CALIBRATION EFFECTIVE 5-30-68. RSS STANDS FOR "REFERENCE SOUND SOURCE".
2. N.C. LEVEL BASED ON RDB ROOM EFFECT PLUS 10 DB CEILING TRANSMISSION LOSS IN EACH OCTAVE BAND. N.C. LEVEL BASED ON INLET STATIC PRESSURE OF 1.0 INCH W.G..
3. MAXIMUM AIR PRESSURE DROP THRU THE BOX AT MAXIMUM CFM SHALL NOT EXCEED 0.50 INCHES W.C.. THIS PRESSURE DROP INCLUDES LOSSES DOWNSTREAM OF THE VARIABLE VOLUME BOX.

HOT WATER UNIT HEATER SCHEDULE table with columns for MARK, UH-1 through UH-14, and rows for LOCATION, TYPE, FAN DATA, COIL DATA, MOUNTING HEIGHT ABOVE FLOOR, and REMARKS.

1. CAPACITY BASED ON 60°F ENTERING AIR TEMPERATURE.

PUMP SCHEDULE table with columns for MARK, P-1 through P-11, and rows for LOCATION, TYPE, SERVICE, GPM, HEAD (FT), MOTOR, ELEC (V/φ/Hz), and REMARKS.

HOT WATER REHEAT COIL SCHEDULE table with columns for MARK, RHC-2A through RHC-9, and rows for AREA SERVED, AIR SIDE, CAPACITY, WATER SIDE, COIL DATA, and REMARKS.

PRESSURE REDUCING VALVE SCHEDULE (STEAM) table with columns for MARK, PRV-1 through PRV-4, and rows for LOCATION, CAPACITY, INLET STEAM PRES., OUTLET STEAM PRES., and REMARKS.

AUTOMATIC STEAM VALVE SCHEDULE table with columns for MARK, ASV-1 through ASV-4, and rows for LOCATION, CAPACITY, INLET STEAM PRES., OUTLET STEAM PRES., and REMARKS.

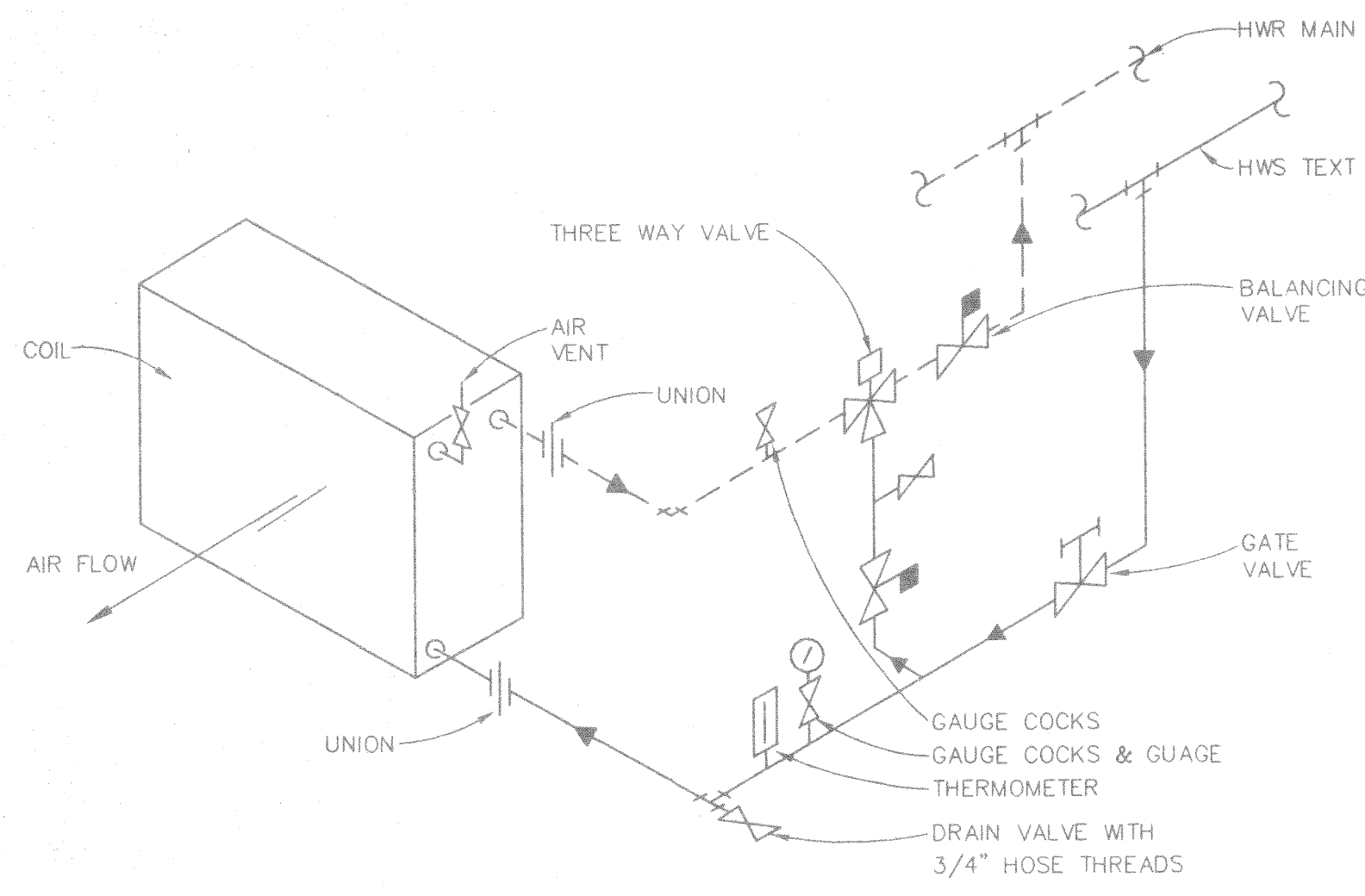
HUMIDIFIER SCHEDULE table with columns for MARK, H-2 through H-8, and rows for LOCATION, CFM, CAP. LBS. STEAM/HR., STEAM PRESSURE PSI, and REMARKS.

SOUND ATTENUATOR SCHEDULE table with columns for MARK, SA-1 through SA-8, and rows for LOCATION, TYPE, CFM, MAX. ΔP, DIMENSION DATA, and REMARKS.

UNIVERSITY OF LOUISVILLE ACADEMIC BUILDING PHASE FIVE project information including date, drawing title, agency authorization, and drawing number M402.

H.V.A.C. EQUIPMENT SCHEDULES

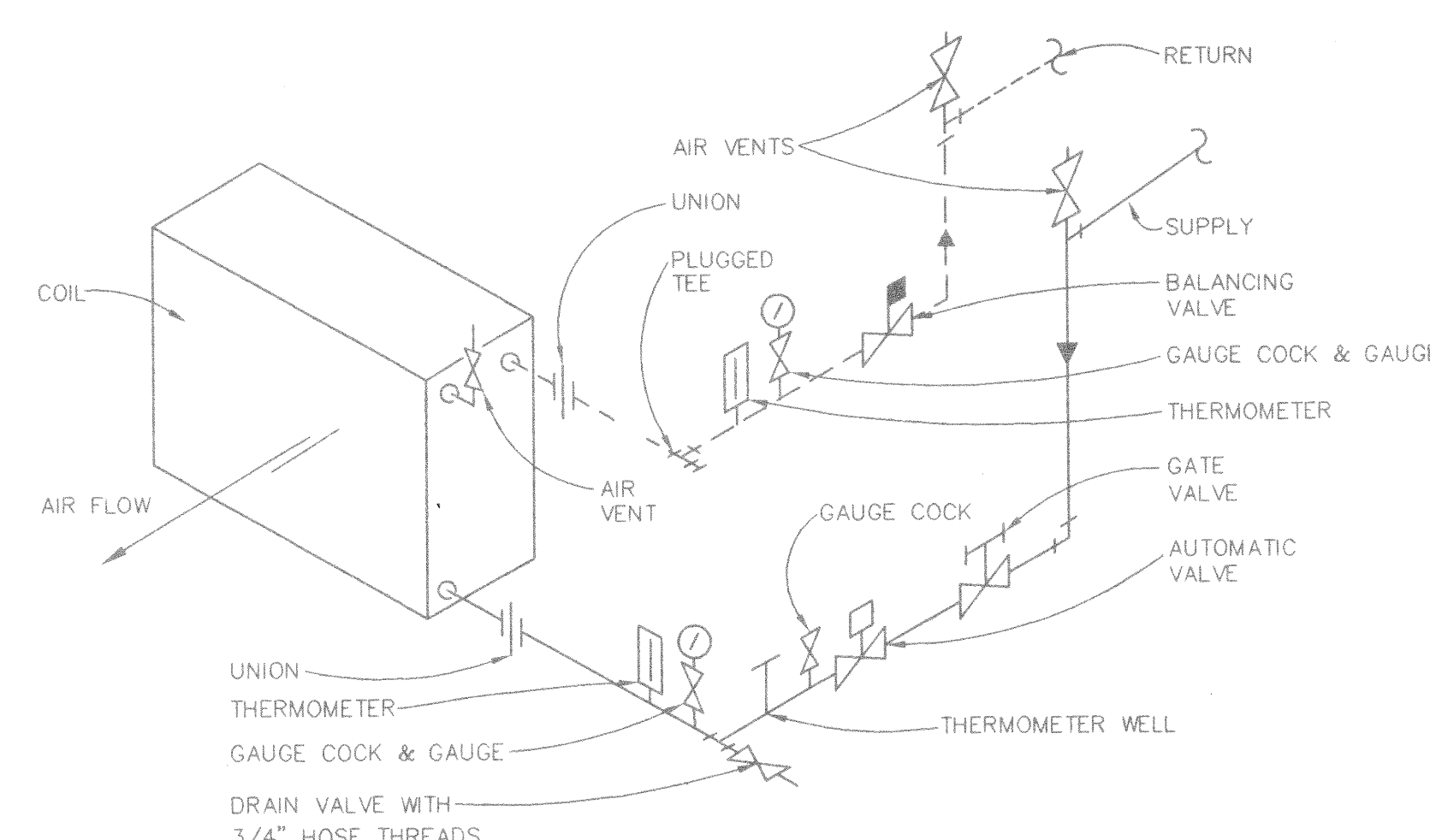
SCALE: NONE



COIL PIPING DIAGRAM NO.1
NO SCALE

1
M501

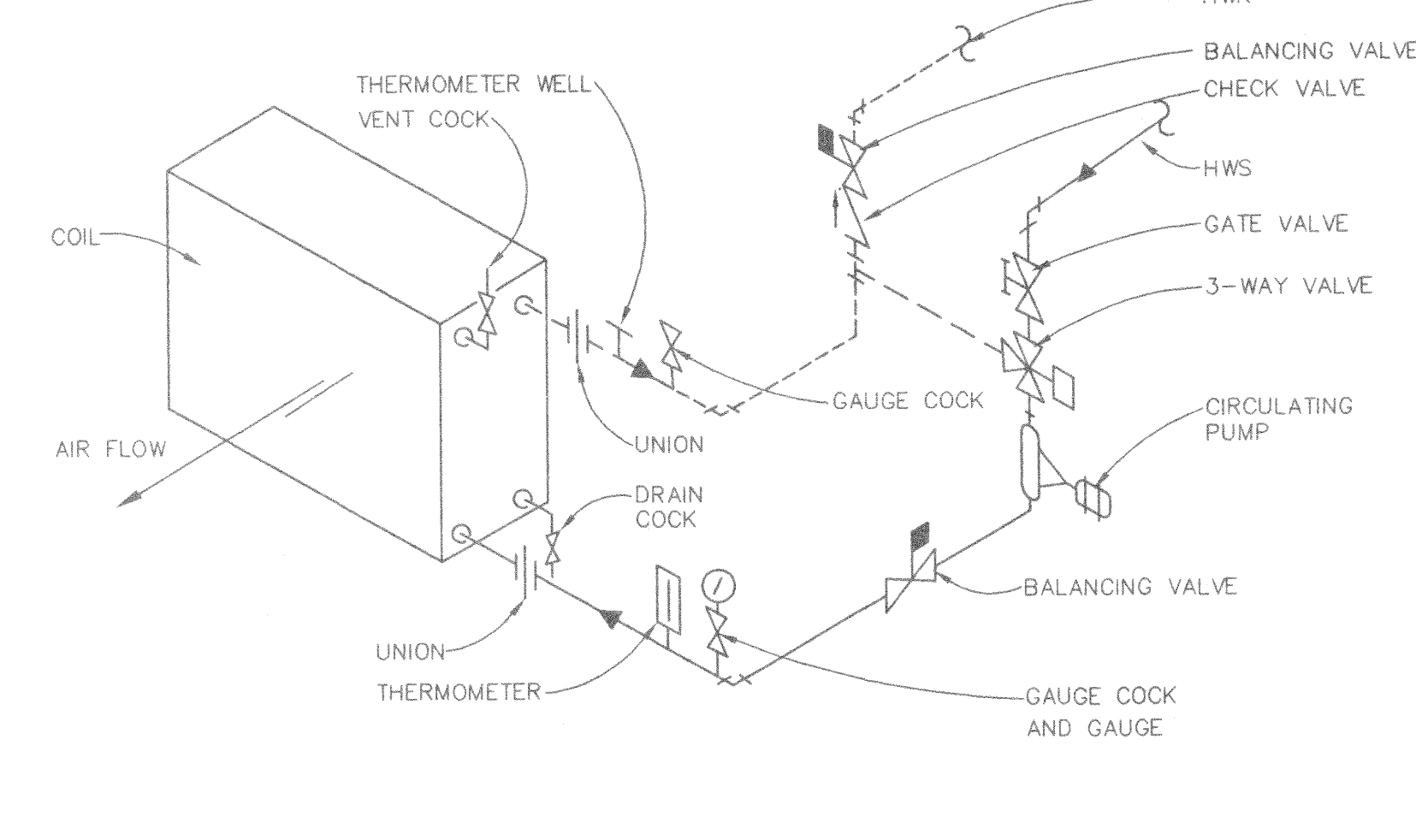
TYPICAL PIPING DIAGRAM FOR THE FOLLOWING:
1. VARIABLE VOLUME REHEAT BOXES.
2. REHEAT COILS



COIL PIPING DIAGRAM NO.2
NO SCALE

2
M501

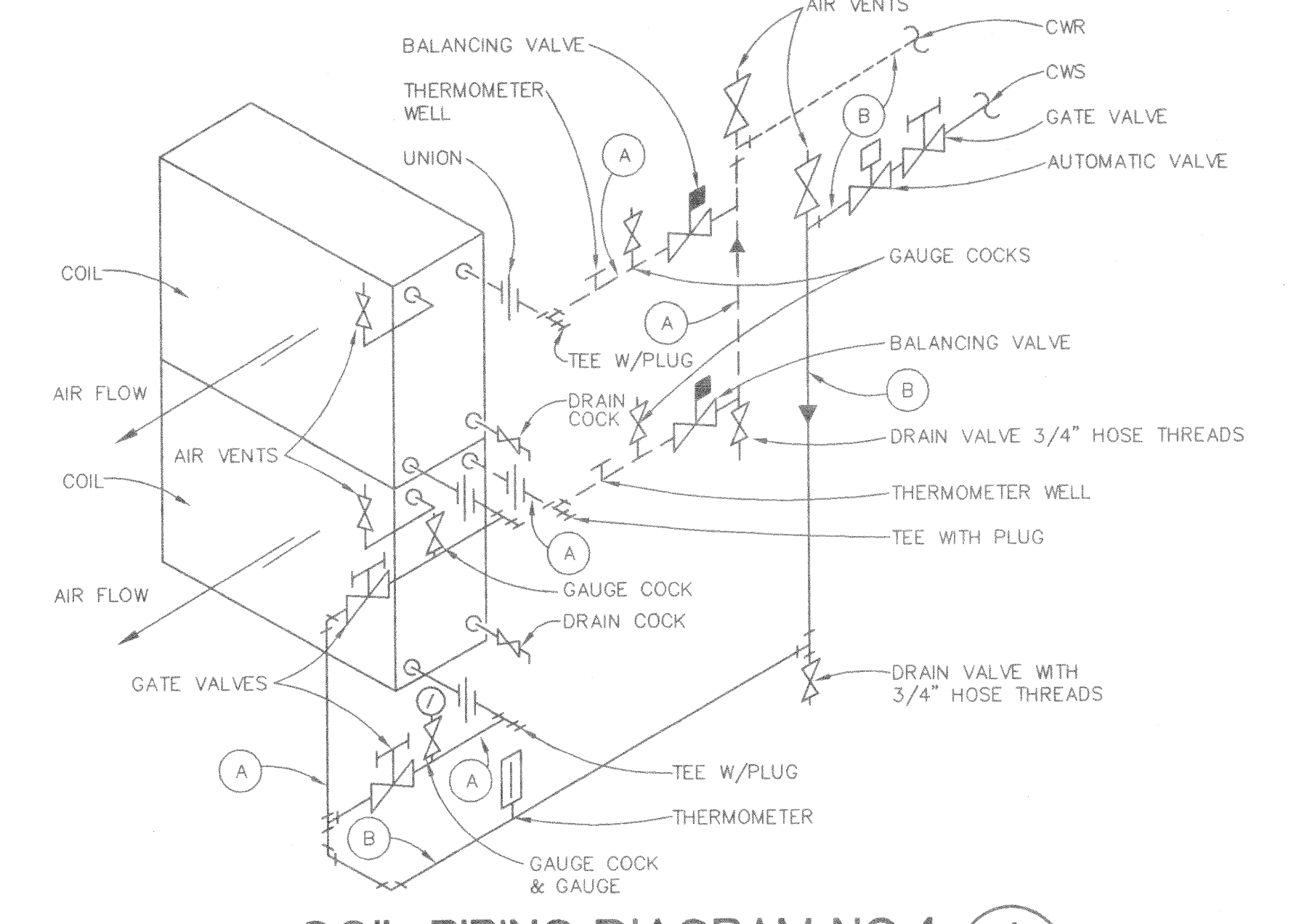
TYPICAL PIPING DIAGRAM FOR THE FOLLOWING:
1. CHILLED WATER COILS FOR A.H. UNITS NO. 2, 3, 6, 7, 8, AND 9.
2. HOT WATER COIL FOR A.H. UNIT NO. 7 AND 8.



COIL PIPING DIAGRAM NO.3
NO SCALE

3
M501

TYPICAL PIPING DIAGRAM FOR THE FOLLOWING:
1. HEATING COILS FOR A.H. UNITS NO. 2, 3, 6, AND 9.

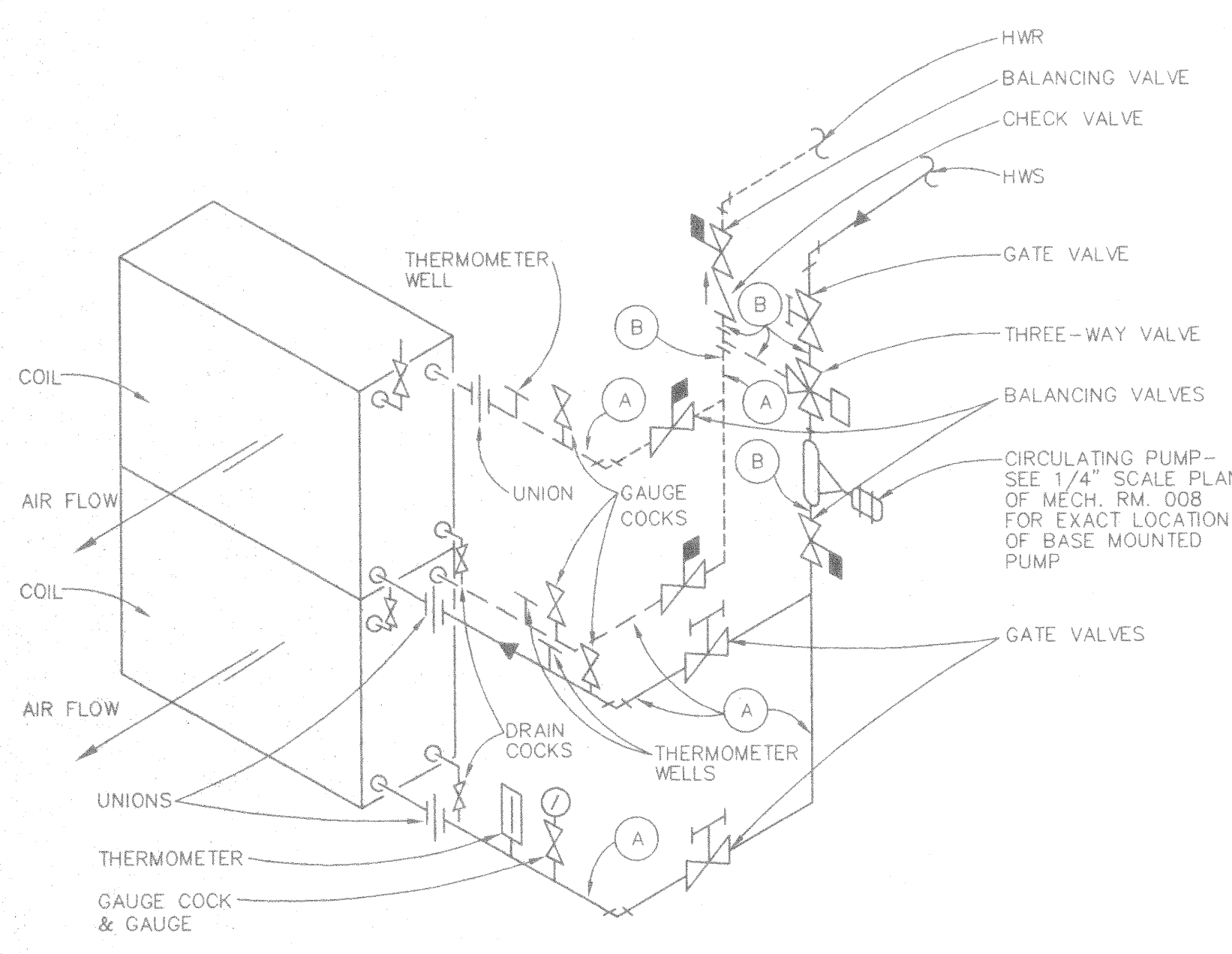


COIL PIPING DIAGRAM NO.4
NO SCALE

4
M501

TYPICAL PIPING DIAGRAM FOR THE FOLLOWING:
1. CHILLED WATER COIL NO. 5.

PIPE SIZE SCHEDULE - COIL PIPING DIAGRAM NO. 4		
AIR HANDLING UNIT NO.	A	B
5	3	4

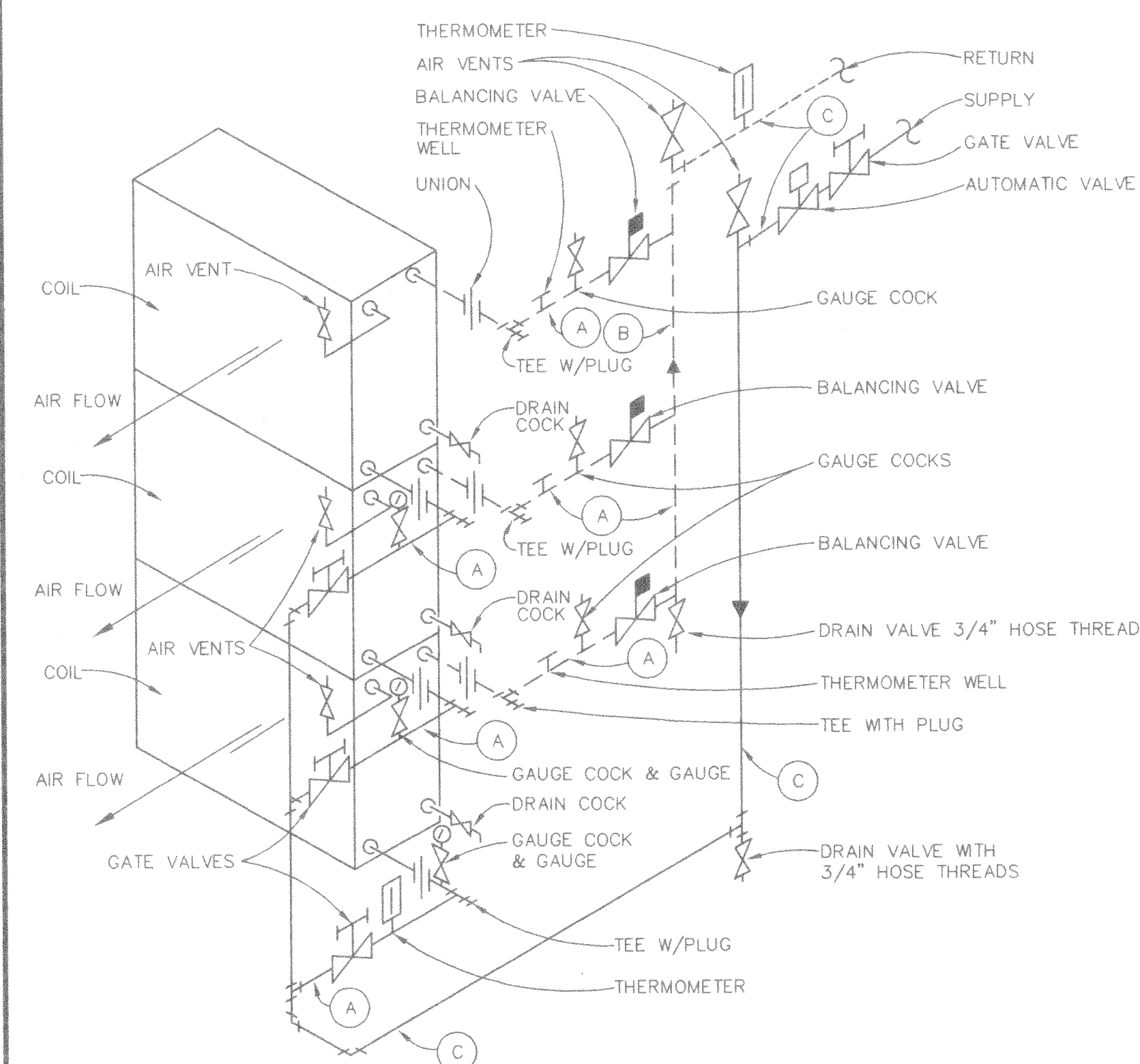


COIL PIPING DIAGRAM NO.5
NO SCALE

5
M501

TYPICAL PIPING DIAGRAM FOR THE FOLLOWING:
1. HEATING COILS FOR A.H. UNIT NO. 5.

PIPE SIZE SCHEDULE - COIL PIPING DIAGRAM NO. 5		
AIR HANDLING UNIT NO.	A	B
5	2 1/2	4

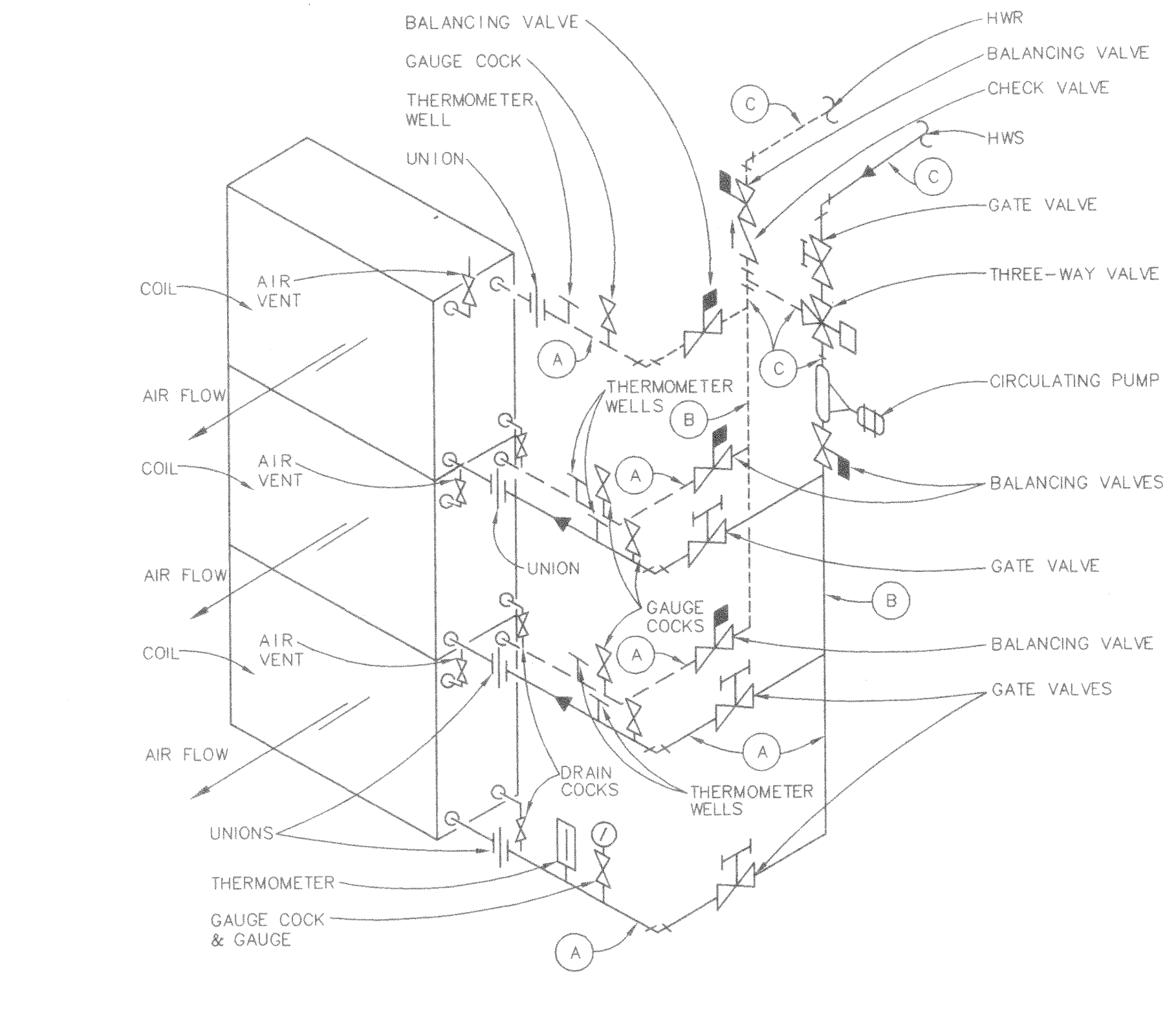


COIL PIPING DIAGRAM NO.6
NO SCALE

6
M501

TYPICAL PIPING DIAGRAM FOR THE FOLLOWING:
1. CHILLED WATER COILS FOR A.H. UNITS NO. 1 AND NO. 4.

PIPE SIZE SCHEDULE - COIL PIPING DIAGRAM NO. 6			
AIR HANDLING UNIT NO.	A	B	C
4	2 1/2	3	4



COIL PIPING DIAGRAM NO.7
NO SCALE

7
M501

TYPICAL PIPING DIAGRAM FOR THE FOLLOWING:
1. HEATING COILS FOR A.H. UNITS NO. 1 AND NO. 4.

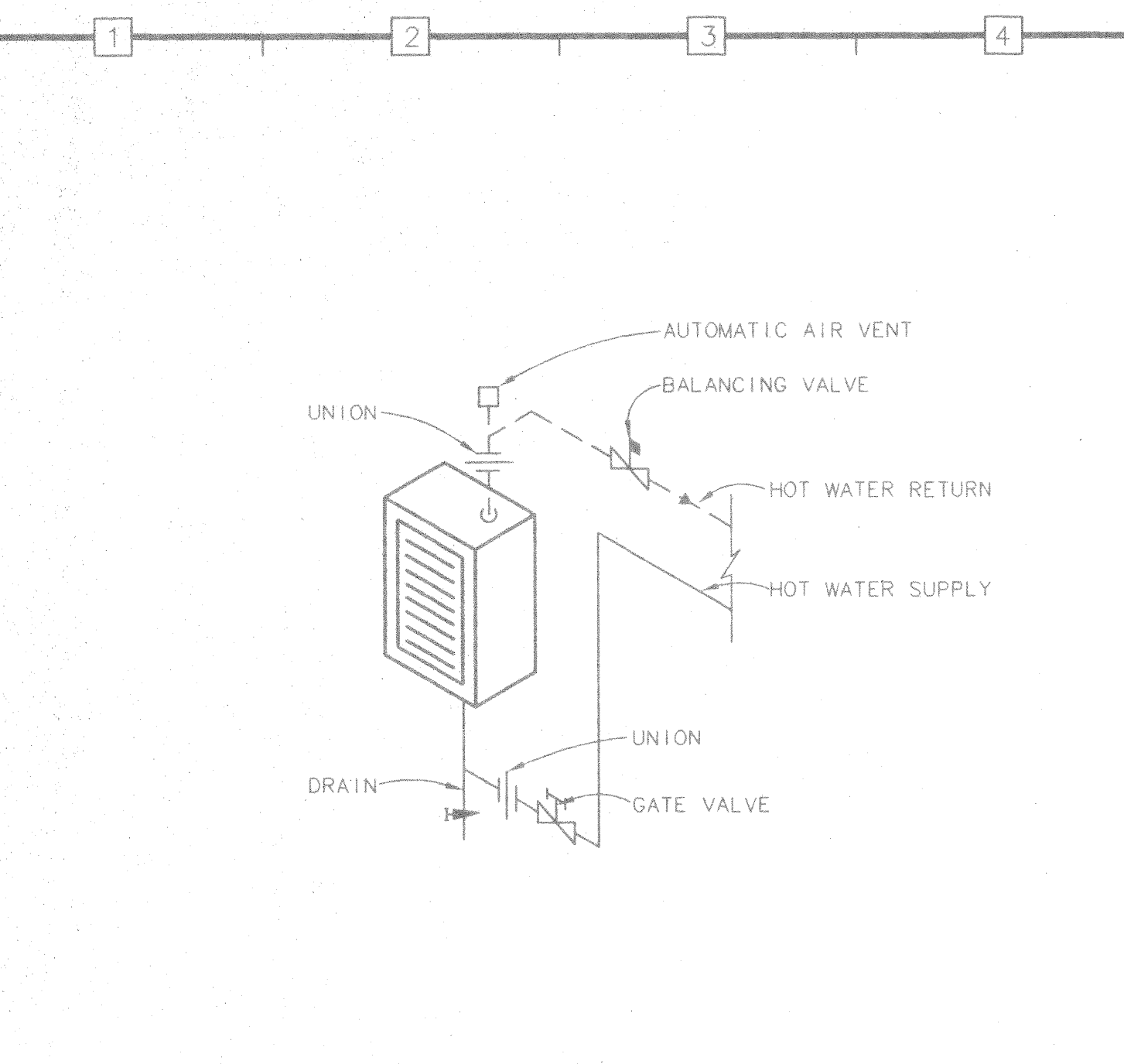
PIPE SIZE SCHEDULE - COIL PIPING DIAGRAM NO. 7			
AIR HANDLING UNIT NO.	A	B	C
1	1 1/2	2 1/2	3
4	1 1/4	1 1/2	2

H.V.A.C. DETAILS

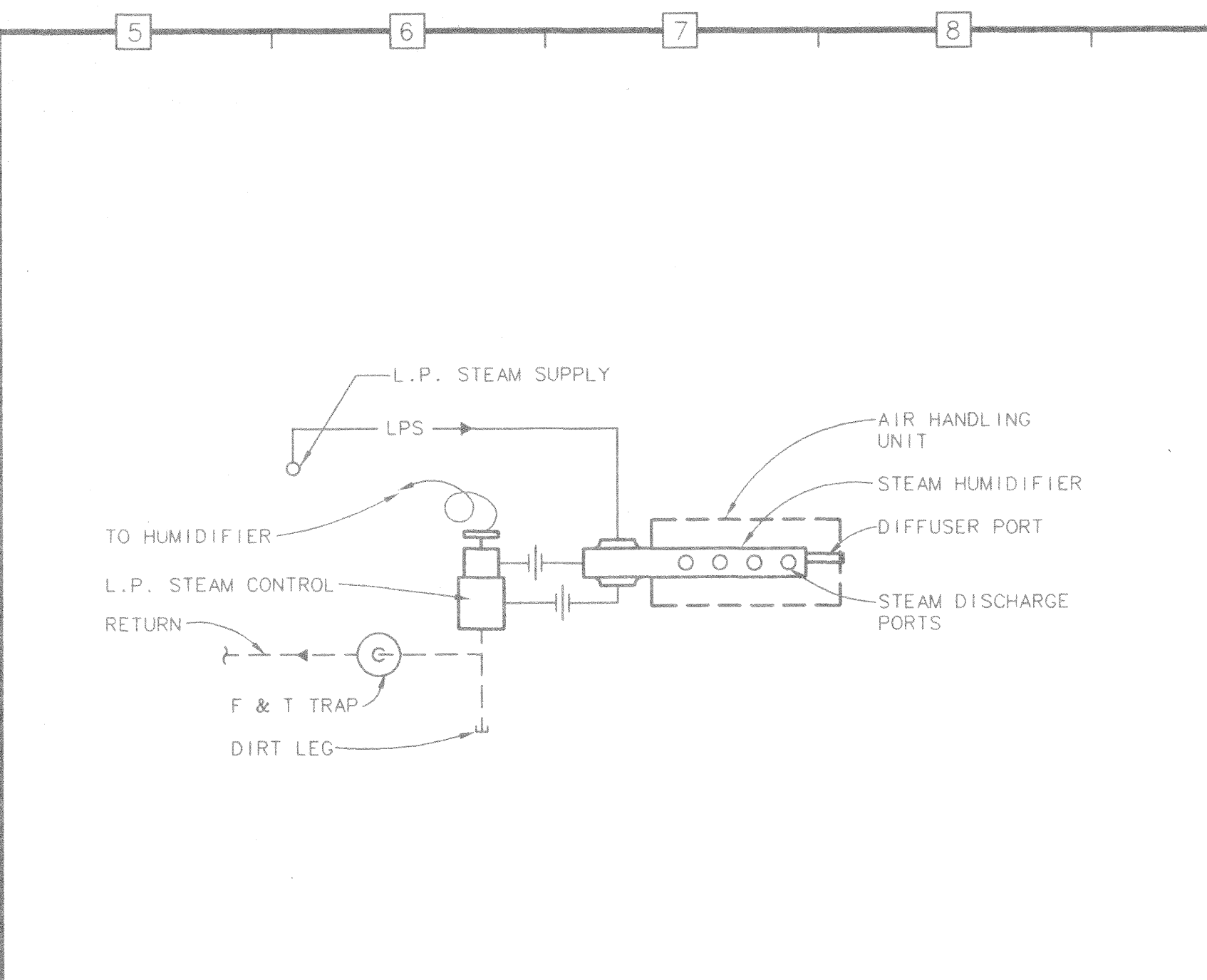
SCALE: NONE

<table border="1"> <tr><th>REVISIONS</th><th>DATE</th></tr> <tr><td>1</td><td></td></tr> <tr><td>2</td><td></td></tr> <tr><td>3</td><td></td></tr> <tr><td>4</td><td></td></tr> <tr><td>5</td><td></td></tr> </table>	REVISIONS	DATE	1		2		3		4		5		<p>UNIVERSITY OF LOUISVILLE ACADEMIC BUILDING PHASE FIVE</p> <p>DATE: 12-17-93 DRAWN BY: M.B.D. CHECKED BY: J.H.R. PROJ. ARCH: R.A. DOCKERY 10,211</p>	<p>LOUIS & HENRY GROUP 101 S. NIGHT AT MAIN, LOUISVILLE, KY 40208</p> <p>E.R. RONALD & ASSOC., SENLER-CAMPBELL & ASSOC., INC. EARL WALLS ASSOCIATES, SKEES ENGINEERING, INC. MONK DUNSTONE ASSOCIATES, INC.</p> <p>UNIVERSITY OF LOUISVILLE OFFICE OF FACILITIES MANAGEMENT LOUISVILLE, KENTUCKY 40292 (502) 538-6167</p> <p>H.V.A.C. DETAILS</p>	<p>RECORD DATE</p> <p>UNIVERSITY FILE NO.</p> <p>DRAWING NO. M501</p> <p>AGENCY AUTHORIZATION</p> <p>APPROVAL FOR PROGRAM CONCEPT ONLY</p>
REVISIONS	DATE														
1															
2															
3															
4															
5															

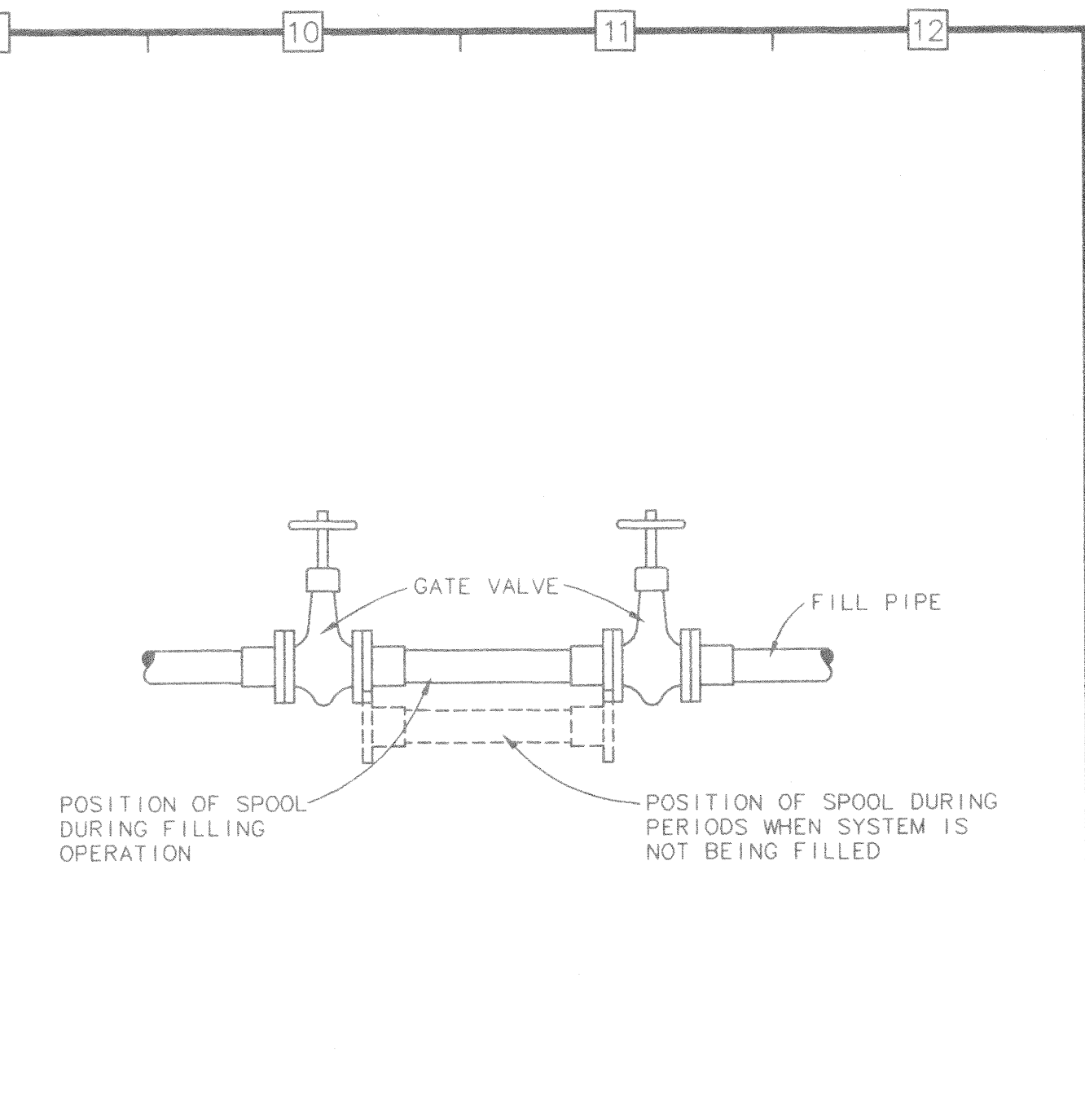
P: 10/20/95 01:12:14-93 05 28



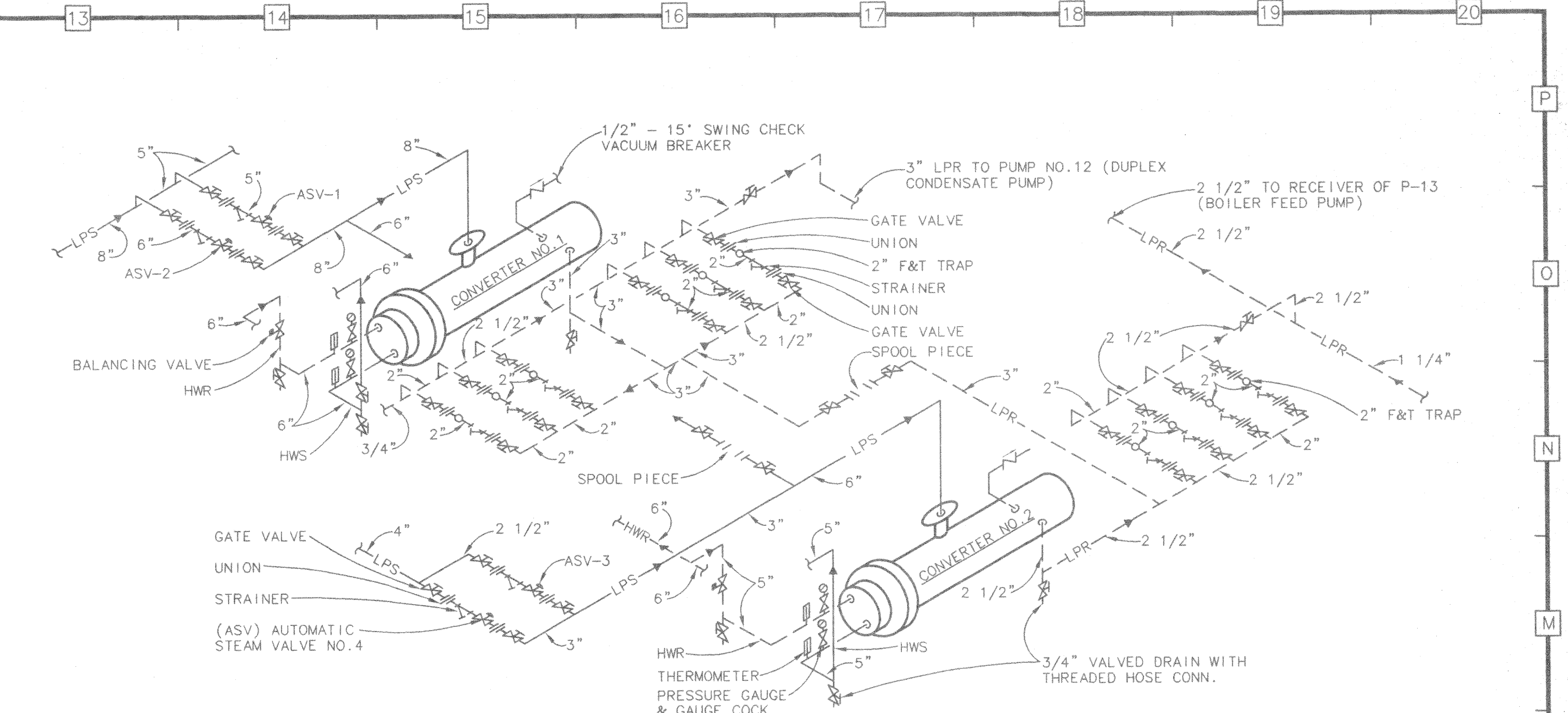
TYPICAL DETAIL OF HORIZONTAL UNIT HEATER CONNECTIONS
NO SCALE



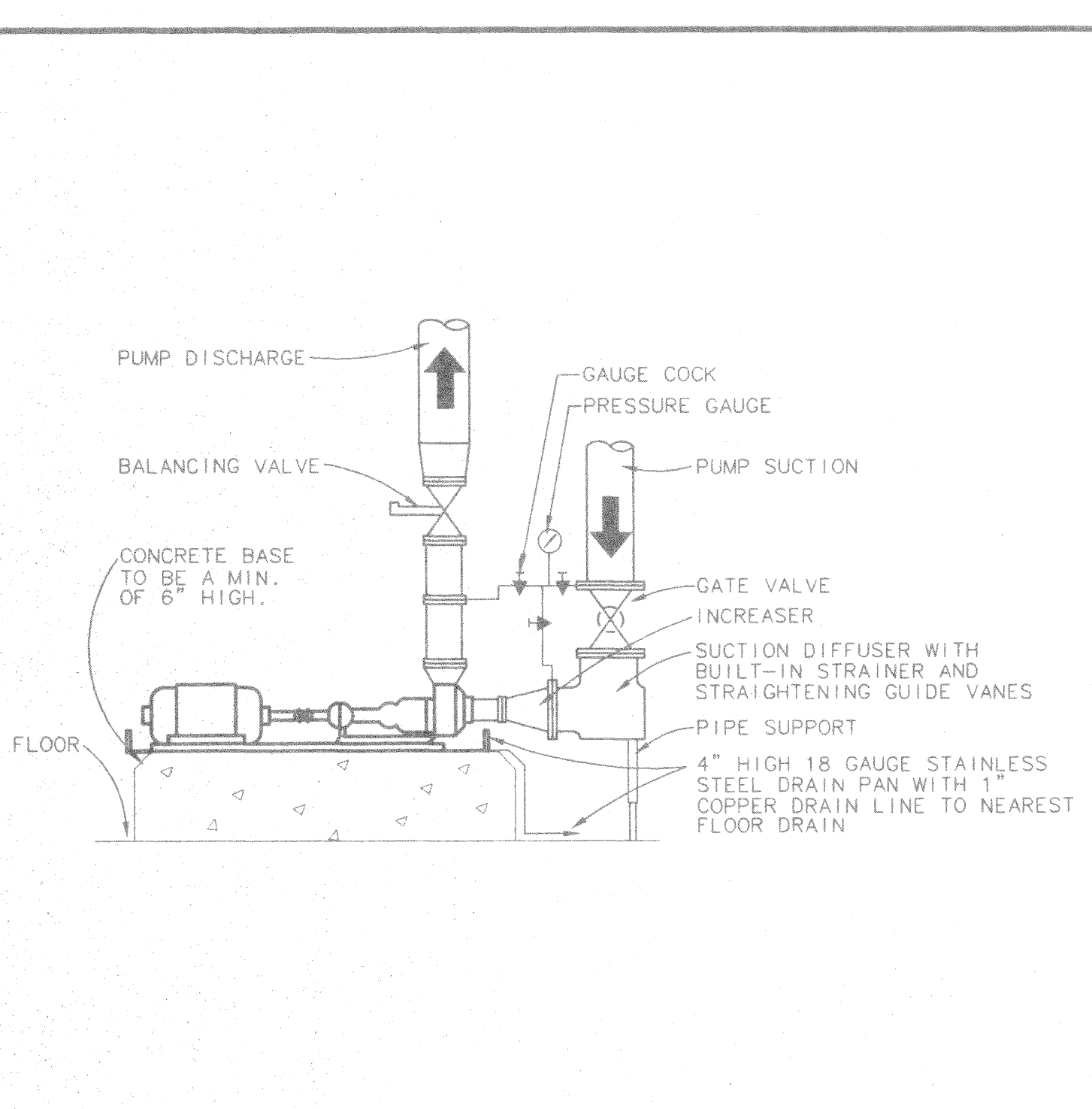
TYPICAL CONNECTION TO STEAM TYPE HUMIDIFIER (HORIZONTAL TYPE)
NO SCALE



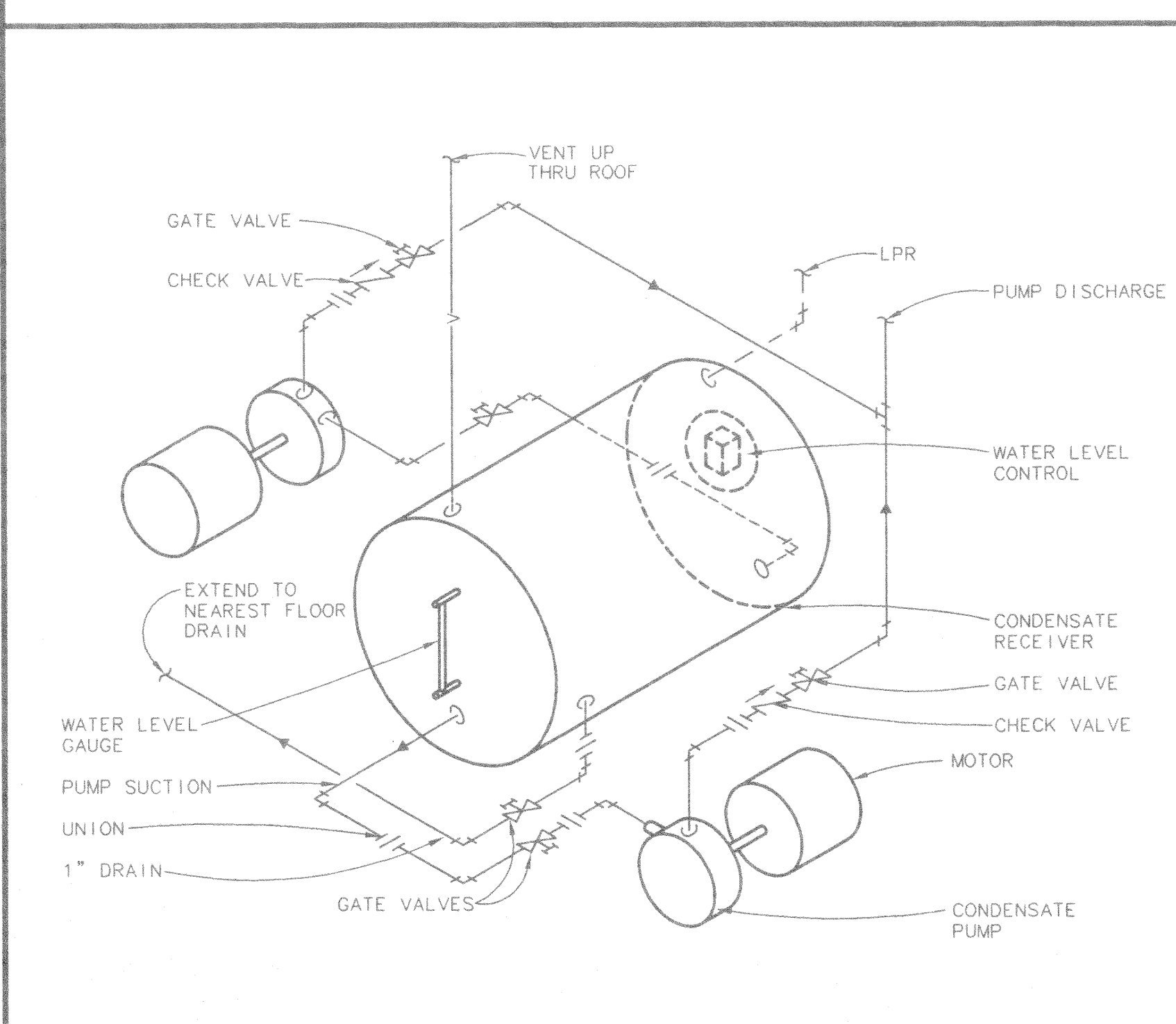
DETAIL OF SPOOL PIECE
NO SCALE



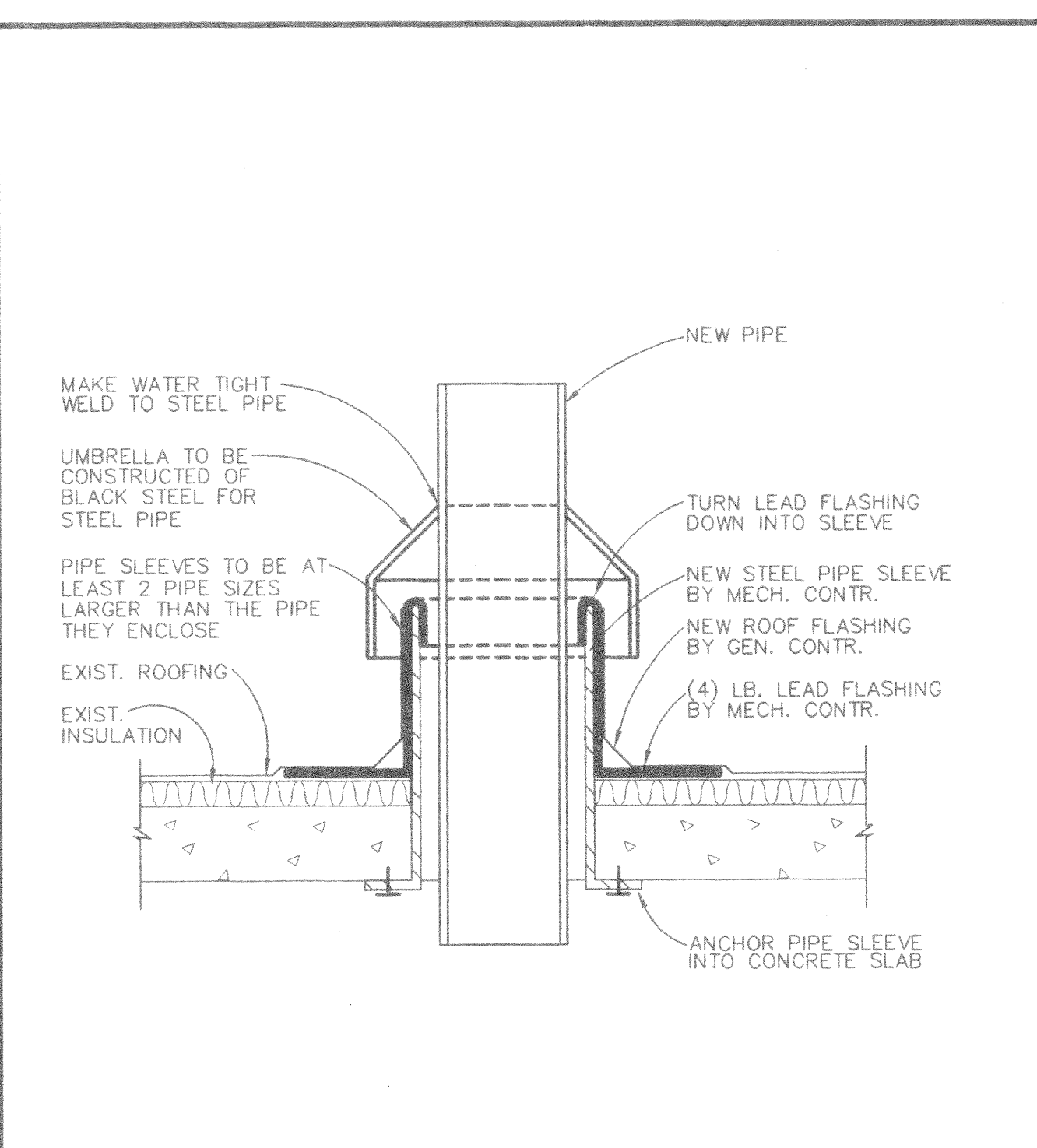
CONVERTER NO. 1 AND NO. 2 SCHEMATIC PIPING DIAGRAM
NO SCALE



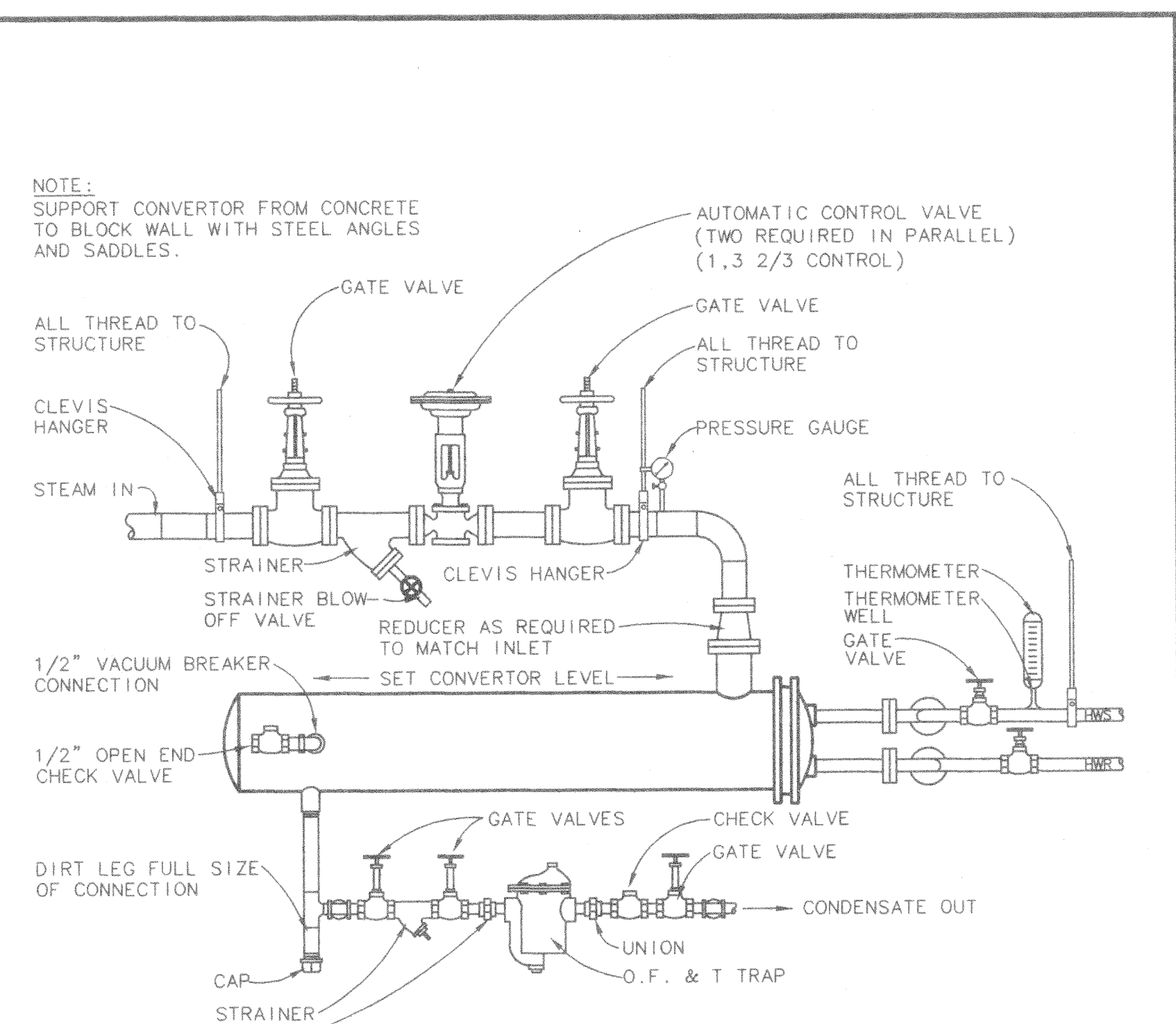
DETAIL OF END SUCTION PUMP
NO SCALE



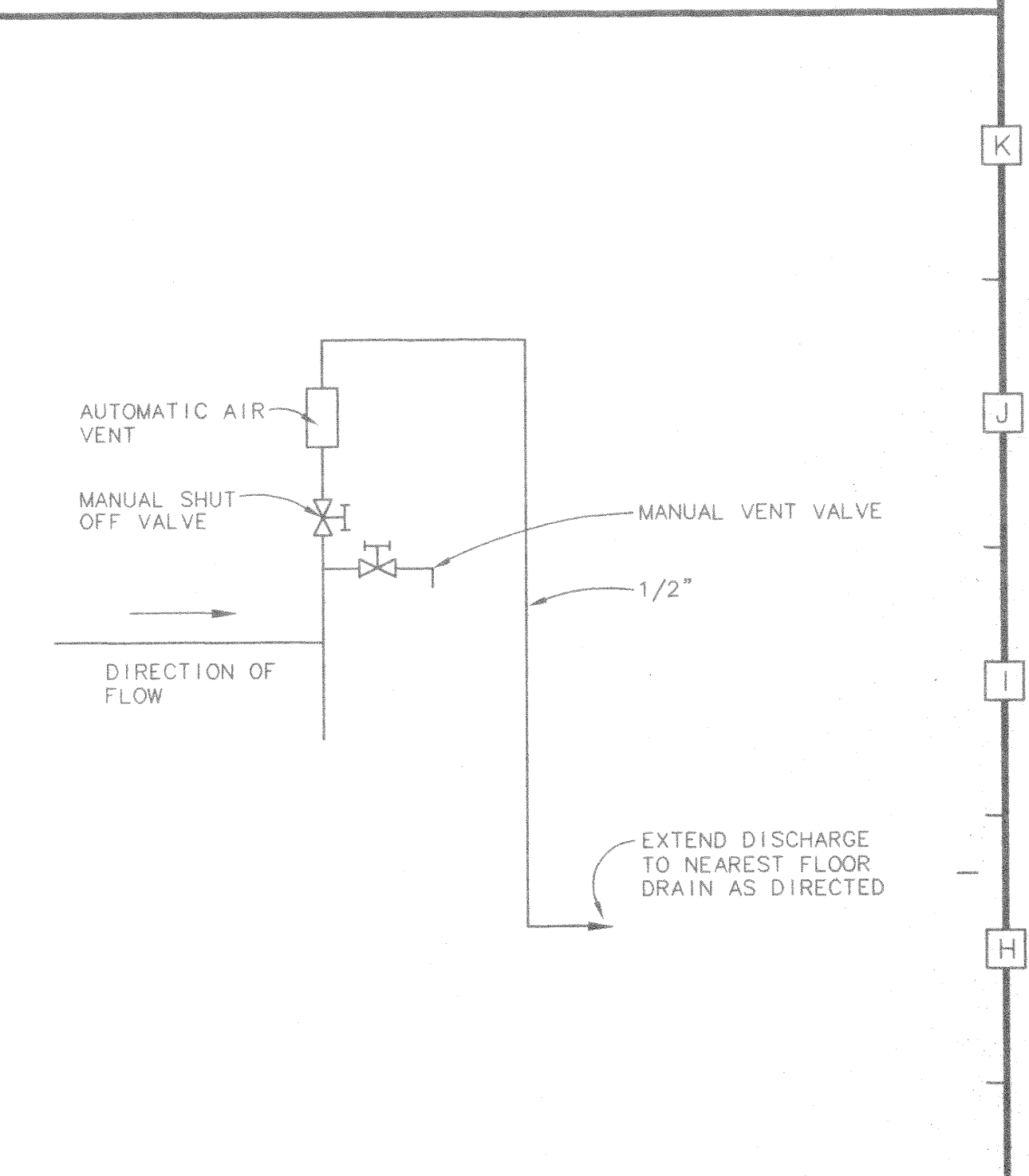
DETAIL OF PIPING DIAGRAM FOR DUPLEX CONDENSATE PUMP AND RECEIVER
NO SCALE



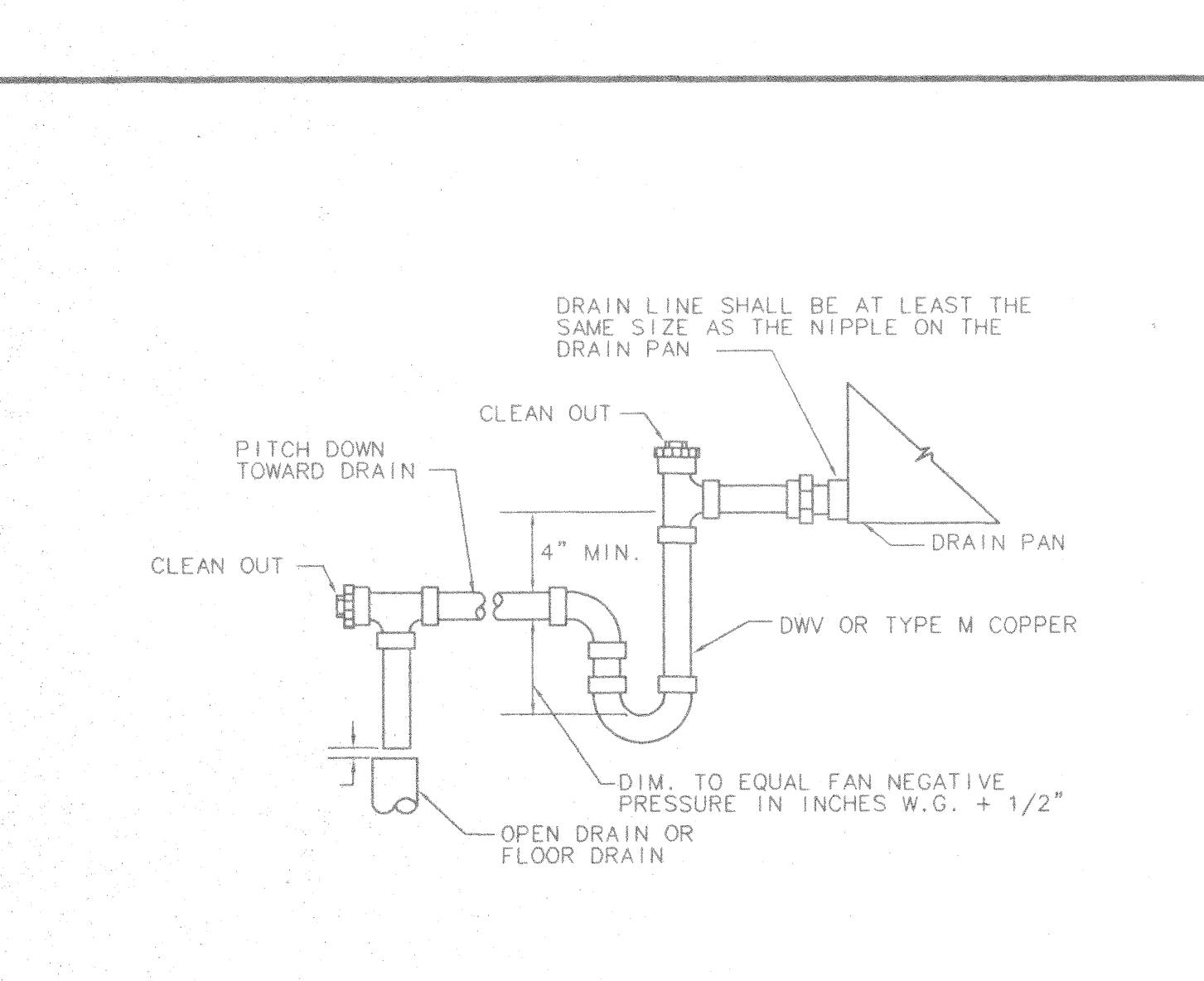
DETAIL OF PIPE THRU ROOF
NO SCALE



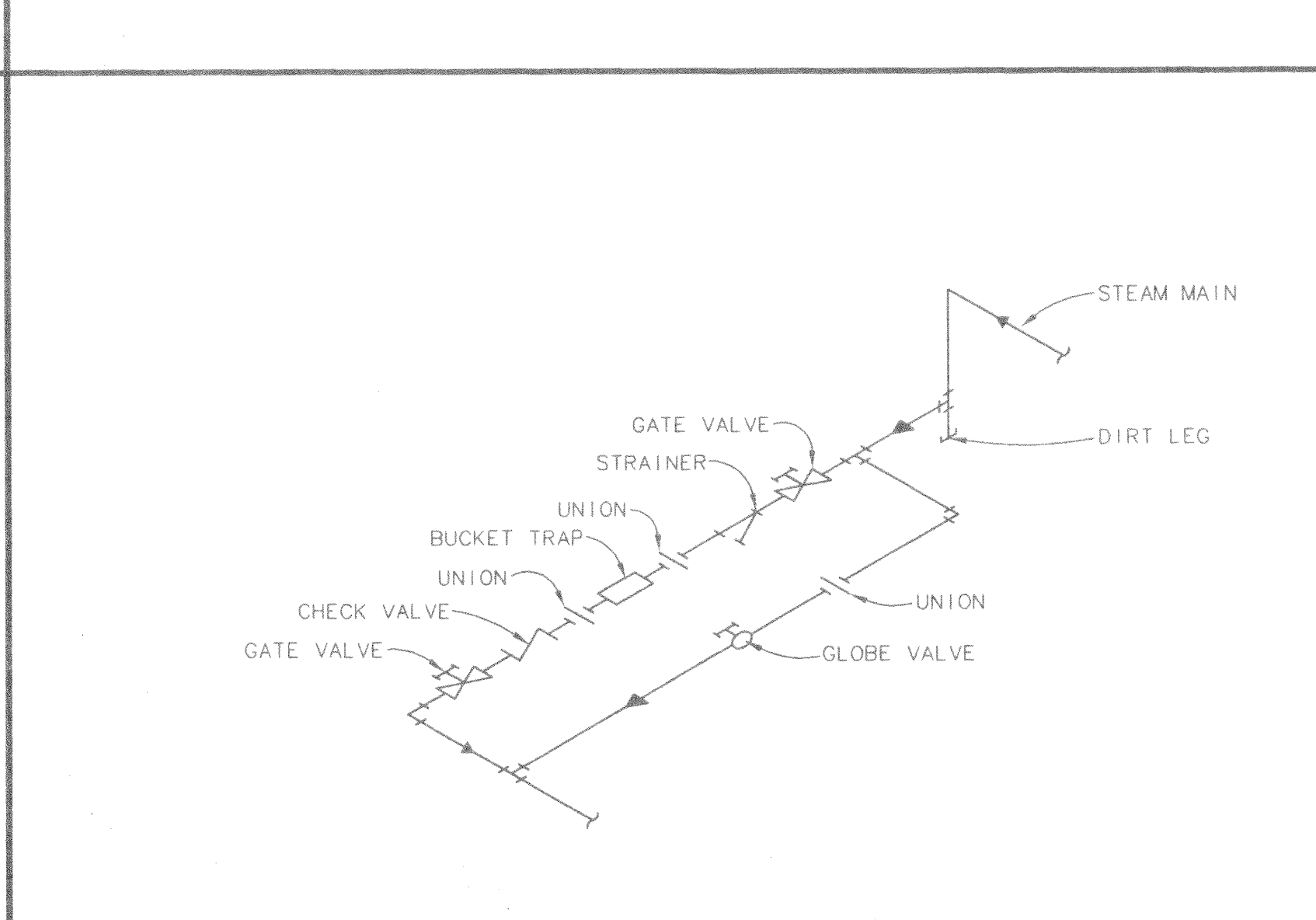
CONVERTER PIPING AND SUPPORT DETAIL
NO SCALE



DETAIL OF AUTOMATIC AND MANUAL AIR VENT
NO SCALE



CONDENSATE DRAIN TRAP DETAIL
NOT TO SCALE

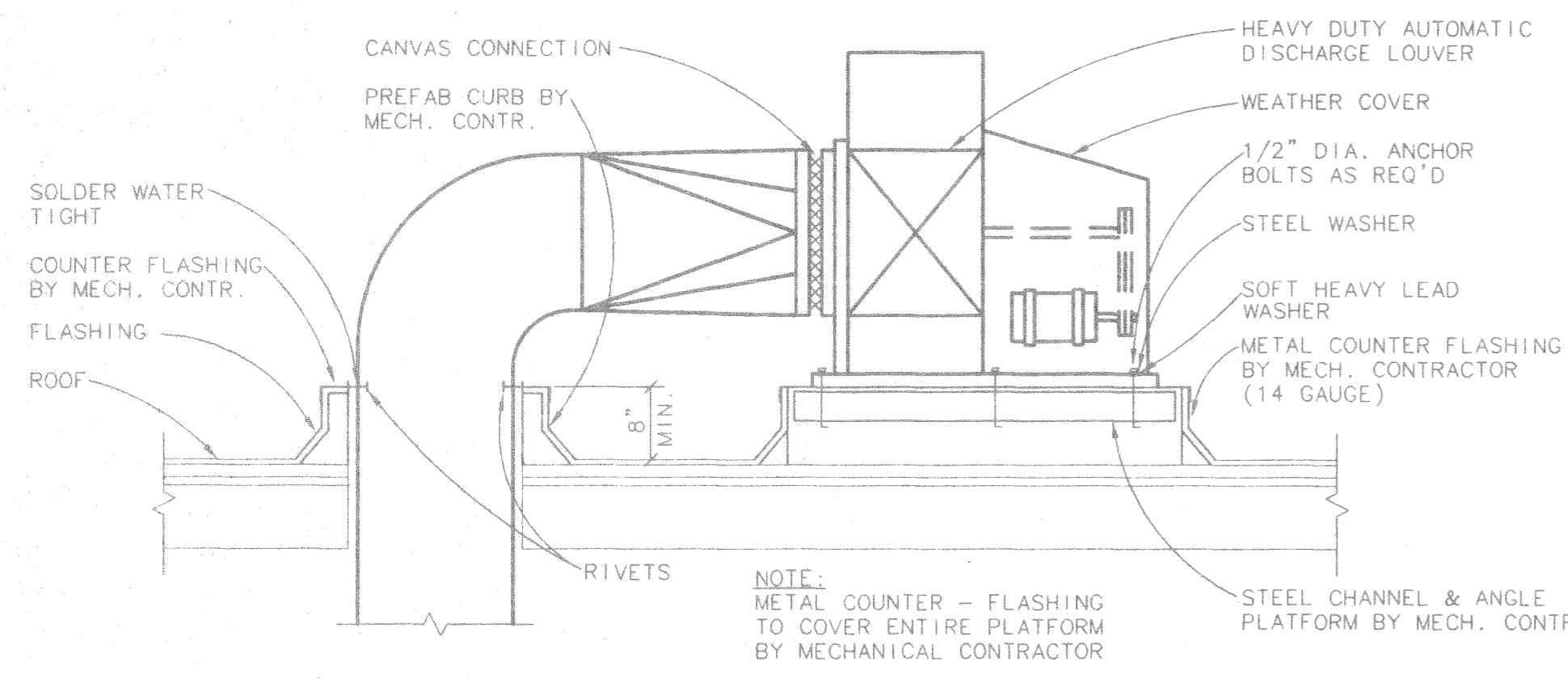


HIGH PRESSURE AND MEDIUM PRESSURE DRIP STEAM MAIN
NO SCALE

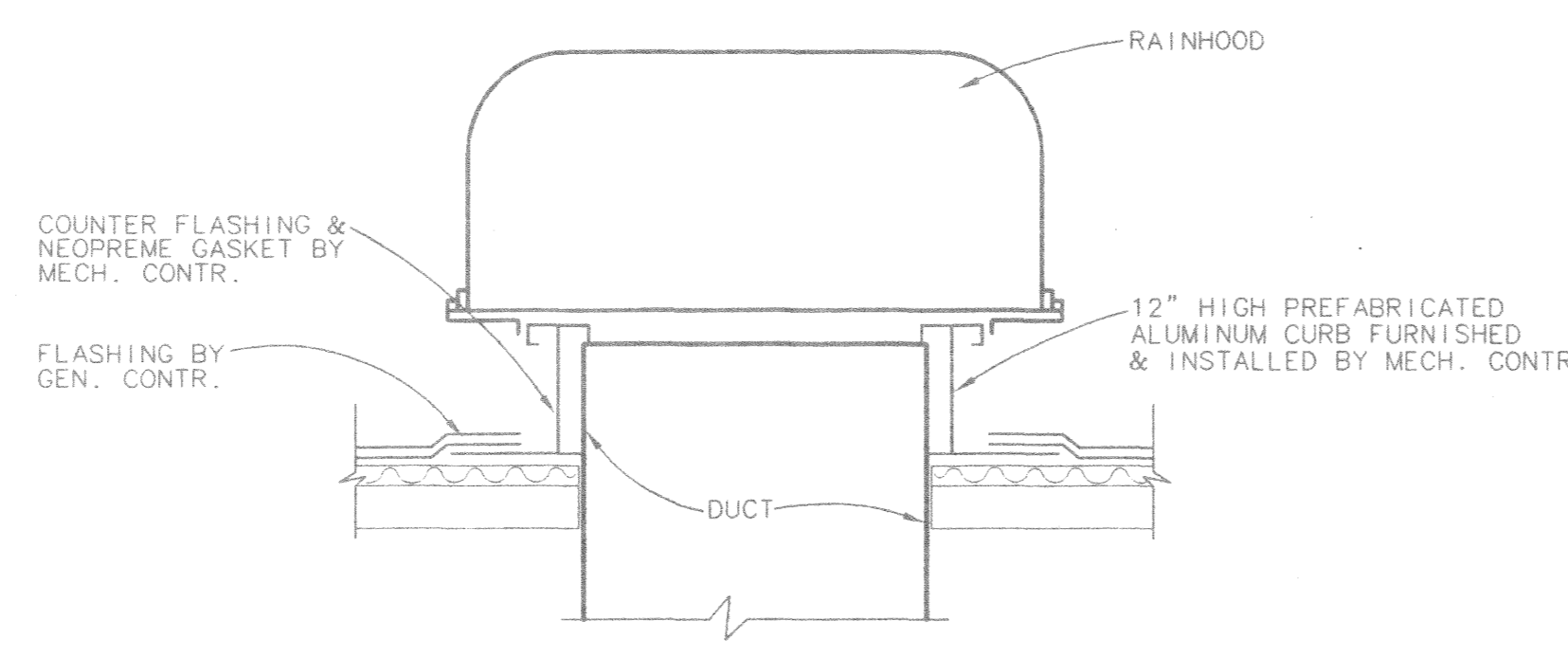
H.V.A.C. DETAILS
SCALE: NONE

UNIVERSITY OF LOUISVILLE ACADEMIC BUILDING
PHASE FIVE

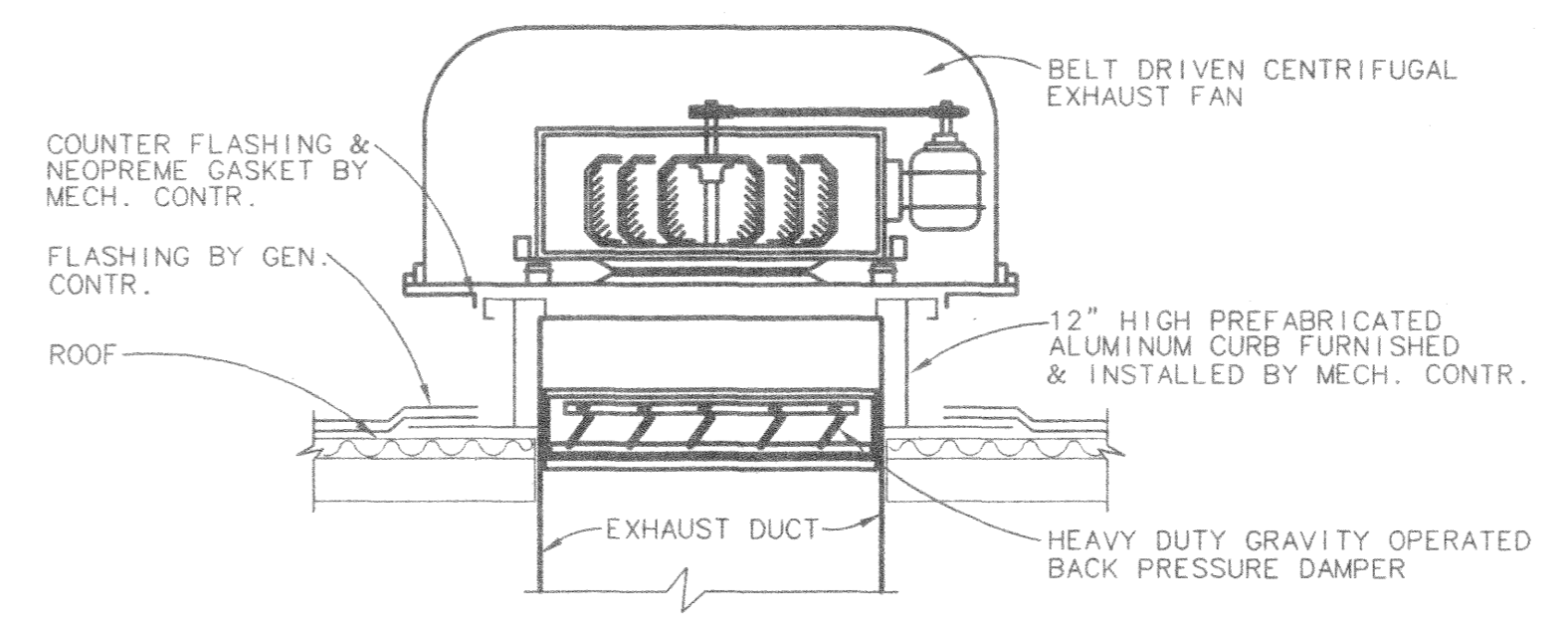
REVISIONS	DATE	UNIVERSITY OF LOUISVILLE ACADEMIC BUILDING PHASE FIVE	
1		DATE 12-17-93	RECORD DATE
2		DRAWN BY M.B.D.	UNIVERSITY FILE NO.
3		CHECKED BY J.H.R.	PROJ. ARCH. UNIVERSITY OF LOUISVILLE OFFICE OF FACILITIES MANAGEMENT LOUISVILLE, KENTUCKY 40292 (502) 588-6167
4		A & E FILE NO.	DRAWING NO. M502
5		AGENCY AUTHORIZATION	APPROVAL FOR PROGRAM CONCEPT ONLY



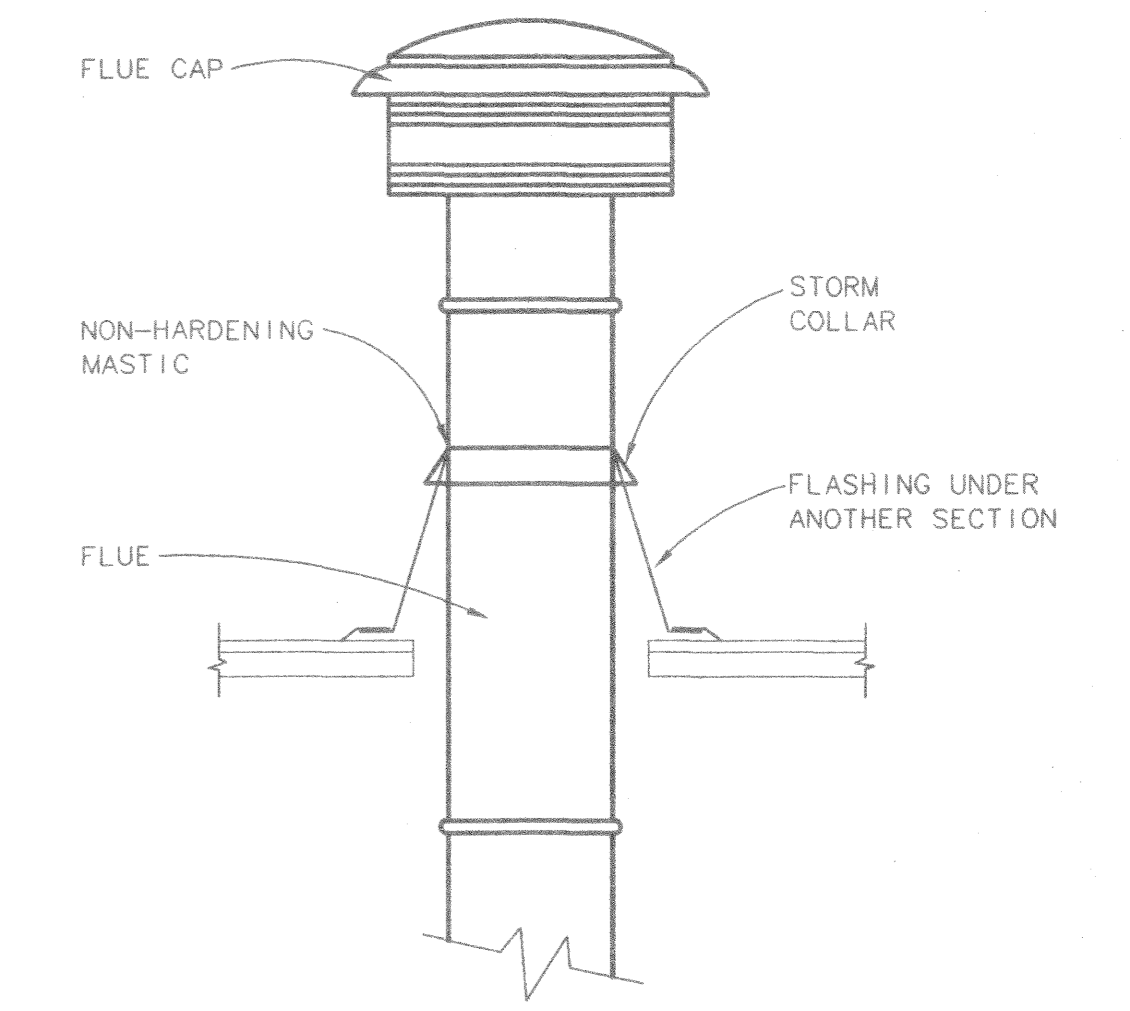
DETAIL OF UTILITY SET TYPE EXHAUST FAN ON ROOF
NO SCALE
M503



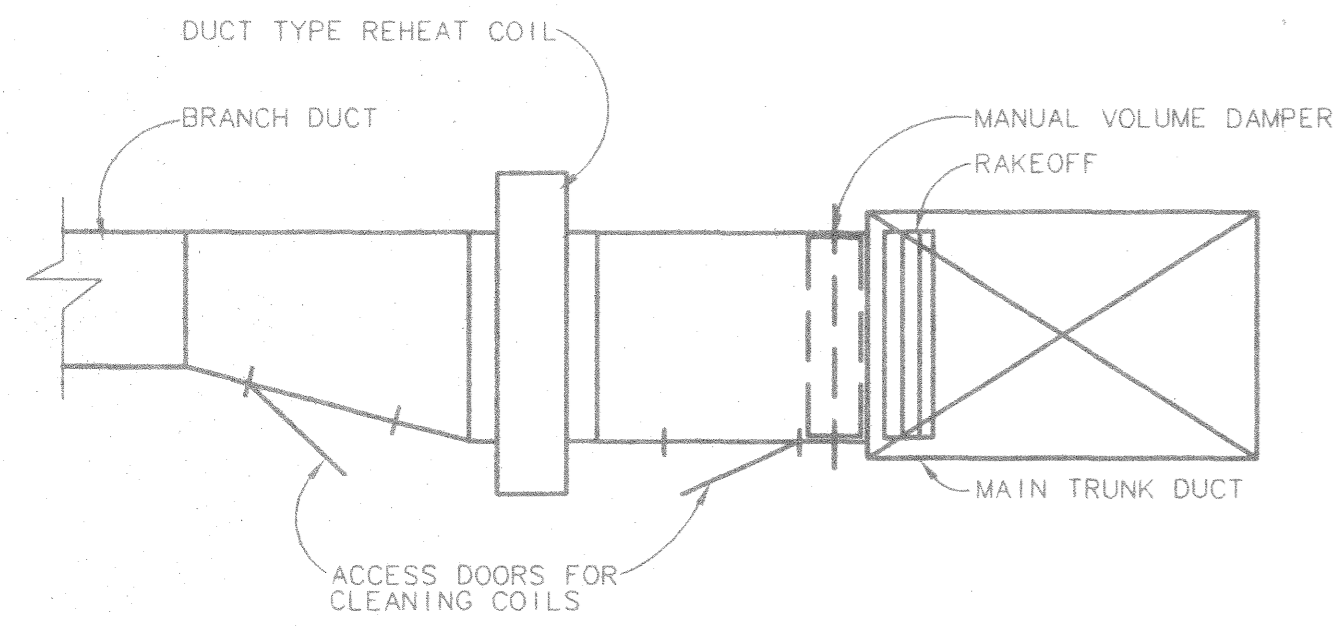
DETAIL OF RAINHOOD
NO SCALE
M503
NOTE: ALL CURBS SHALL BE BUILT TO FIT SLOPE OF ROOF



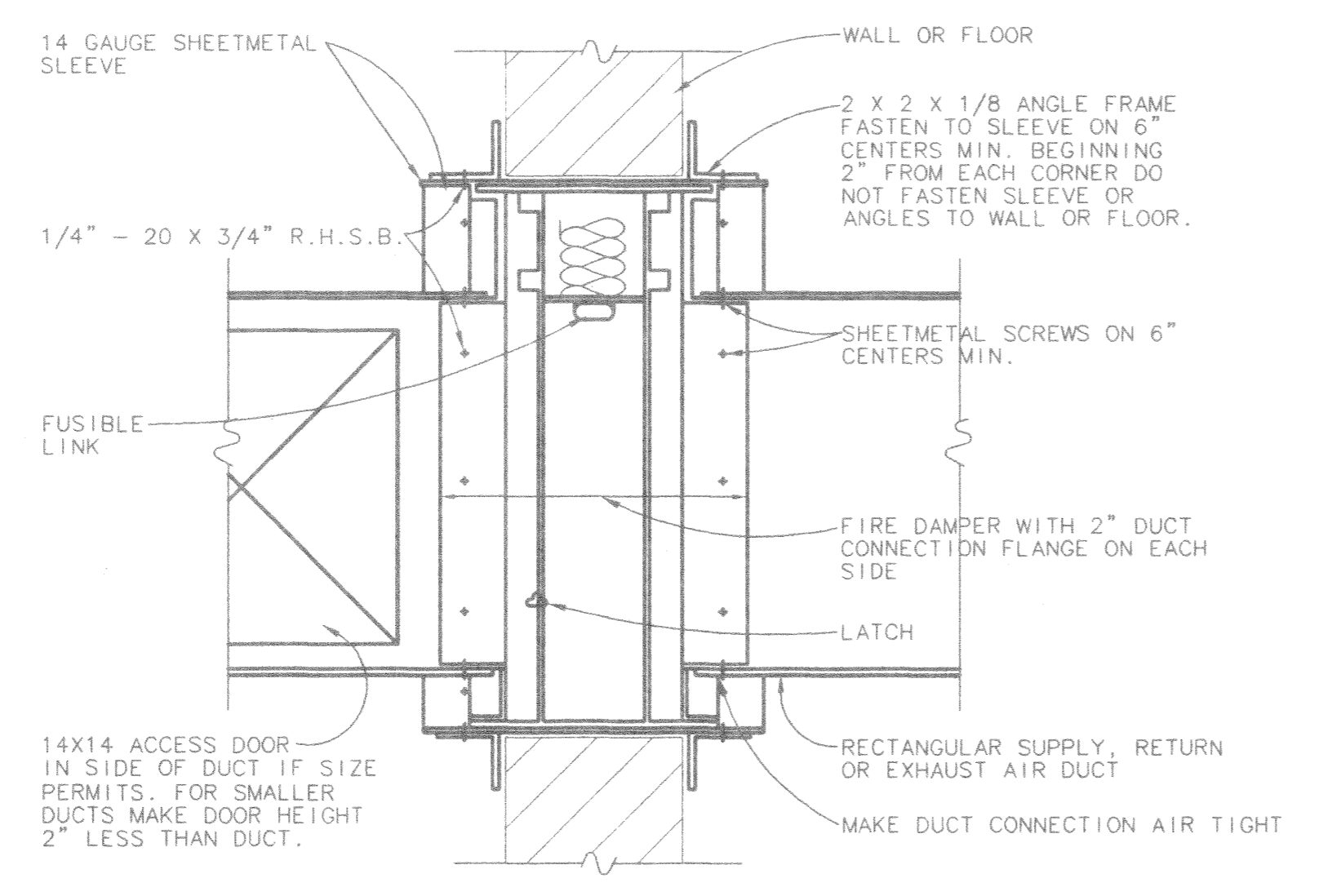
DETAIL OF CENTRIFUGAL EXHAUST FAN
NO SCALE
M503



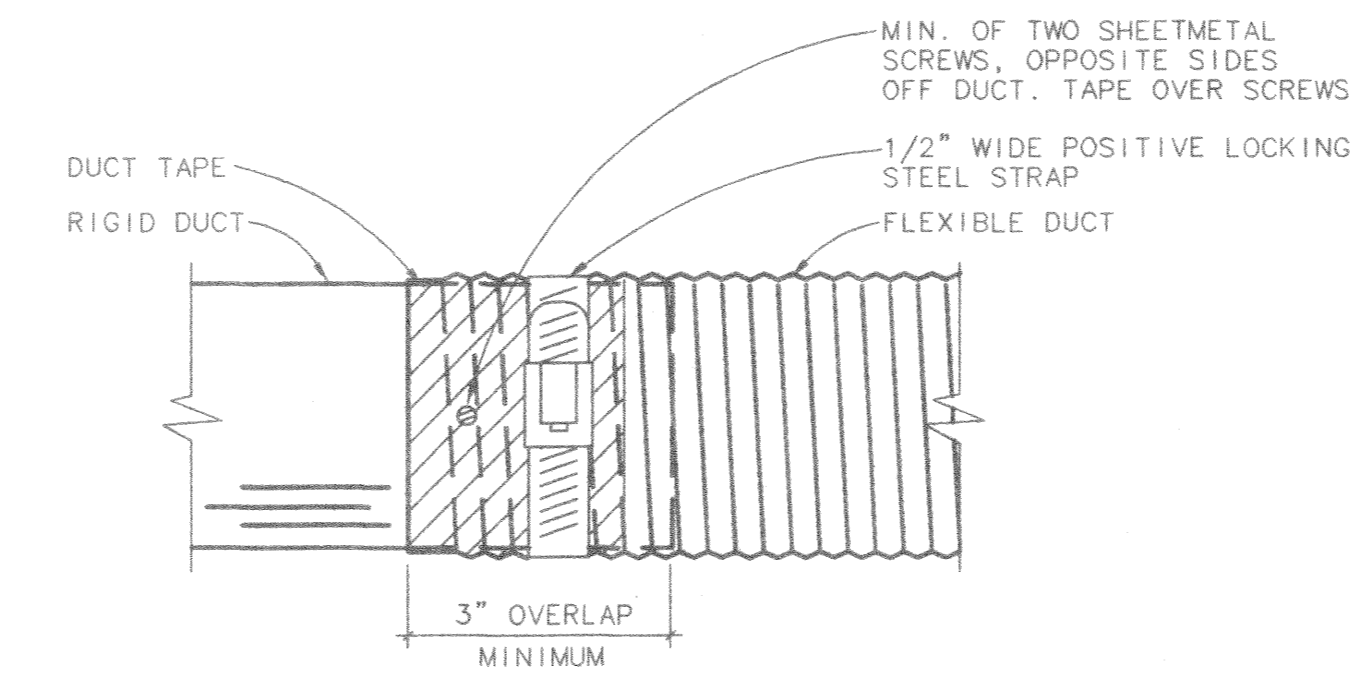
DETAIL OF FLUE THRU ROOF
NO SCALE
M503



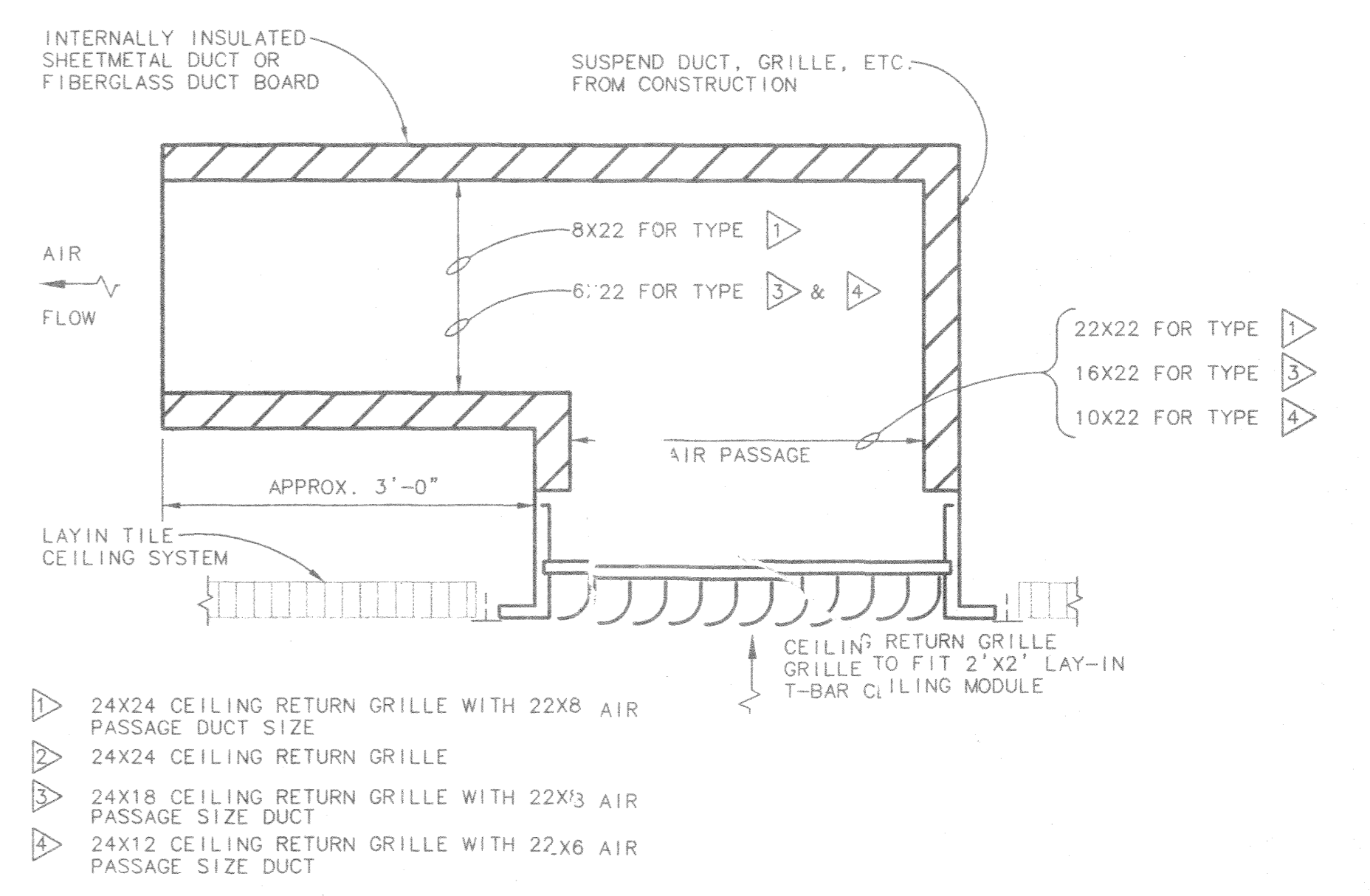
TYPICAL REHEAT COIL DUCT CONNECTION
NO SCALE
M503



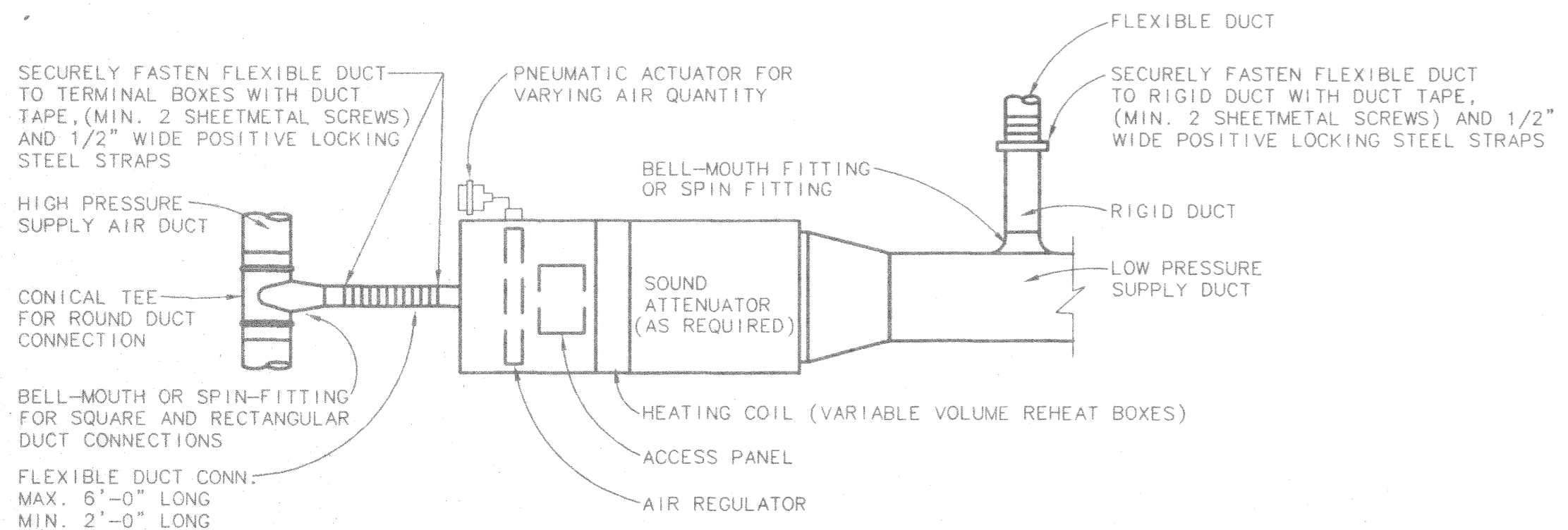
DETAIL OF FIRE DAMPER
NO SCALE
M503



DETAIL OF FLEXIBLE TO RIGID DUCT CONNECTION
NO SCALE
M503



DETAIL OF CEILING RETURN GRILLE
NO SCALE
M503



TYPICAL DETAIL OF SINGLE DUCT VARIABLE VOLUME BOXES
NO SCALE
M503

REVISIONS		DATE	UNIVERSITY OF LOUISVILLE ACADEMIC BUILDING PHASE FIVE	
1			DATE	RECORD DATE
2			12-17-93	
3				
4				
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			LOUIS & HENRY GROUP 101 S. EIGHTH AT MAIN, LOUISVILLE, KY 40202 E.R. RONALD & ASSOC., SENIOR-CAMPBELL & ASSOC., INC. EARL WALLS ASSOCIATES, SEES ENGINEERING, INC. MONK DUNSTON ASSOCIATES, INC.	UNIVERSITY FILE NO.
DRAWN BY M.B.D. CHECKED BY J.H.R. PROJ. ARCH. R.A. DOCKERY 10,211 A & E FILE NO.			UNIVERSITY OF LOUISVILLE OFFICE OF FACILITIES MANAGEMENT LOUISVILLE, KENTUCKY 40202 (502) 588-6167 HVAC DETLS	DRAWING NO. M503
AGENCY AUTHORIZATION			APPROVAL FOR PROGRAM CONCEPT ONLY	DATE