MECHANICAL SYMBOLS

GENERAL MECHANICAL SYMBOLS

- KEYNOTE TAG
  1. KEYNOTE NUMBER 1, 2, 3...
  2. DEMOLITION KEYNOTE LETTER A, B, C...
- MECHANICAL EQUIPMENT TAG
  1. MECHANICAL EQUIPMENT TYPE
  2. EQUIPMENT NUMBER
- DETAIL TAG
  1. DETAIL NUMBER
  2. SHEET NUMBER
- SECTION TAG
  1. SECTION NUMBER
  2. SHEET NUMBER
- LINETYPE INDICATES NEW DUCTWORK AND PIPING
- LINETYPE INDICATES EXISTING DUCTWORK AND PIPING TO BE REMOVED
- LINETYPE INDICATES EXISTING DUCTWORK AND PIPING TO REMAIN
- NEW WORK CONNECTION

HVAC PIPING SYMBOLS

- GATE VALVE (OR OTHER TYPE VALVE WHERE SPECIFIED)
- GLOBE VALVE
- CHECK VALVE
- 3-WAY VALVE
- 3-WAY PNEUMATIC CONTROL VALVE
- 3-WAY PNEUMATIC CONTROL VALVE WITH POSITIONER
- 4-WAY VALVE
- RELIEF VALVE
- PRESSURE REDUCING VALVE
- CONTROL VALVE-ELECTRONIC
- CONTROL VALVE-SOLENOID
- STRAINER
- THERMOMETER & SEPARABLE SOCKET
- PRESSURE GAUGE W/ GAUGE COCK
- DIAPHRAM VALVE
- ANGLE VALVE-VERTICAL
- ANGLE VALVE-HORIZONTAL
- UNION
- BALANCING VALVE
- CIRCUIT SETTER
- PLUG VALVE
- NEEDLE VALVE
- BUTTERFLY VALVE
- BALL VALVE
- PIPE RUN UP
- PIPE RUN DOWN
- PIPE DROP
- FLOW DIRECTION
- DN PITCH DIRECTION
- —LPS— LOW PRESSURE STEAM

HVAC PIPING SYMBOLS (CONTINUED)

- —LPC— LOW PRESSURE CONDENSATE
- —PC— PUMPED CONDENSATE
- —G— LOW PRESSURE NATURAL GAS
- —MU— MAKEUP WATER
- —HWS— HOT WATER SUPPLY
- —HWR— HOT WATER RETURN
- —RD— REFRIGERANT DISCHARGE
- —CWS— CONDENSER WATER SUPPLY
- —CWR— CONDENSER WATER RETURN
- —CHWS— CHILLED WATER SUPPLY
- —CHWR— CHILLED WATER RETURN
- —RD— REFRIGERANT DISCHARGE
- —RS— REFRIGERANT SUCTION
- —RL— REFRIGERANT LIQUID
- —GS— GLYCOL SUPPLY
- —GR— GLYCOL RETURN
- PIPE ANCHOR
- PIPE GUIDE
- EXPANSION JOINT
- EXPANSION LOOP
- FLEXIBLE CONNECTION
- REDUCER, CONCENTRIC
- REDUCER, ECCENTRIC
- AIR VENT, MANUAL
- AIR VENT, AUTOMATIC
- PRESSURE & TEMPERATURE TAP
- T STEAM TRAP

PLUMBING PIPING SYMBOLS

- —HW— POTABLE HOT WATER
- —HWR— POTABLE HOT WATER RETURN
- —CW— POTABLE COLD WATER
- —V— SANITARY VENT
- —SAN— SANITARY DRAIN
- —ST— STORM PIPING
- —S— SEWER
- WALL CLEANOUT
- FLOOR CLEANOUT
- FLOOR DRAIN
- ROOF DRAIN

FIRE PROTECTION PIPING SYMBOLS

- —F— FIRE STANDPIPE PIPING
- —SP— SPRINKLER PIPING
- —PA— PRE-ACTION PIPING
- —DLSP— DELUGE SPRINKLER PIPING

FIRE PROTECTION PIPING SYMBOLS (CONTINUED)

- —FS— FIRE SUPPRESSANT PIPING
- SLOPE CHANGE IN PIPE ELEVATION
- AC ALARM CHECK VALVE
- PA PRE-ACTION VALVE
- FIRE DEPARTMENT SIAMESE CONNECTION
- HOSE BIBB

VENTILATION SYMBOLS

- SUPPLY DUCT UP
- SUPPLY DUCT DOWN
- RETURN OR EXHAUST DUCT UP
- RETURN OR EXHAUST DUCT DOWN
- SUPPLY AIR TERMINAL
- RETURN AIR TERMINAL
- ROUND SUPPLY AIR TERMINAL
- SQUARE ELBOW WITH TURNING VANES
- SQUARE TO ROUND TRANSITION
- FLEXIBLE DUCT
- FLEXIBLE DUCT TURN
- VARIABLE AIR VOLUME BOX
- VARIABLE AIR VOLUME BOX W/ REHEAT
- BOOSTER COIL, DUCT MOUNTED
- DUCT SHOE WITH DAMPER
- THERMOSTAT / TEMPERATURE SENSOR
- HUMIDITY SENSOR
- VD VOLUME DAMPER
- M MOTORIZED DAMPER
- H MOTORIZED HALON DAMPER
- FIRE DAMPER
- TRANSFER DUCT W/REGISTERS
- DOOR TRANSFER GRILLE
- HVAC TERMINAL TAG (1 2 - 3)
  1. TERMINAL TYPE
  2. AIRFLOW CFM
  3. TERMINAL FUNCTION (S-SUPPLY, R-RETURN, E-EXHAUST, TR-TRANSFER)

MECHANICAL ABBREVIATIONS

A	AIR
AC	AIR COMPRESSOR
ACC	AIR COOLED CONDENSER
ACU	AIR CONDITIONING UNIT
AD	AIR DRYER
ADP	APPARATUS DEW POINT
AFC	AFTERCOOLER
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AI	ANALOG INPUT
AMS	AIR MONITORING SYSTEM
AO	ANALOG OUTPUT
AS	AIR SEPARATOR
ASV	AIR SOLENOID VALVE
ATM	ATMOSPHERE
AUTO	AUTOMATIC
AUX	AUXILIARY
AWT	AVERAGE WATER TEMPERATURE
BARO	BAROMETER (–TRIC)
BAROPR	BAROMETIC PRESSURE
BDD	BACK DRAFT DAMPER
BFP	BACKFLOW PREVENTER
BHP	BRAKE HORSEPOWER
BOD	BOTTOM OF DUCT
BOP	BOTTOM OF PIPE
BOT	BOTTOM OF TRAY
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNITS PER HOUR
CA	COMPRESSED AIR
CC	COOLING COIL
CCP	CENTRAL CONTROL PANEL
CD	CONDENSATE DRAIN
CFM	CUBIC FEET PER MINUTE
CFS	CUBIC FEET PER SECOND
CH	CABINET HEATER
CHWP	CHILLED WATER PUMP
CHWR	CHILLED WATER RETURN
CHWRR	CHILLED WATER REVERSE RETURN
CHWS	CHILLED WATER SUPPLY
CI	CAST IRON
CISP	CAST IRON SOIL (SEWER) PIPE
CLGLOAD	COOLING LOAD
CO	CARBON MONOXIDE, CLEANOUT
COMP	COMPRESSOR
COND	CONDENS(–ER, –ING, –ATION, –ATE)
CONN	CONNECT(ION)
CONT	CONTINU(E, ATION, OUS)
CT	COOLING TOWER
CTT	CHEMICAL TREATMENT TANK
CU	CONDENSING UNIT
CUIN	CUBIC INCH
Cv	COEFFICIENT, VALVE FLOW
CV	CONSTANT VOLUME, CONTROL VALVE
CW	COLD WATER
CWP	COLD POTABLE WATER PUMP
CWR	CONDENSER WATER RETURN
CWS	CONDENSER WATER SUPPLY
CWT	CONDENSER WATER TANK
DA	DISCHARGE AIR
DBT	DRY–BULB TEMPERATURE
DDC	DIRECT DIGITAL CONTROL
DG	DOOR GRILLE
DH	DOOR HEATER
DI	DIGITAL INPUT
DIF	DIFFERENCE, DELTA
DIFF	DIFFUSER
DIR	DIRECT
DN	DOWN
DO	DIGITAL OUTPUT
DP	DEW POINT
DPT	DIFFERENTIAL PRESSURE TRANSMITTER
DS	DUCT SILENCER, DOWNSPOUT
DT	DRAIN TILE
DTK	DIAPHRAGM TANK
DWG	DRAWING
DX	DIRECT EXPANSION
EAT	ENTERING AIR TEMPERATURE
ED	EXHAUST DISCHARGE
EF	EXHAUST FAN
EFF	EFFICIENCY
ER	EXHAUST RETURN
ESVCP	EXTRA STRONG VITREOUS CLAY PIPE
ET	ENTERING TEMPERATURE, EXPANSION TANK
EUH	ELECTRIC UNIT HEATER
EVAP	EVAPORATE (–E, –ING, –ED, –OR)
EWC	ELECTRIC WATER COOLER
EWT	ENTERING WATER TEMPERATURE
EXH	EXHAUST
EXP	EXPANSION
EXPL	EXPANSION LOOP
FA	FIRE ALARM
FAG	FIRE ALARM GONG
FCO	FLOOR CLEANOUT
FCU	FAN COIL UNIT
FD	FIRE DAMPER/FLOOR DRAIN
FDC	FIRE DEPARTMENT CONNECTION
FE	FIRE EXTINGUISHER
FEC	FIRE EXTINGUISHER CABINET
FH	FIRE HOSE
FHC	FIRE HOSE CABINET
FHE	FUME HOOD EXHAUST
FHR	FIRE HOSE RACK
FHYR	FIRE HYDRANT
FITG	FITTING
FIXT	FIXTURE
FL	FIRE LINE
FL	FLUID
FLA	FULL LOAD AMPS
FLG	FLANGE
FP	FIRE PROTECTION, FIRE PUMP
FP	FREEZING POINT
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FR	FLOW RATE
FS	FLOW SWITCH
FST	FREEZE STAT
FTR	FIN TUBE RADIATION
GALV	GALVANIZED
GD	GRAVITY DAMPER
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GPS	GALLONS PER SECOND
HB	HOSE BIB
HC	HEATING COIL
HCP	HEATING COIL PUMP
HEV	HAND EXPANSION VALVE
HG	MERCURY
HG	HEAT GAIN
HGR	HOT GAS REGULATOR
HI	HEIGHT OF INSTRUMENT
HP	HIGH POINT, HORSEPOWER
HR	HUMIDITY RATIO
HT	HEIGHT
HTD	HEAT DETECTOR
HTG	HEAT OR HEATING
HTR	HEATER
HV	HEATING VENTILATING UNIT
HVAC	HEATING/VENTILATING/AIR CONDITIONING
HVP	HEATING & VENTILATING UNIT PUMP
HW	HOT WATER
HWP	HOT WATER PUMP
HYD	HYDRAULIC
ID	INSIDE DIAMETER
IHP	INDICATED HORSEPOWER
INCR	INCREASER
IP	INTERFACE PANEL
IPS	INTERNATIONAL PIPE STD
IW	INDIRECT WASTE
KW	KILOWATTS
LAT	LEAVING AIR TEMPERATURE
LAV	LAVATORY
LH	LATENT HEAT
LHG	LATENT HEAT GAIN
LIN	LINEAR
LINFT	LINEAR FEET
LIQ	LIQUID
LLR	LOW LIMIT RELAY
LMTD	LOG MEAN TEMP DIFFERENCE
LP	LOCAL PANEL
LP	LOW PRESSURE
LPT	LOW POINT
LRA	LOCKED ROTOR AMPS
LSV	LIQUID SOLENOID VALVE
LT	LEAVING TEMPERATURE
LTD	LEAST TEMP DIFFERENCE
LVR	LOUVER
LW	LOW WATER
LWT	LEAVING WATER TEMPERATURE
M	METER
MA	MIXED AIR
MAT	MIXED AIR TEMPERATURE
MBH	BRITISH THERMAL UNITS (THOUSANDS)
MCC	MOTOR CONTROL CENTER
MD	MOTORIZED DAMPER
MET	MEAN EFFECTIVE TEMPERATURE
MOCP	MAXIMUM OVERCURRENT PROTECTION (AMPS)
MTD	MEAN TEMPERATURE DIFFERENCE
MU	MAKE–UP WATER
MWP	MAXIMUM WORKING PRESSURE
N/A	NOT APPLICABLE
NC	NOISE CRITERIA, NORMALLY CLOSED
NFWH	NON–FREEZING WALL HYDRANT
NIC	NOT IN CONTRACT
NK	NECK
NO	NORMALLY OPEN
NRS	NON–RISING STEM (VALVE)
OA	OUTSIDE AIR
OBD	OPPOSED BLADE DAMPER
OD	OUTSIDE DIAMETER
OL	OVERLOAD
OS&Y	OUTSIDE SCREW AND YOKE (VALVE)
OV	OUTLET VELOCITY
OW	OPEN WASTE
PBD	PARALLEL BLADE DAMPER
PCF	POUNDS PER CUBIC FEET
PD	PUMP DISCHARGE
PESW	PNEUMATIC–ELECTRIC SWITCH
PF	PREFILTER
PH	PREHEAT
PI	PRESSURE INDICATOR
PIV	POST INDICATOR VALVE
PLF	POUNDS PER LINEAL FEET
PNEU	PNEUMATIC
PNL	PANEL
PPM	PARTS PER MILLION
P&T	PRESSURE & TEMPERATURE
PRESS	PRESSURE
PRESSDIFF	PRESSURE DROP, PRESSURE DIFFERENCE
PRP	PERIMETER RADIATION PUMP
PRR	PERIMETER RADIATION RETURN
PRS	PERIMETER RADIATION SUPPLY
PRV	PRESSURE REDUCING VALVE
PS	PLUMBING STACK
PSIG	P.S.I. GAGE
PSV	PILOT SOLENOID VALVE
QT	QUART
RA	RETURN AIR
RAD	RADIATION
RAD	REFRIGERATED AIR DRYER
RCU	REMOTE CONTROL UNIT
RE	ROOF EXHAUST FAN
RECIRC	RECIRCULATE
RED	REDUCER
REFR	REFRACTORY
REFRIG	REFRIGERANT (12, 22, ETC.)
REG	REGISTER
RET	RETURN
REV	REVOLUTIONS
RH	REHEAT
RH	RELATIVE HUMIDITY
RPM	REVOLUTIONS PER MINUTE
RPS	REVOLUTIONS PER SECOND
RR	RETURN REGISTER
RTD	RESISTANCE TEMPERATURE DETECTOR
RV	RELIEF VENT
SAT	SATURATION
SB	SETTLING BASIN
SCFM	CFM, STANDARD CONDITIONS
SD	SUPPLY DIFFUSER, SMOKE DETECTOR, STORM DRAIN
SEG	SEGMENT
SEW	SEWER
SH	SENSIBLE HEAT
SHG	SENSIBLE HEAT GAIN
SHT	SHEET
SL	SEA LEVEL
SOL	SOLENOID
SP	STATIC PRESSURE
SP	SUMP PUMP
SPD	SPLITTER DAMPER
SPGR	SPECIFIC GRAVITY
SPHT	SPECIFIC HEAT
SPKLR	SPRINKLER
SPLY	SUPPLY
SPLYAIR	SUPPLY AIR
SPM	SPRINKLER MAIN
SPT	STATIC PRESSURE TRANSMITTER
SPVOL	SPECIFIC VOLUME
SR	SUCTION REGULATOR, SUPPLY REGISTERS
SS	SERVICE SINK
SSV	STEAM SOLENOID VALVE
STDGPH	GPH, STANDARD
STM	STEAM
SV	SAFETY/RELIEF VALVE
SYS	SYSTEM
T	TANK OR THERMOSTAT
TAB	TESTING ADJUSTING & BALANCING
TC	THERMOCOUPLE
TCC	TEMPERATURE CONTROL CONTRACTOR
TCP	TEMPERATURE CONTROL PANEL
TD	TEMPERATURE DIFFERENCE
TEMP	TEMPERATURE
TG	TRANSFER GRILLE
TH	TOP HORIZONTAL
THRM	THERM (–AL)
TI	TEMPERATURE INDICATOR
TONSREFR	TONS OF REFRIGERATION
TRANSF	TRANSFORMER
TS	TIP SPEED
TSP	TOTAL STATIC PRESSURE
TT	TEMPERATURE TRANSMITTER
TW	TEMPERED WATER
U	HEAT TRANSFER COEFFICIENT
UB	UP BLAST
UH	UNIT HEATER
UNO	UNLESS NOTED OTHERWISE
UR	URINAL
UVENT	UNIT VENTILATOR
V	VOLTS/VENT
VA	VALVE
VAC	VACUUM
VAPPR	VAPOR PRESSURE
VAR	VARIABLE
VAV	VARIABLE AIR VOLUME
VBRK	VACUUM BREAKER
VD	VOLUME DAMPER
VEL	VELOCITY
VELPR	VELOCITY PRESSURE
VENT	VENTILATION
VI	VIBRATION ISOLATOR
VISC	VISCOSITY
VP	VENT PIPE
VPT	VELOCITY PRESSURE TRANSMITTER
VTR	VENT THRU ROOF
W	WASTE, WATTS
W/	WITH
W/O	WITHOUT
WB	WET BULB
WC	WATER CLOSET
WFS	WASTE FLOW SWITCH
WH	WALL HUNG, WATER HEATER
WM	WATER METER
WP	WORKING PRESSURE
WTR	WATER
XH	EXTRA HEAVY

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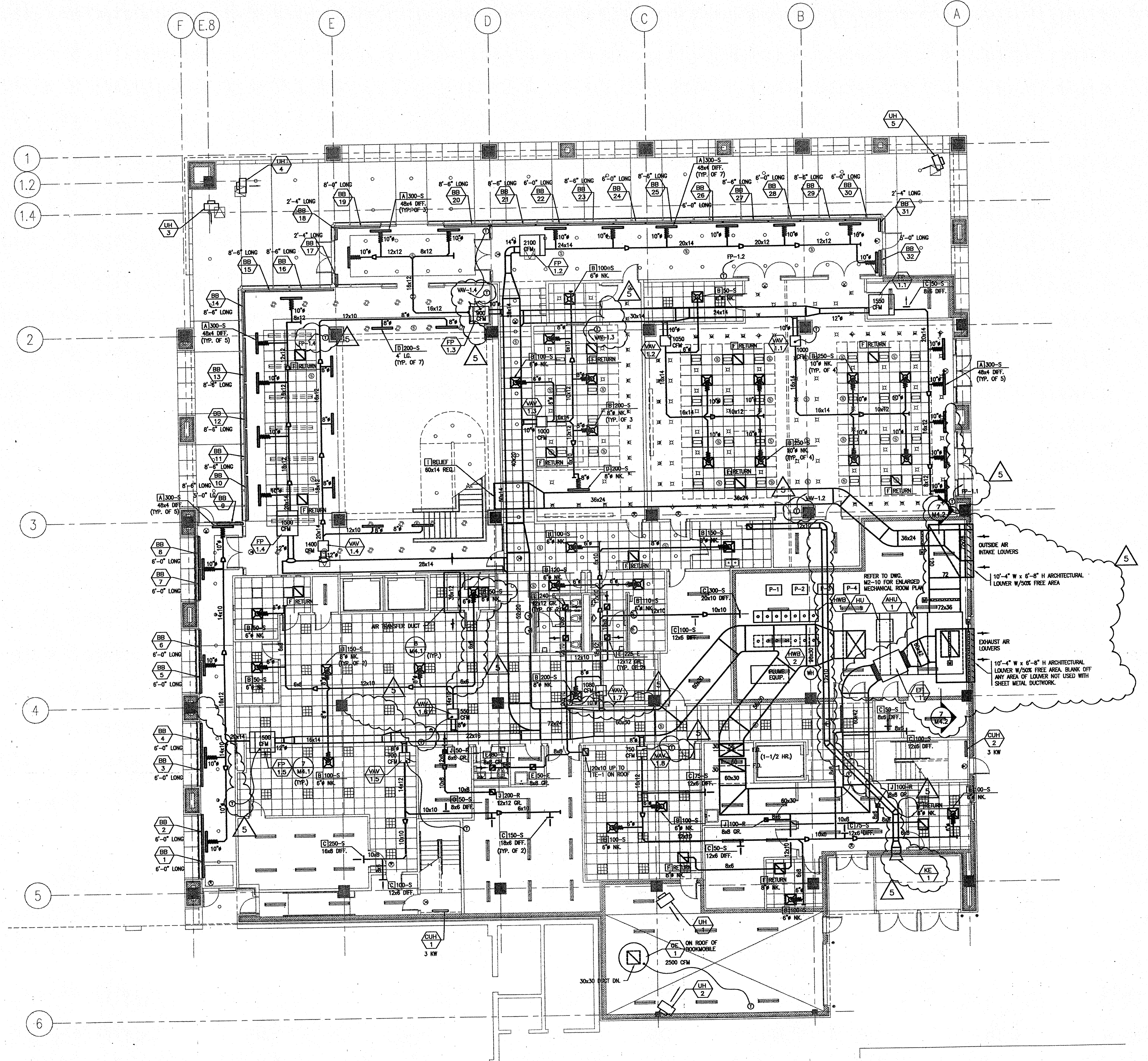
4	3-24-99	ISSUED FOR CONSTRUCTION & FINAL PERMIT
3	12-30-98	ISSUED FOR BID AND PERMIT
2	11-24-98	50% CD REVIEW
1	09-15-98	DESIGN DEVELOPMENT

DRAWING TITLE:
MECHANICAL SYMBOLS AND ABBREVIATIONS

SEAL:

DRAWING NUMBER: MPFP1-1

DATE:
SCALE: NONE
DRAWN: SS
PROJ. NO.:



1 FIRST FLOOR MECHANICAL PLAN
1/8"=1'-0"

north

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NOTES:

1. ALL HVAC WORK SHALL BE PERFORMED IN ACCORDANCE WITH PROJECT SPECIFICATIONS, AND ALL APPLICABLE STATE AND CITY CODES.
2. REFER TO ARCHITECTURAL DRAWINGS FOR PRECISE LOCATION OF DIFFUSERS, THERMOSTATS, BASEBOARDS ETC.
3. THERMOSTATS IN ALL COMMON AREAS SHALL BE TEMPERATURE SENSING TYPE ONLY. NO PROGRAMMABLE FEATURES SHALL BE ACCESSIBLE TO GENERAL PUBLIC. THERMOSTATS IN CONFERENC ROOMS SHALL BE PROGRAMMABLE TYPE WITH MANUAL OVERRIDE BUTTONS.
4. ALL HVAC WORK SHALL BE COORDINATED WITH OTHER TRADES TO MINIMIZE INTERFERENCES ETC.

NO.	DATE	DESCRIPTION
5	03-24-99	ISSUED FOR CONST. & FINAL PERMIT
4	01-29-99	ADDENDUM NO. 2
3	12-30-98	ISSUED FOR BID AND PERMIT
2	11-24-98	50% CD REVIEW
1	09-15-98	DESIGN DEVELOPMENT

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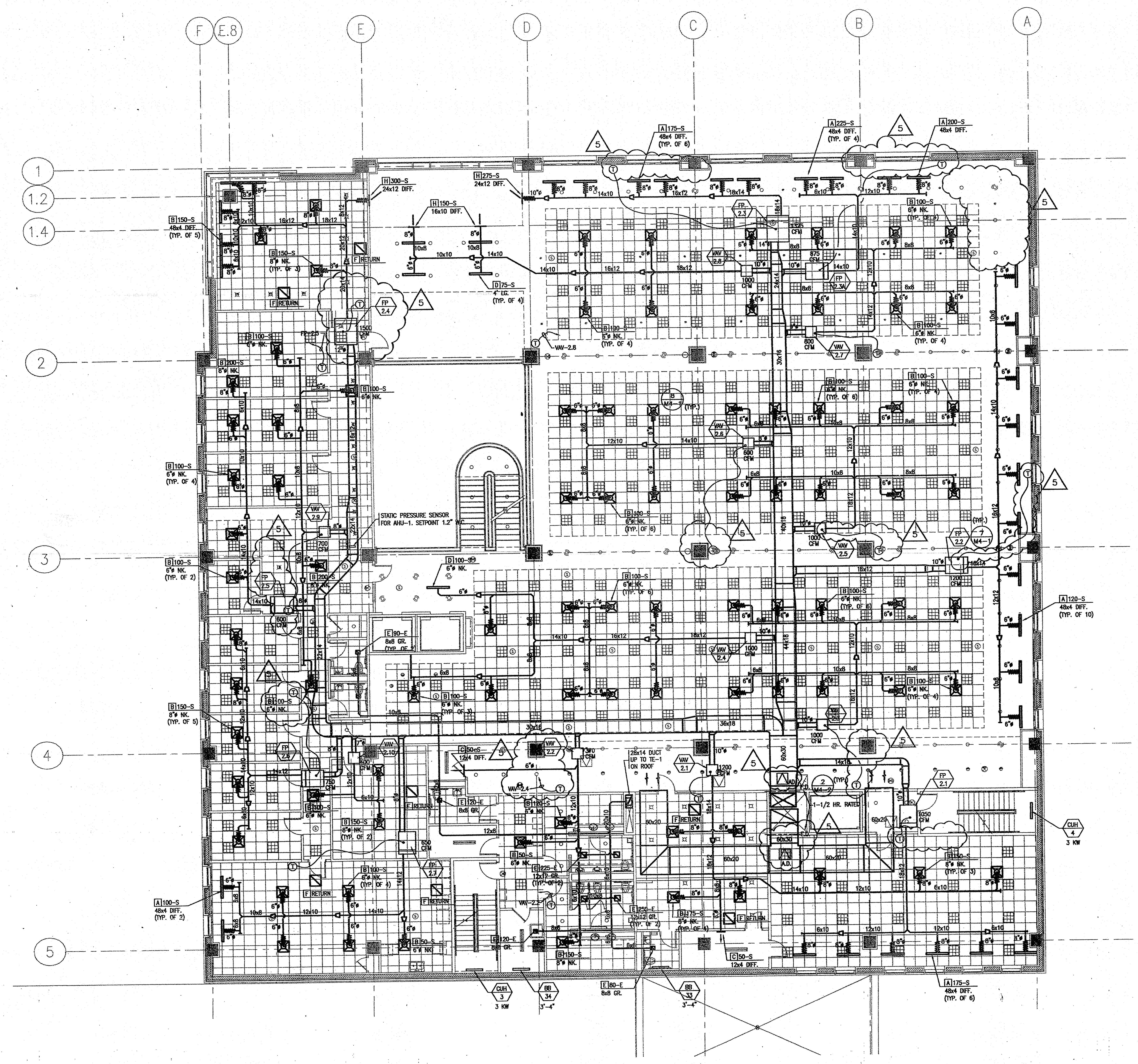
FIRST FLOOR MECHANICAL PLAN

SEAL:

DRAWING NUMBER
M2-1

DATE:
SCALE:
DRAWN: SS
PROJ. NO.:



1 SECOND FLOOR MECHANICAL PLAN

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2. REFER TO ARCHITECTURAL DRAWINGS FOR PRECISE LOCATION OF DIFFUSERS, THERMOSTATS ETC.
3. THERMOSTATS IN STACK AREAS AND COMMON TO MULTIPLE PRIVATE OFFICES SHALL BE TEMPERATURE SENSING TYPE ONI WITH TIE-IN TO THE DDC SYSTEM. NO PROGRAMMABLE FEATURES SHALL BE ACCESSIBLE. THERMOSTATS IN CONFERE ROOMS SHALL BE PROGRAMMABLE TYPE WITH ACCESS TO MANUAL OVERRIDES.
4. ALL HVAC WORK SHALL BE COORDINATED WITH OTHER TRADE TO MINIMIZE INTERFERENCES ETC.

NO.	DATE	DESCRIPTION
5	03-24-99	ISSUED FOR CONSTRUCTION & FINAL PE
4	01-29-99	ADDENDUM NO. 2
3	12-30-98	ISSUED FOR BID AND PERMIT
2	11-24-98	50% CD REVIEW
1	09-15-98	DESIGN DEVELOPMENT

DRAWING TITLE:

SECOND FLOOR
MECHANICAL PLAN

SEAL:

DRAWING NUMBER
M2-2

DATE:
SCALE:
DRAWN: SS
PROJ. NO.:

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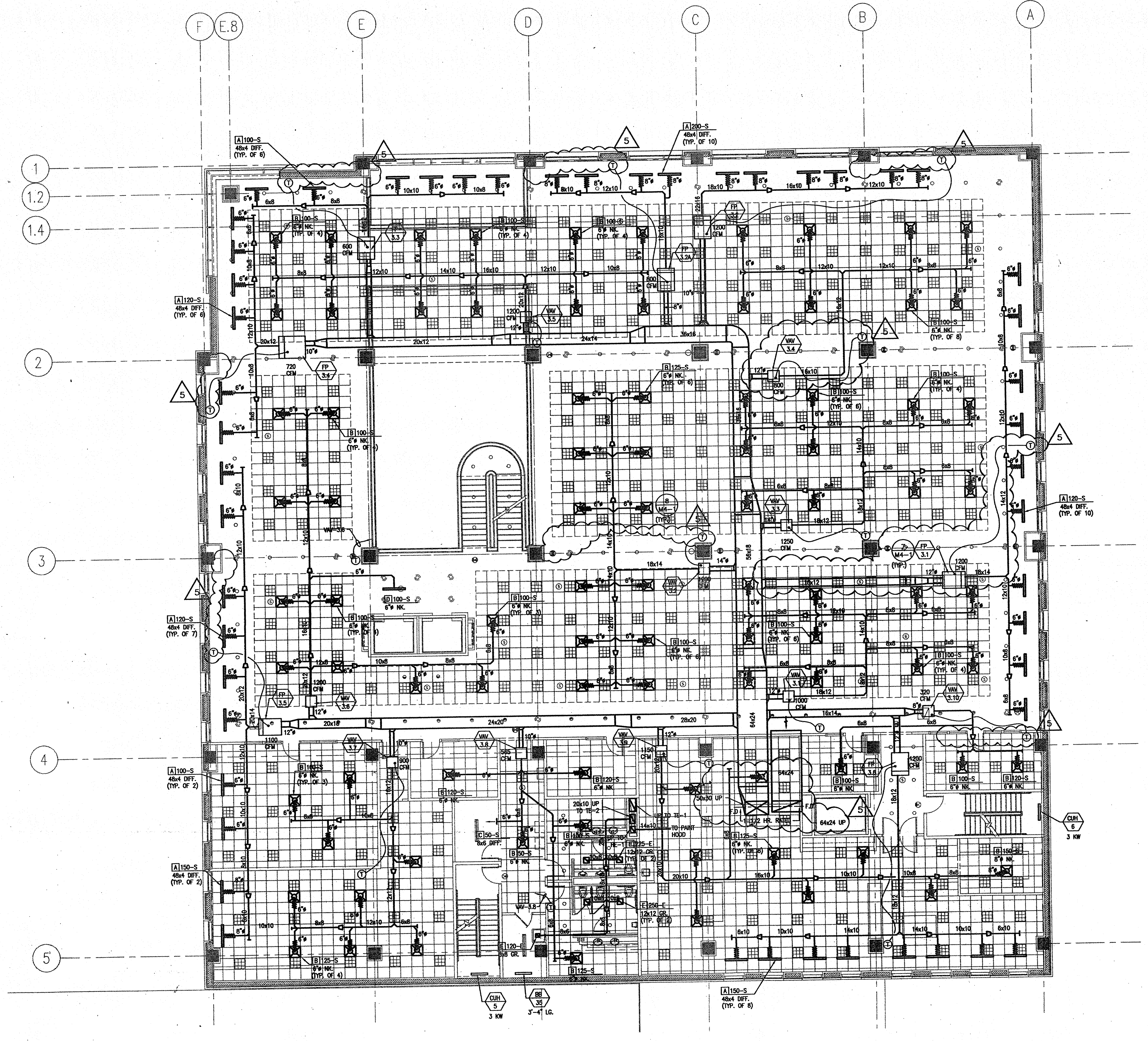

1 THIRD FLOOR MECHANICAL PLAN
1/8"=1'-0"

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2. REFER TO ARCHITECTURAL DRAWINGS FOR PRECISE LOCATION OF DIFFUSERS, THERMOSTATS ETC.
3. THERMOSTATS IN ALL COMMON AREAS SHALL BE TEMPERATURE SENSING TYPE ONLY. NO PROGRAMMABLE FEATURES SHALL BE ACCESSIBLE TO GENERAL PUBLIC. THERMOSTATS IN CONFERENCE ROOMS SHALL BE PROGRAMMABLE TYPE WITH MANUAL OVERRIDE BUTTONS.
4. ALL HVAC WORK SHALL BE COORDINATED WITH OTHER TRADES TO MINIMIZE INTERFERENCES ETC.

NO.	DATE	DESCRIPTION
5	03-24-99	ISSUED FOR CONSTRUCTION & FINAL PERMIT
4	01-29-99	ADDENDUM NO. 2
3	12-30-98	ISSUED FOR BID AND PERMIT
2	11-24-98	50% CD REVIEW
1	09-15-98	DESIGN DEVELOPMENT

DRAWING TITLE:

THIRD FLOOR
MECHANICAL PLAN

SEAL:

DRAWING NUMBER:
M2-3

DATE: 11/24/1998
SCALE:
DRAWN: SS
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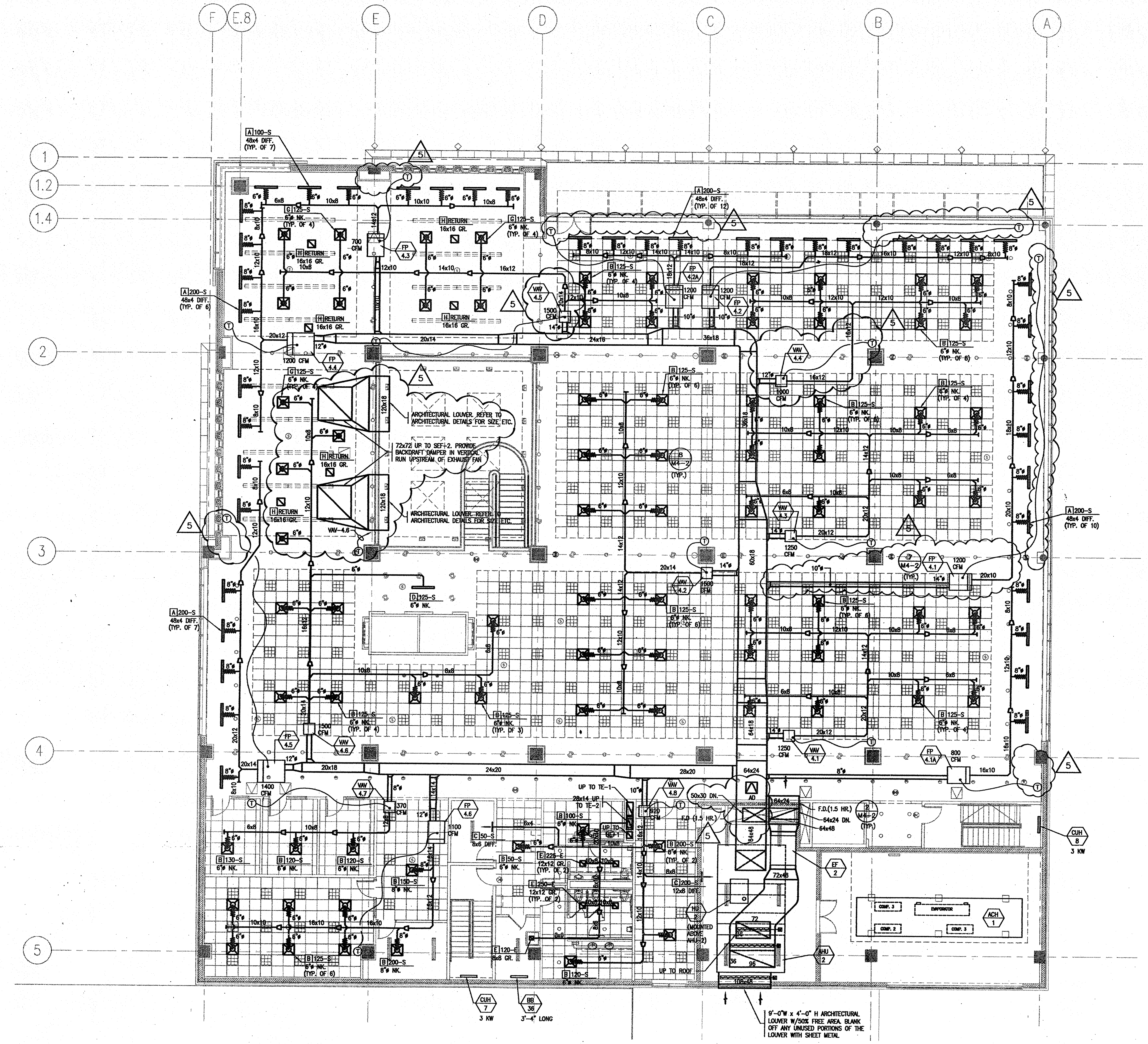

1 FOURTH FLOOR MECHANICAL PLAN
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2. REFER TO ARCHITECTURAL DRAWINGS FOR PRECISE LOCATION OF DIFFUSERS, THERMOSTATS ETC.
3. THERMOSTATS IN ALL COMMON AREAS SHALL BE TEMPERATURE SENSING TYPE ONLY. NO PROGRAMMABLE FEATURES SHALL BE ACCESSIBLE TO GENERAL PUBLIC. THERMOSTATS IN CONFERENCE ROOMS SHALL BE PROGRAMMABLE TYPE WITH MANUAL OVERRIDE BUTTONS.
4. ALL HVAC WORK SHALL BE COORDINATED WITH OTHER TRADES TO MINIMIZE INTERFERENCES ETC.

NO.	DATE	DESCRIPTION
5	03-24-99	ISSUED FOR CONSTRUCTION & FINAL PERMIT
4	01-29-99	ADDENDUM NO. 2
3	12-30-98	ISSUED FOR BID AND PERMIT
2	11-24-98	50% CD REVIEW
1	09-15-98	DESIGN DEVELOPMENT

DRAWING TITLE:
FOURTH FLOOR MECHANICAL PLAN

SEAL:

DRAWING NUMBER:
M2-4

DATE:
SCALE:
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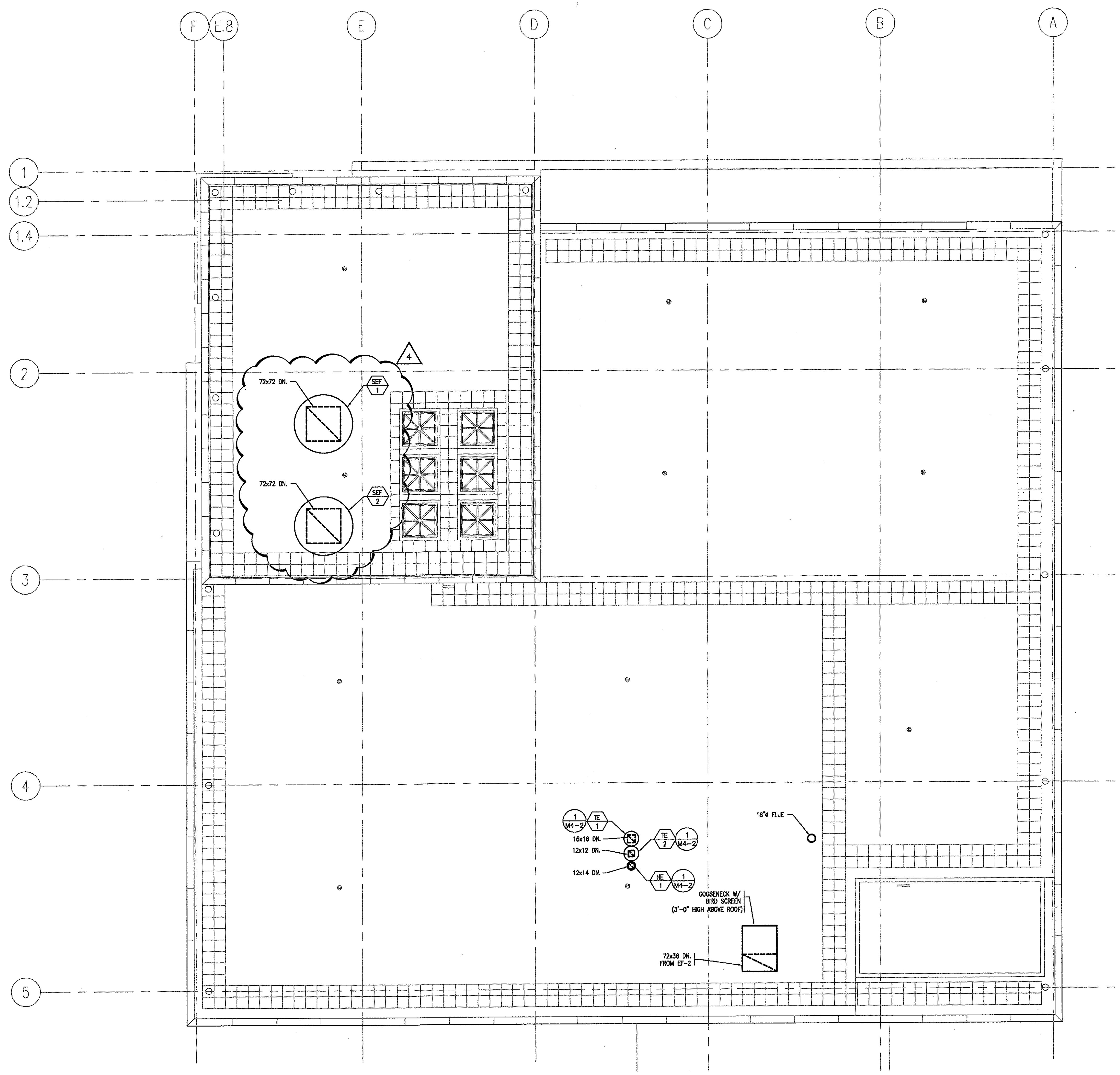
PROJ. NO.:



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NOTES:

1. EXHAUST FANS TE-1, TE-2 AND HE-1 SHALL BE MOUNTED ON A BUILT-UP CURB TO SERVE ALL THE THREE EXHAUST FANS. PROVIDE APPROPRIATE FLASHING TO THE CURB AS REQUIRED TO PREVENT LEAKS. THE CURB SHALL A BIG ROOF OPENING.
2. ALL ROOF PENETRATIONS SHALL BE COORDINATED WITH OTHER DISCIPLINES.

NO.	DATE	DESCRIPTION
4	03-24-99	ISSUED FOR CONSTRUCTION & FINAL PERMIT
3	12-30-98	ISSUED FOR BID AND PERMIT
2	11-24-98	50% CD REVIEW
1	09-15-98	DESIGN DEVELOPMENT

DRAWING TITLE:

ROOF MECHANICAL PLAN

SEAL:

DRAWING NUMBER: M2-5

DATE:
SCALE:
DRAWN: SS
PROJ. NO.:

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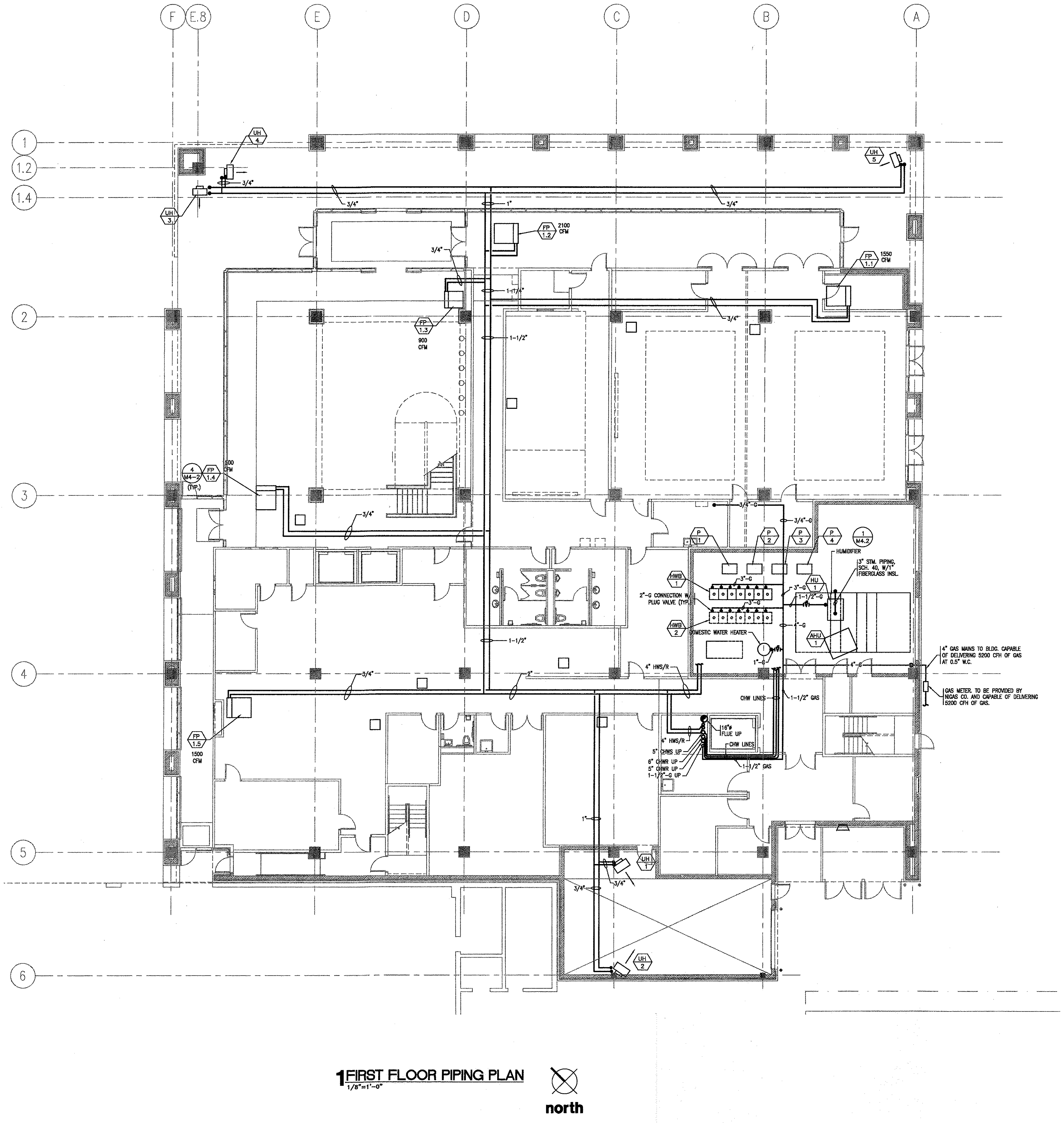

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2	11-24-98	50% CD REVIEW
1	09-15-98	DESIGN DEVELOPMENT

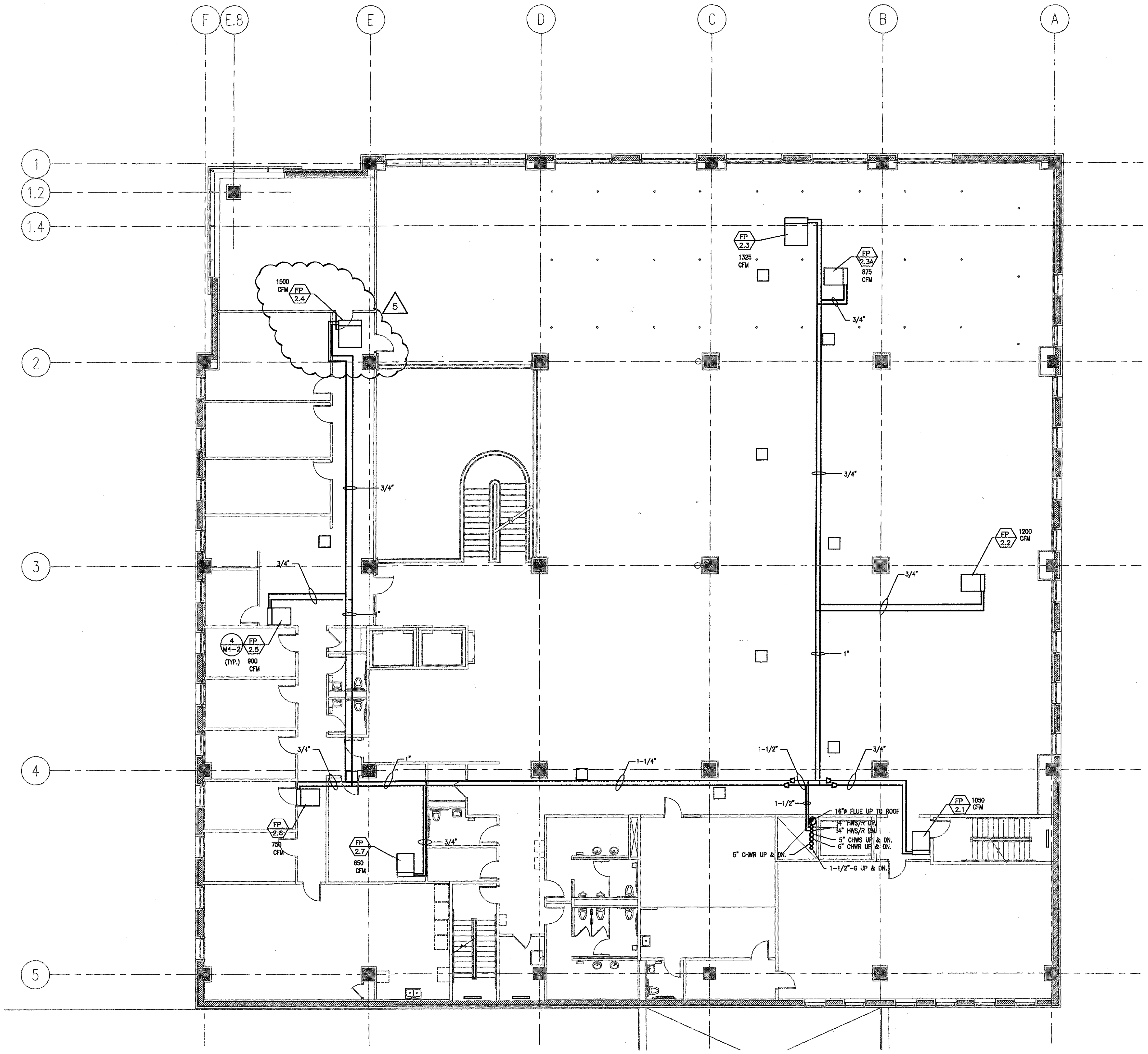
DRAWING TITLE:

FIRST FLOOR PIPING PLAN

SEAL:

DRAWING NUMBER: M2-6

DATE:
SCALE:
DRAWN: SS
PROJ. NO.:



1 SECOND FLOOR PIPING PLAN
1/8"=1'-0"

north

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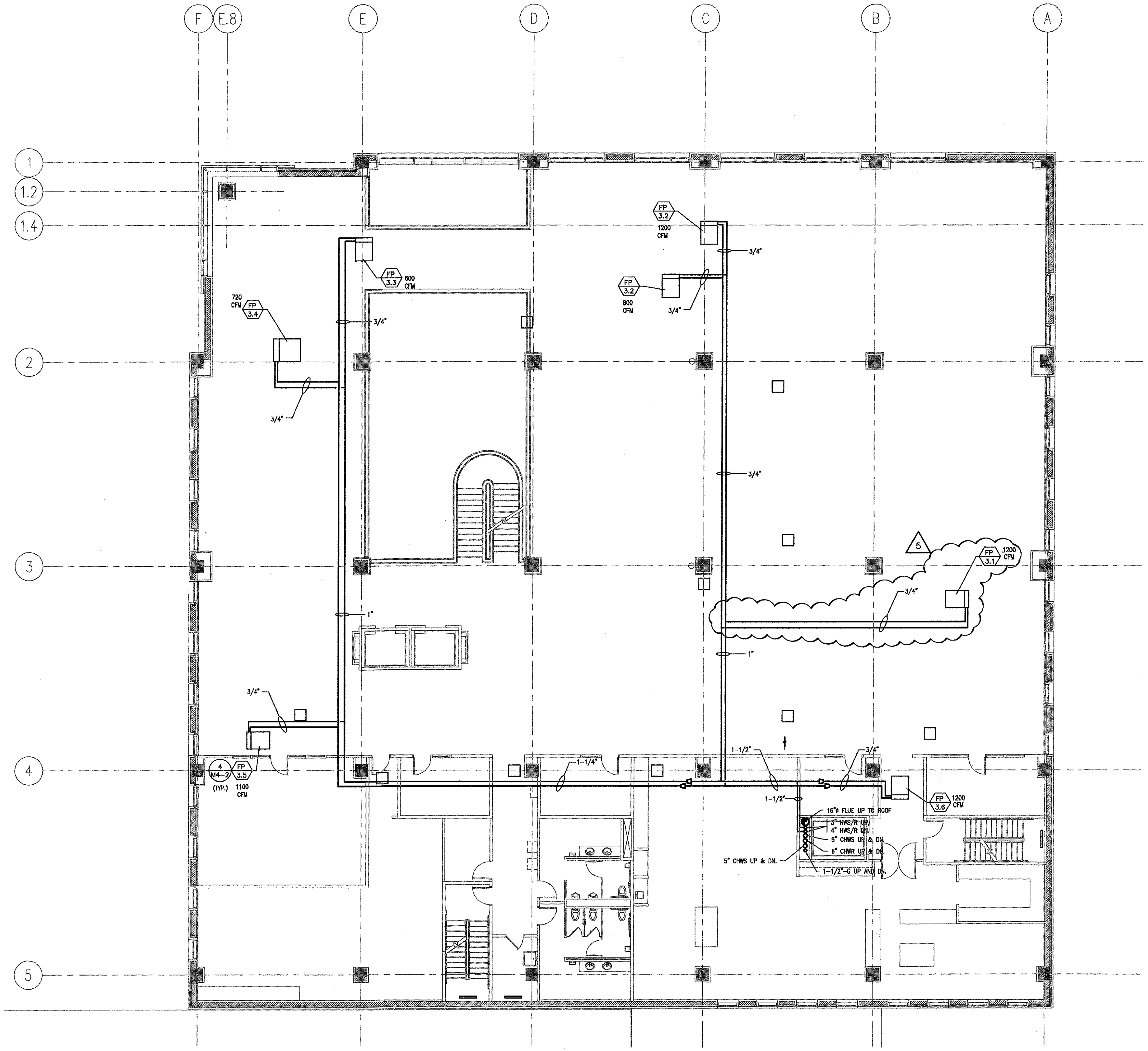
4	01-29-99	ADDENDUM NO. 2
3	12-30-98	ISSUED FOR BID AND PERMIT
2	11-24-98	50% CD REVIEW
1	09-15-98	DESIGN DEVELOPMENT

DRAWING TITLE:
SECOND FLOOR PIPING PLAN

SEAL:

DRAWING NUMBER:
M2-7

DATE:
SCALE:
DRAWN: SS
PROJ. NO.:



1 THIRD FLOOR PIPING PLAN
1/8"=1'-0"

north

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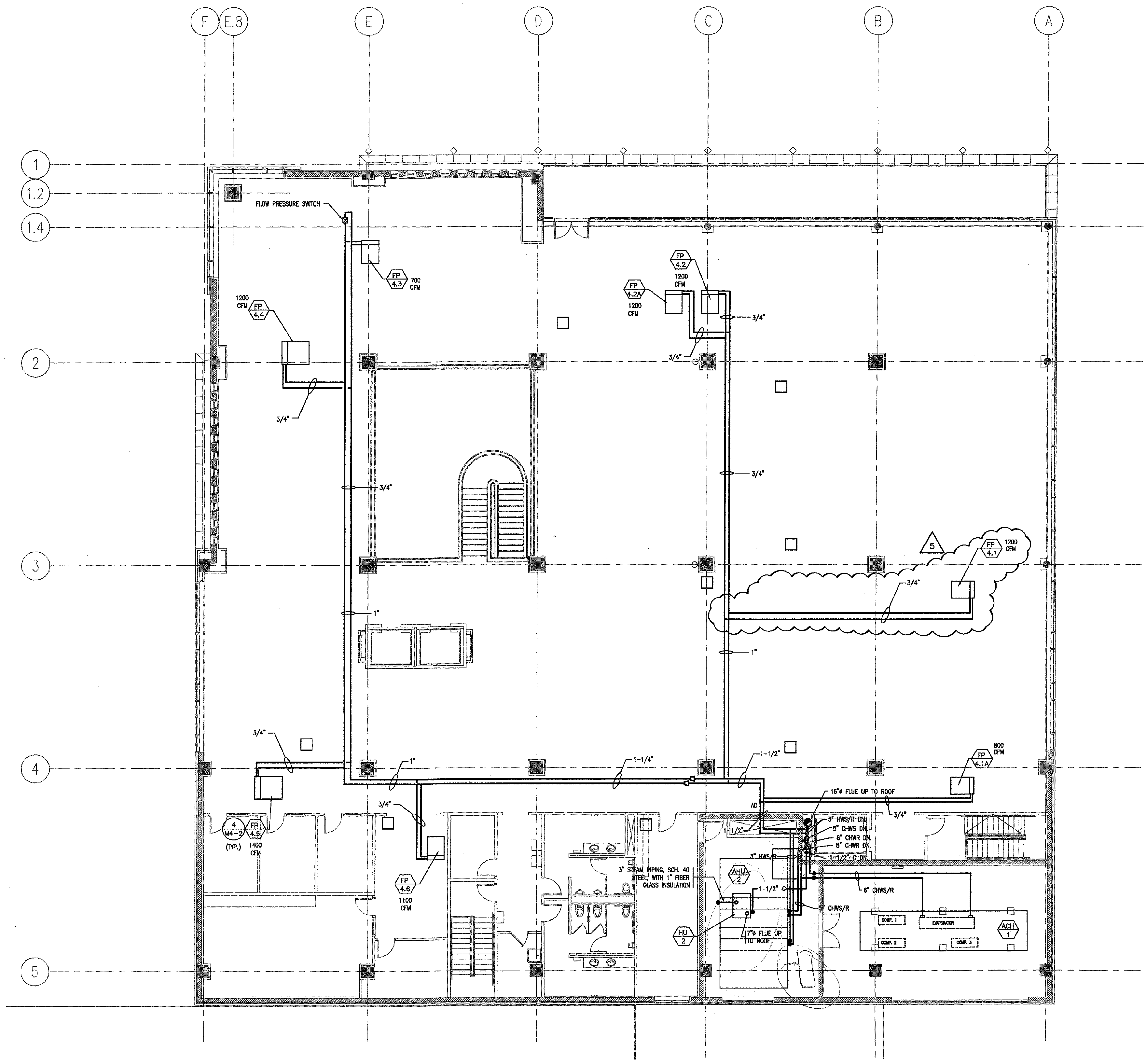
2	11-24-98	50% CD REVIEW
1	09-15-98	DESIGN DEVELOPMENT

DRAWING TITLE:
THIRD FLOOR PIPING PLAN

SEAL:

DRAWING NUMBER:
M2-8

DATE:
SCALE:
DRAWN: SS
PROJ. NO.:



1 FOURTH FLOOR PIPING PLAN
1/8"=1'-0"

north

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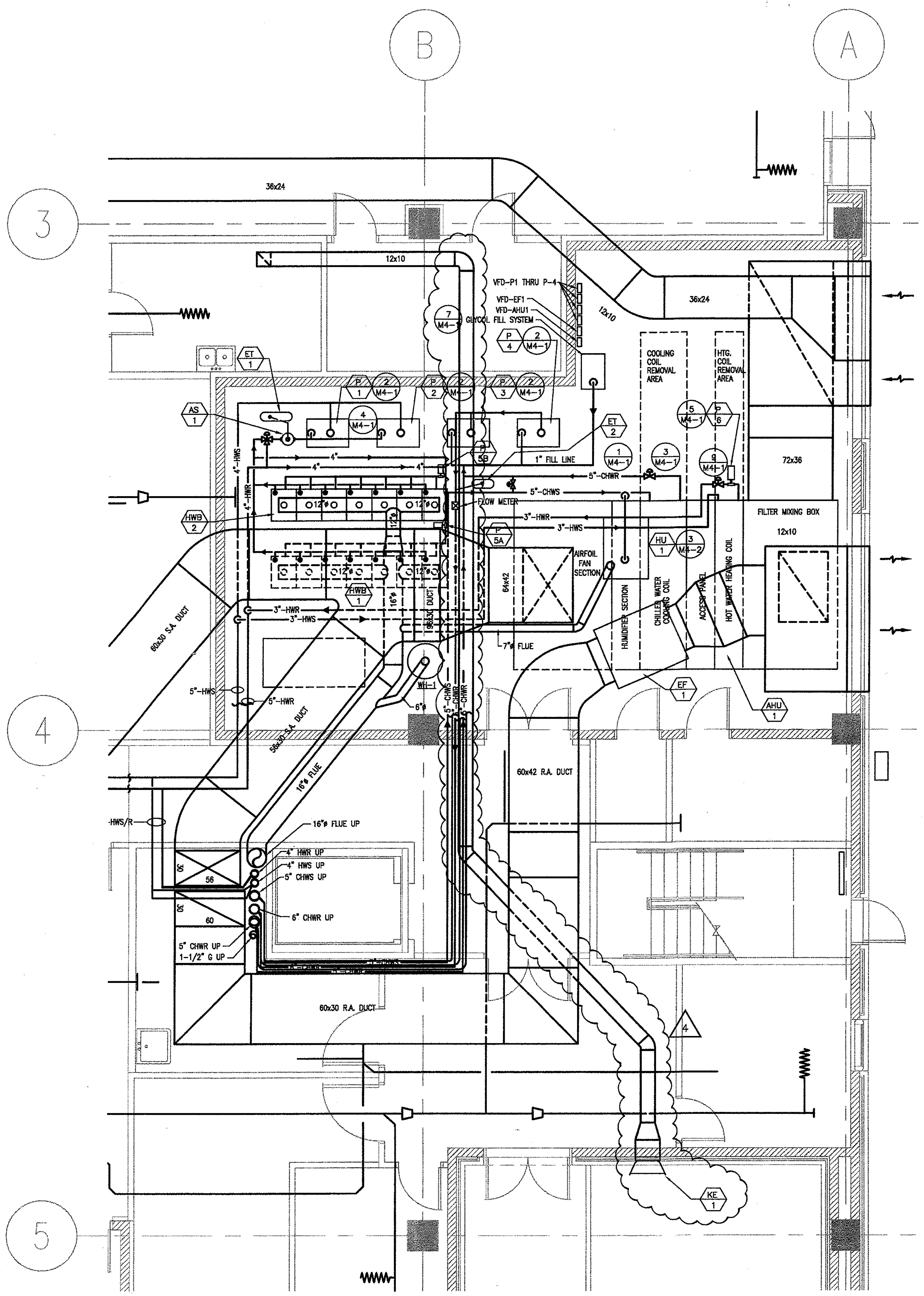
1	09-15-98	DESIGN DEVELOPMENT

DRAWING TITLE:
FOURTH FLOOR
PIPING PLAN

SEAL:

DRAWING NUMBER:
M2-9

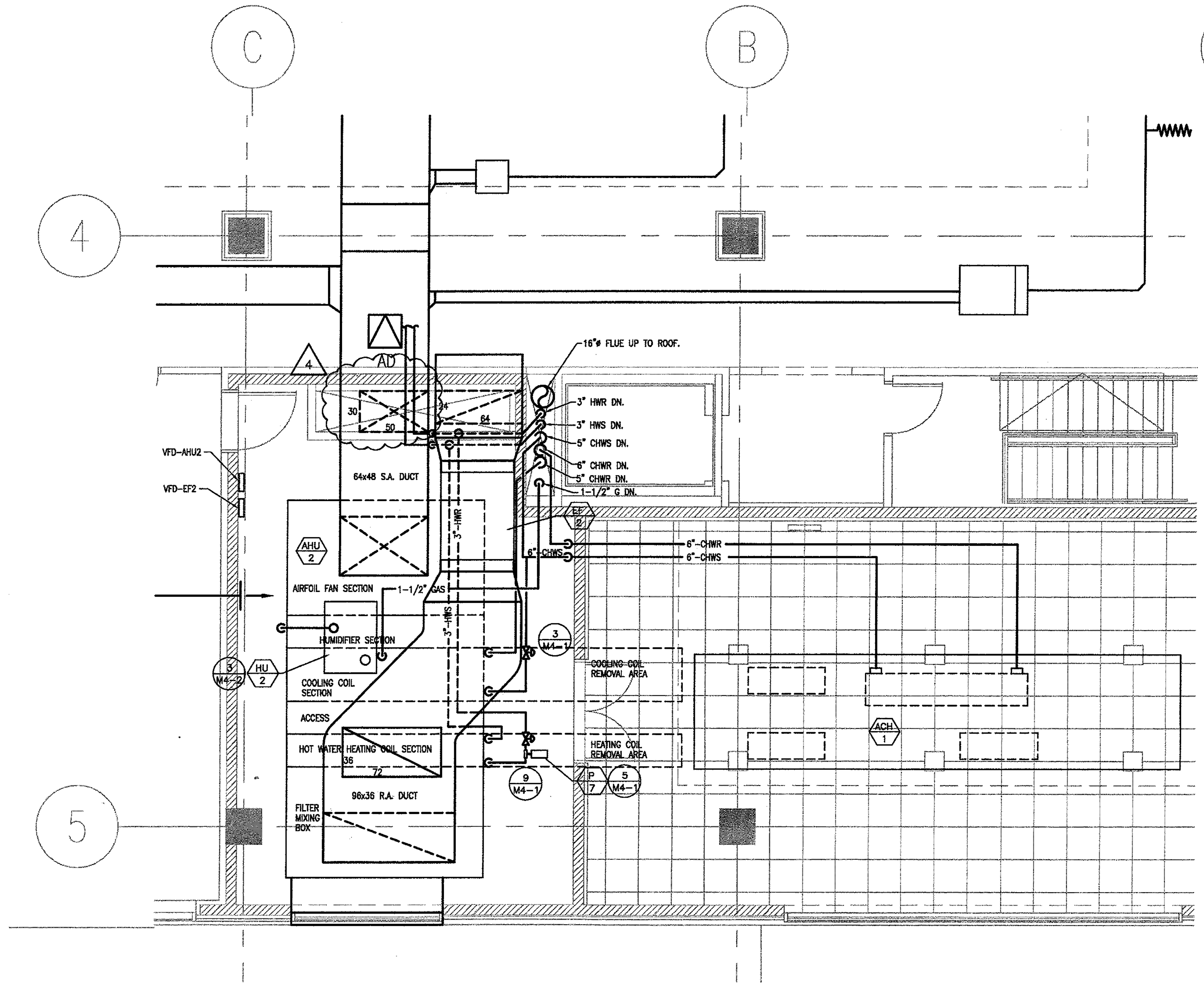
DATE:
SCALE:
DRAWN: SS
PROJ. NO.:



1 ENLARGED FIRST FLOOR MECHANICAL ROOM PLAN

1/4"=1'-0"

north



2 ENLARGED FOURTH FLOOR MECHANICAL ROOM PLAN

1/4"=1'-0"

north

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2	11-24-98	50% CD REVIEW
1	09-15-98	DESIGN DEVELOPMENT

DRAWING TITLE:

MECHANICAL ROOM ENLARGED PLANS

SEAL:

DRAWING NUMBER: M2-10

DATE:
SCALE:
DRAWN: SS
PROJ. NO.:

AIR HANDLING UNIT SCHEDULE

UNIT NO.	LOCATION	SERVES	SUPPLY FAN SECTION: CFM	T.S.P " W.C	E.S.P. " W.C.	BHP	HP	V/F/HZ	COOLING COIL EWT= 45° F LWT= 55° F ETHYLENE GLYCOL 50% BY WEIGHT): EAT F DB	EAT F WB	LAT F DB	LAT F WB	F.V. FPM	AIR P.D. " WC	TOTAL BTU/ HR	GPM	WATER P.D. FT	FACE AREA SQ. FT.	ROWS	FINS PER IN.	CIRCUITING	HOT WATER HEATING COIL (WATER): EAT F	LAT F	F.V. FPM	AIR P.D. " WC	TOTAL BTU/ HR	GPM	EWT F	LWT F	ROWS	FINS PER IN.	WATER P.D. FT	FACE AREA SQ. FT.	MANUFACTURER AND MODEL	REMARKS
AHU-1	1ST FLOOR MECH. ROOM	1ST & 2ND. FLOOR	36,000	5.00	3.20	37.8	50	480/3/60	80	67	55.3	54.9	488	0.91	1,334,900	290	15.1	73.8	8	8	DOUBLE	65	92.5	596	0.27	1,067,800	120	180	160	1	8	25.1	60.4	CARRIER 39T – 74	1 2
AHU-2	4TH FLOOR MECH. ROOM	3RD. & 4TH FLOOR	36,000	5.00	3.20	37.8	50	480/3/60	80	67	55.3	54.9	488	0.91	1,334,900	290	15.1	73.8	8	8	DOUBLE	65	92.5	596	0.27	1,067,800	120	180	160	1	8	25.1	60.4	CARRIER 39T – 74	1 2

NOTES:

1. ACCESS TO COIL SHALL BE LIMITED TO ONE SIDE ONLY. HEADERS FOR COILS SHALL BE LOCATED ON ONE SIDE ONLY.
2. PROVIDE 35% FILTERS IN THE FILTER MIXING BOX SECTION. FILTERS SHALL BE REPLACED ON A SCHEDULED BASIS. HIGH STATIC ALARM SHALL BE SOUNDED IF HIGH FILTER STATIC IS REACHED.

AIR COOLED SCREW CHILLER SCHEDULE

UNIT NO.	LOCATION	SERVING	CAPACITY TONS	CHILLED WATER (E.G. 50%): GPM	MAX. P.D.	EWT	LWT	CONDENSER DATA: FANS	FAN DIA. (IN.)	HP	V/°/Hz	REFRIGERANT DATA: TYPE	TOTAL WEIGHT (LB.)	ELECTRICAL DATA: VOLTS/ ⊕ 60 Hz	FULL LOAD AMPS	MAX. FUSE SIZE	P'WIRED Y/N	DISC. SWITCH Y/N	INTER-LOCKED WITH	REMOTE CONTROL DEVICES	MANUFACTURER AND MODEL	REMARKS
ACH-1	4TH FLOOR ROOF	ENTIRE BLDG.	200	579	19	54	44	14	28	1-1/2	480/3/60	R-22	430	480/3	433	500	Y	Y	N	N	MCQUAY ALS205A	

EXHAUST FAN SCHEDULE

UNIT NO.	LOCATION	SERVING	FAN CAPACITY CFM	FAN RPM	WHEEL DIAMETER INCHES	S.P. IN OF WATER	ARRANGEMENT	DRIVE	FAN BHP	VOLTS/F ⊕ 60 Hz	HP	MOTOR RPM	MOTOR STARTER Y/N	DISCH SWITCH Y/N	P'WIRED Y/N	INTER-LOCKED WITH	REMOTE CONTROL DEVICES	BASED ON MANUFACTURER AND MODEL	REMARKS
EF-1	1ST FLOOR MECH. ROOM	AHU-1	33000	1336	50	1.00	TUBULAR CENTRIFUGAL	BELT	27.8	480/3/60	30	1725	Y	Y	Y	AHU-1	N	GREENHECK 36-TCF	
EF-2	4TH FLOOR MECH. ROOM	AHU-2	33000	1321	50	0.75	TUBULAR CENTRIFUGAL	BELT	26.5	480/3/60	30	1725	Y	Y	Y	AHU-2	N	GREENHECK 36-TCF	
TE-1	ROOF	TOILETS ON FLOORS 1/2	2430	1507	18	0.75	CENTRIFUGAL	BELT	0.71	208/3/60	3/4	1725	Y	Y	Y	N	N	GREENHECK GB-140-7	
TE-2	ROOF	TOILETS ON FLOORS 3/4	2140	1507	14	0.50	CENTRIFUGAL	BELT	0.49	120/1/60	1/2	1725	Y	Y	Y	N	N	GREENHECK GB-130-5	
SEF-1	ATRIUM ROOF	SMOKE EXHAUST	45000	479	82	0.50	ROOF PROPELLER FAN	BELT	7.28	208/3/60	7 1/2	1725	Y	Y	Y	AHU-1/2	N	GREENHECK RBE-3H72-75	5
SEF-2	ATRIUM ROOF	SMOKE EXHAUST	45000	479	82	0.50	ROOF PROPELLER FAN	BELT	7.28	208/3/60	7 1/2	1725	Y	Y	Y	AHU-1/2	N	GREENHECK RBE-3H72-75	
GE-1	ROOF OF BOOKMOBILE	BOOKMOBILE	2500	1197	20	0.375	ROOF PROPELLER FAN	BELT	0.42	120/1/60	1/2	1725	Y	Y	Y	N	T-STAT	GREENHECK RBE-1H20-5	
HE-1	ROOF	PAINT HOOD ON 3RD.	1500	1289	16	0.50	CENTRIFUGAL	BELT	0.25	120/1/60	1/4	1725	Y	Y	Y	N	SWITCH	GREENHECK GB-130-4	
KE-1	WALL OF MECH. ROOM	KITCHEN	750	1550	15	0.375	WALL CENTRIFUGAL	DIRECT	0.12	120/1/60	1/8	1550	Y	Y	Y	HOOD	N	GREENHECK GW-95-D	

FAN POWERED CONSTANT VOLUME BOX W/ REHEAT SCHEDULE

UNIT NO.	AIR FLOW CFM	S.P. WATER COLUMN IN. WO/ COIL	S.P. WATER COLUMN IN. W/ COIL	INLET SIZE IN DIA. IN.	DISCHARGE SIZE W x H	OVERALL BOX SIZE L x W x H	MAX. S.P.	FAN HP	FAN VOLTAGE V/ø/Hz.	HEATING DATA: BTU/HR.	AIR DATA ENT. °F	AIR DATA LVG. °F	WATER DATA ENT. °F	WATER DATA LVG. °F	GPM	ROWS	N.C. (MAX) IN SPACE	MANUFACTURER AND MODEL	REMARKS
FP1.1	1550	0.25	0.41	12	20x15	46x48x20	0.41	1/3	120/1/60	66,960	55	95	180	160	3.35	2	31	TITUS MODEL DTQS-5	
FP1.2	2100	0.17	0.42	14	20x15	46x48x20	0.42	3/4	208/3/60	90,720	55	95	180	160	4.54	2	32	TITUS MODEL DTQS-6	
FP1.3	900	0.15	0.39	10	16x13	40x36x17	0.39	1/3	120/1/60	38,880	55	95	180	160	1.94	2	28	TITUS MODEL DTQS-4	
FP1.4	1500	0.25	0.41	12	20x15	46x48x20	0.41	1/3	120/1/60	64,800	55	95	180	160	3.24	2	31	TITUS MODEL DTQS-5	
FP1.5	1500	0.25	0.41	12	20x15	46x48x20	0.41	1/3	120/1/60	64,800	55	95	180	160	3.24	2	31	TITUS MODEL DTQS-5	
FP2.1	1050	0.15	0.39	10	16x13	40x36x17	0.39	1/3	120/1/60	45,360	55	95	180	160	2.27	2	28	TITUS MODEL DTQS-4	
FP2.2	1200	0.15	0.39	10	16x13	40x36x17	0.39	1/3	120/1/60	51,840	55	95	180	160	2.59	2	28	TITUS MODEL DTQS-4	
FP2.3	1325	0.25	0.41	12	20x15	46x48x20	0.41	1/3	120/1/60	57,240	55	95	180	160	2.86	2	31	TITUS MODEL DTQS-5	
FP2.3A	875	0.15	0.39	10	16x13	40x36x17	0.39	1/3	120/1/60	37,800	55	95	180	160	1.89	3	28	TITUS MODEL DTQS-4	
FP2.4	1500	0.25	0.41	12	20x15	46x48x20	0.41	1/3	120/1/60	64,800	55	95	180	160	3.24	2	31	TITUS MODEL DTQS-5	
FP2.5	600	0.11	0.23	8	16x13	40x36x17	0.23	1/4	120/1/60	25,920	55	95	180	160	1.30	2	28	TITUS MODEL DTQS-3	
FP2.6	750	0.11	0.23	8	16x13	40x36x17	0.23	1/4	120/1/60	32,400	55	95	180	160	1.62	2	28	TITUS MODEL DTQS-3	
FP2.7	650	0.11	0.23	8	16x13	40x36x17	0.23	1/4	120/1/60	28,080	55	95	180	160	1.40	2	28	TITUS MODEL DTQS-3	
FP3.1	1200	0.15	0.39	10	16x13	40x36x17	0.39	1/3	120/1/60	51,840	55	95	180	160	2.59	2	28	TITUS MODEL DTQS-4	
FP3.2	1200	0.15	0.39	10	16x13	40x36x17	0.39	1/3	120/1/60	51,840	55	95	180	160	2.59	2	28	TITUS MODEL DTQS-4	
FP3.2A	800	0.11	0.23	8	16x13	40x36x17	0.23	1/4	120/1/60	34,560	55	95	180	160	1.73	3	28	TITUS MODEL DTQS-3	
FP3.3	600	0.11	0.23	8	16x13	40x36x17	0.23	1/4	120/1/60	25,920	55	95	180	160	1.30	2	28	TITUS MODEL DTQS-3	
FP3.4	720	0.11	0.23	8	16x13	40x36x17	0.23	1/4	120/1/60	31,104	55	95	180	160	1.56	2	28	TITUS MODEL DTQS-3	
FP3.5	1100	0.15	0.39	10	16x13	40x36x17	0.39	1/3	120/1/60	47,520	55	95	180	160	2.38	2	28	TITUS MODEL DTQS-4	
FP3.6	1200	0.15	0.39	10	16x13	40x36x17	0.39	1/3	120/1/60	51,840	55	95	180	160	2.59	2	28	TITUS MODEL DTQS-4	
FP4.1	1200	0.15	0.39	10	16x13	40x36x17	0.39	1/3	120/1/60	51,840	55	95	180	160	2.59	2	28	TITUS MODEL DTQS-4	
FP4.1A	800	0.11	0.23	8	16x13	40x36x17	0.23	1/4	120/1/60	34,560	55	95	180	160	1.73	3	28	TITUS MODEL DTQS-3	
FP4.2	1200	0.15	0.39	10	16x13	40x36x17	0.39	1/3	120/1/60	51,840	55	95	180	160	2.59	2	28	TITUS MODEL DTQS-4	
FP4.2A	1200	0.15	0.39	10	16x13	40x36x17	0.39	1/3	120/1/60	51,840	55	95	180	160	2.59	3	28	TITUS MODEL DTQS-4	
FP4.3	700	0.11	0.23	8	16x13	40x36x17	0.23	1/4	120/1/60	30,240	55	95	180	160	1.51	2	28	TITUS MODEL DTQS-3	
FP4.4	1200	0.15	0.39	10	16x13	40x36x17	0.39	1/3	120/1/60	51,840	55	95	180	160	2.59	2	28	TITUS MODEL DTQS-4	
FP4.5	1400	0.25	0.41	12	20x15	46x48x20	0.41	1/3	120/1/60	60,480	55	95	180	160	3.02	2	31	TITUS MODEL DTQS-5	
FP4.6	1100	0.15	0.39	10	16x13	40x36x17	0.39	1/3	120/1/60	47,520	55	95	180	160	2.38	2	28	TITUS MODEL DTQS-4	

PUMP SCHEDULE

UNIT NO.	LOCATION	SERVICE	SERVICE TEMP. °F	TYPE	CAP GPM	HEAD FT.	VOLT / PH ⊕60HZ.	HP	MOTOR RPM	MANUFACTURER AND MODEL	REMARKS
P-1	1ST FLOOR MECH. ROOM	HEATING HOT WATER	160-200	END SUCTION	300	40	480/3/60	7.5	1750	BELL & GOSSETT 1510, 2-1/2 BB	
P-2	1ST FLOOR MECH. ROOM	HEATING HOT WATER	160-200	END SUCTION	300	40	480/3/60	7.5	1750	BELL & GOSSETT 1510, 2-1/2 BB	STAND BY
P-3	2nd FLOOR MECH. ROOM	CHILLED WATER (E.G.)	45-55	END SUCTION	600	50	480/3/60	15	1750	BELL & GOSSETT 1510, 5BC	
P-4	3rd FLOOR MECH. ROOM	CHILLED WATER (E.G.)	45-55	END SUCTION	600	50	480/3/60	15	1750	BELL & GOSSETT 1510, 5BC	STAND BY
P-5A	BOILER HWB-1 PRIMARY	HEATING HOT WATER	180-200	IN-LINE	300	30	480/3/60	5	1750	BELL & GOSSETT SERIES 80, 4x4x7	
P-5B	BOILER HWB-2 PRIMARY	HEATING HOT WATER	180-200	IN-LINE	300	30	480/3/60	5	1750	BELL & GOSSETT SERIES 80, 4x4x7	STAND BY
P-6	AHU-1 HOT WATER LOOP	HEATING HOT WATER	160-200	IN-LINE	120	30	480/3/60	1.5	1750	BELL & GOSSETT SERIES 80, 3x3x7B	
P-7	AHU-2 HOT WATER LOOP	HEATING HOT WATER	160-200	IN-LINE	120	30	480/3/60	1.5	1750	BELL & GOSSETT SERIES 80, 3x3x7B	

HOT WATER BOILER SCHEDULE

UNIT NO	LOCATION	BOILER DATA: TYPE	NO. OF MODULES	INPUT MBH	OUTPUT MBH	EDR WATER, SF	HP	WATER SIZE GAL.	HEADER SIZE: WATER (IN.)	GAS (IN.)	TEMP. (°F)	FLUE SIZE/MODULE (IN.)	VENT DAMPER (Y/N)	MANUFACTURER AND MODEL	FUEL
HWB-1	1ST FLOOR MECHANICAL ROOM	MODULAR	7	2100	1680	9740	50.19	49	3-1/2	2	200	8	Y	HYDROTHERM MR-2100-B	NAT. GAS
HWB-2	1ST FLOOR MECHANICAL ROOM	MODULAR	7	2100	1680	9740	50.19	49	3-1/2	2	200	8	Y	HYDROTHERM MR-2100-B	NAT. GAS

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1	09-15-98	DESIGN DEVELOPMENT

DRAWING TITLE:

MECHANICAL SCHEDULES

SEAL:

DRAWING NUMBER: M3-1

DATE:
SCALE: NONE
DRAWN: SS
PROJ. NO.:

VARIABLE AIR VOLUME BOX SCHEDULE

UNIT NO.	AIR FLOW MIN CFM	AIR FLOW MAX. CFM	S.P. WATER COLUMN IN. WO/ COIL	INLET SIZE IN DIA. IN.	DISCHARGE SIZE W x H	OVERALL BOX SIZE L x W x H	MAX. S.P.	N.C. (MAX) IN SPACE	BASED ON MANUFACTURER AND MODEL	REMARKS
VAV-1.1	250	1000	0.24	10	14 x 12	24x20x12	0.24	17	TITUS MODEL DESV-3000	
VAV-1.2	265	1050	0.24	10	14 x 12	24x20x12	0.24	17	TITUS MODEL DESV-3000	
VAV-1.3	250	1000	0.24	10	14 x 12	24x20x12	0.24	17	TITUS MODEL DESV-3000	
VAV-1.4	350	1400	0.26	12	16 x 15	24x22x15	0.26	17	TITUS MODEL DESV-3000	
VAV-1.5	175	700	0.26	8	12 x 10	24x18x10	0.26	16	TITUS MODEL DESV-3000	
VAV-1.6	140	550	0.26	8	12 x 10	24x18x10	0.26	16	TITUS MODEL DESV-3000	
VAV-1.7	270	1080	0.24	10	14 x 12	24x20x12	0.24	17	TITUS MODEL DESV-3000	
VAV-1.8	150	600	0.26	8	12 x 10	24x18x10	0.26	16	TITUS MODEL DESV-3000	
VAV-2.1	300	1200	0.24	10	14 x 12	24x20x12	0.24	17	TITUS MODEL DESV-3000	
VAV-2.2	95	370	0.20	7	12 x 10	24x18x10	0.20	12	TITUS MODEL DESV-3000	
VAV-2.3	250	1000	0.24	10	14 x 12	24x20x12	0.24	17	TITUS MODEL DESV-3000	
VAV-2.4	250	1000	0.24	10	14 x 12	24x20x12	0.24	17	TITUS MODEL DESV-3000	
VAV-2.5	250	1000	0.24	10	14 x 12	24x20x12	0.24	17	TITUS MODEL DESV-3000	
VAV-2.6	150	600	0.26	8	12 x 10	24x18x10	0.26	16	TITUS MODEL DESV-3000	
VAV-2.7	200	800	0.24	9	14 x 12	24x20x 12	0.24	13	TITUS MODEL DESV-3000	
VAV-2.8	250	1000	0.24	10	14 x 12	24x20x12	0.24	17	TITUS MODEL DESV-3000	
VAV-2.9	175	700	0.26	8	12 x 10	24x18x10	0.26	16	TITUS MODEL DESV-3000	
VAV-2.10	100	400	0.20	7	12 x 10	24x18x10	0.20	12	TITUS MODEL DESV-3000	
VAV-3.1	250	1000	0.24	10	14 x 12	24x20x12	0.24	17	TITUS MODEL DESV-3000	
VAV-3.2	300	1200	0.24	10	14 x 12	24x20x12	0.24	17	TITUS MODEL DESV-3000	
VAV-3.3	315	1250	0.26	12	16 x 15	24x22x15	0.26	17	TITUS MODEL DESV-3000	
VAV-3.4	200	800	0.24	9	14 x 12	24x20x 12	0.24	13	TITUS MODEL DESV-3000	
VAV-3.5	300	1200	0.24	10	14 x 12	24x20x12	0.24	17	TITUS MODEL DESV-3000	
VAV-3.6	300	1200	0.24	10	14 x 12	24x20x12	0.24	17	TITUS MODEL DESV-3000	
VAV-3.7	225	900	0.24	9	14 x 12	24x20x 12	0.24	13	TITUS MODEL DESV-3000	
VAV-3.8	145	565	0.26	8	12 x 10	24x18x10	0.26	16	TITUS MODEL DESV-3000	
VAV-3.9	290	1150	0.24	10	14 x 12	24x20x12	0.24	17	TITUS MODEL DESV-3000	
VAV-3.10	80	320	0.20	7	12 x 10	24x18x10	0.20	12	TITUS MODEL DESV-3000	
VAV-4.1	315	1250	0.26	12	16 x 15	24x22x15	0.26	17	TITUS MODEL DESV-3000	
VAV-4.2	375	1500	0.26	12	16 x 15	24x22x15	0.26	17	TITUS MODEL DESV-3000	
VAV-4.3	315	1250	0.26	12	16 x 15	24x22x15	0.26	17	TITUS MODEL DESV-3000	
VAV-4.4	250	1000	0.24	10	14 x 12	24x20x12	0.24	17	TITUS MODEL DESV-3000	
VAV-4.5	375	1500	0.26	12	16 x 15	24x22x15	0.26	17	TITUS MODEL DESV-3000	
VAV-4.6	375	1500	0.26	12	16 x 15	24x22x15	0.26	17	TITUS MODEL DESV-3000	
VAV-4.7	95	370	0.20	7	12 x 10	24x18x10	0.20	12	TITUS MODEL DESV-3000	
VAV-4.8	230	920	0.24	10	14 x 12	24x20x12	0.24	17	TITUS MODEL DESV-3000	

DIFFUSER AND REGISTER SCHEDULE

TYPE	TAG	MODULE SIZE	NECKINLET SIZE	CFM RANGE	CEILING OR WALL CONSTRUCTION (FRAME TO FIT)	MATERIAL AND COLOR	BASED ON MANUFACTURER	MODEL	OPPOSED BLADE DAMPERS	REMARKS
S	A	48x4 (2 SLOTS)	AS SHOWN	AS SHOWN	CEILING	STEEL/WHITE	TITUS	TBD-80	Y	
S	B	24x24	AS SHOWN	AS SHOWN	CEILING LAY-IN	STEEL/WHITE	TITUS	PCS	Y	
S	C	AS SHOWN	AS SHOWN	AS SHOWN	DUCT MOUNTED	STEEL/WHITE	TITUS	300	Y	
S	D	48"x3" (LINEAR)	AS SHOWN	AS SHOWN	CEILING	STEEL/WHITE	TITUS	CT-480	Y	
E	E	AS SHOWN	AS SHOWN	AS SHOWN	CEILING	STEEL/WHITE	TITUS	23R	Y	
R	F	24x24	AS SHOWN	AS SHOWN	CEILING LAY-IN	STEEL/WHITE	TITUS	PAR	N	
S	G	24x24	AS SHOWN	AS SHOWN	CEILING W/DUCTED NECK	STEEL/WHITE	TITUS	TDC	Y	
S	H	AS SHOWN	AS SHOWN	AS SHOWN	WALL MOUNTED	STEEL/WHITE	TITUS	272RL	Y	
R	J	AS SHOWN	AS SHOWN	AS SHOWN	DUCT MOUNTED	STEEL/WHITE	TITUS	350R	Y	

HOT WATER UNIT HEATER SCHEDULE

UNIT NO.	LOCATION	CAPACITY BTU/HR	TYPE	LAT °F	CFM @ 50°F	HEATING EWT °F	HEATING LWT °F	GPM	PD. (FT. OF WATER)	ELECTRICAL DATA VOLTS/ø @ 60 HZ.	HP	MOTOR RPM	MOTOR STARTER (Y/N)	DISC. SWITCH (Y/N)	P'WIRED (Y/N)	REMOTE CONTROL DEVICES	BASED ON MANUFACTURER AND MODEL	REMARKS
UH-1	BOOKMOBILE	27400	PROPELLER	95	815	180	160	2.83	0.16	120/1	1/20	1550	Y	Y	Y	Y	TRANE MODEL-S	T-STAT ON WALL
UH-2	BOOKMOBILE	27400	PROPELLER	95	815	180	160	2.83	0.16	120/1	1/20	1550	Y	Y	Y	Y	TRANE MODEL-S	T-STAT ON WALL
UH-3	SPACE ABOVE 1ST FLOOR	27400	PROPELLER	95	815	180	160	2.83	0.16	120/1	1/20	1550	Y	Y	Y	Y	TRANE MODEL-S	BUILT IN T-STAT
UH-4	SPACE ABOVE 1ST FLOOR	27400	PROPELLER	95	815	180	160	2.83	0.16	120/1	1/20	1550	Y	Y	Y	Y	TRANE MODEL-S	BUILT IN T-STAT
UH-5	SPACE ABOVE 1ST FLOOR	27400	PROPELLER	95	815	180	160	2.83	0.16	120/1	1/20	1550	Y	Y	Y	Y	TRANE MODEL-S	BUILT IN T-STAT

ELECTRIC BASEBOARD RADIATION SCHEDULE

UNIT NO.	LOCATION	WATTS/FT	TOTAL WATTS	HEATING CAPACITY BTU/HR.	LENGTH (FT.)	ELECTRICAL DATA VOLTS/ø @ 60 HZ	FULL LOAD AMPS	DISC. SWITCH Y/N	P'WIRED Y/N	BASED ON MANUFACTURER AND MODEL	REMARKS
BB-1	1ST FLOOR EAST CORRIDOR	187	1122	3829	6	208/1	5.4	N	Y	MARKEL H2506N	1
BB-2	1ST FLOOR EAST CORRIDOR	187	1122	3829	6	208/1	5.4	N	Y	MARKEL H2506N	1
BB-3	1ST FLOOR EAST CORRIDOR	187	1122	3829	6	208/1	5.4	N	Y	MARKEL H2506N	1
BB-4	1ST FLOOR EAST CORRIDOR	187	1122	3829	6	208/1	5.4	N	Y	MARKEL H2506N	1
BB-5	1ST FLOOR EAST CORRIDOR	187	1122	3829	6	208/1	5.4	N	Y	MARKEL H2506N	1
BB-6	1ST FLOOR EAST CORRIDOR	187	1122	3829	6	208/1	5.4	N	Y	MARKEL H2506N	1
BB-7	1ST FLOOR EAST CORRIDOR	187	1122	3829	6	208/1	5.4	N	Y	MARKEL H2506N	1
BB-8	1ST FLOOR EAST CORRIDOR	187	1122	3829	6	208/1	5.4	N	Y	MARKEL H2506N	1
BB-9	1ST FLOOR EAST CORRIDOR	187	935	3191	5	208/1	4.5	N	Y	MARKEL H2505N	1
BB-10	1ST FLOOR LOBBY	187	1590	5425	8.5	208/1	7.6	N	Y	MARKEL H2500N	1
BB-11	1ST FLOOR LOBBY	187	1590	5425	8.5	208/1	7.6	N	Y	MARKEL H2500N	1
BB-12	1ST FLOOR LOBBY	187	1590	5425	8.5	208/1	7.6	N	Y	MARKEL H2500N	1
BB-13	1ST FLOOR LOBBY	187	1590	5425	8.5	208/1	7.6	N	Y	MARKEL H2500N	1
BB-14	1ST FLOOR LOBBY	187	1590	5425	8.5	208/1	7.6	N	Y	MARKEL H2500N	1
BB-15	1ST FLOOR LOBBY	187	1590	5425	8.5	208/1	7.6	N	Y	MARKEL H2500N	1
BB-16	1ST FLOOR LOBBY	187	1590	5425	8.5	208/1	7.6	N	Y	MARKEL H2500N	1
BB-17	1ST FLOOR VESTIBULE	187	468	1596	2.5	208/1	2.2	N	Y	MARKEL G2512N	1
BB-18	1ST FLOOR VESTIBULE	187	468	1596	2.5	208/1	2.2	N	Y	MARKEL G2512N	1
BB-19	1ST FLOOR VESTIBULE	187	1496	5106	8	208/1	7.2	N	Y	MARKEL H2508N	1
BB-20	1ST FLOOR VESTIBULE	187	1590	5425	8.5	208/1	7.6	N	Y	MARKEL H2500N	1
BB-21	1ST FLOOR NORTH CORRIDOR	187	1590	5425	8.5	208/1	7.6	N	Y	MARKEL H2500N	1
BB-22	1ST FLOOR NORTH CORRIDOR	187	1122	3829	6	208/1	5.4	N	Y	MARKEL H2506N	1
BB-23	1ST FLOOR NORTH CORRIDOR	187	1590	5425	8.5	208/1	7.6	N	Y	MARKEL H2500N	1
BB-24	1ST FLOOR NORTH CORRIDOR	187	1122	3829	6	208/1	5.4	N	Y	MARKEL H2506N	1
BB-25	1ST FLOOR NORTH CORRIDOR	187	1590	5425	8.5	208/1	7.6	N	Y	MARKEL H2500N	1
BB-26	1ST FLOOR NORTH CORRIDOR	187	1122	3829	6	208/1	5.4	N	Y	MARKEL H2506N	1
BB-27	1ST FLOOR NORTH CORRIDOR	187	1590	5425	8.5	208/1	7.6	N	Y	MARKEL H2500N	1
BB-28	1ST FLOOR NORTH CORRIDOR	187	1122	3829	6	208/1	5.4	N	Y	MARKEL H2506N	1
BB-29	1ST FLOOR NORTH CORRIDOR	187	1590	5425	8.5	208/1	7.6	N	Y	MARKEL H2500N	1
BB-30	1ST FLOOR NORTH CORRIDOR	187	1122	3829	6	208/1	5.4	N	Y	MARKEL H2506N	1
BB-31	1ST FLOOR NORTH CORRIDOR	187	468	1596	2.5	208/1	2.2	N	Y	MARKEL G2512N	1
BB-32	1ST FLOOR NORTH CORRIDOR	187	935	3191	5	208/1	4.5	N	Y	MARKEL H2505N	1
BB-33	2ND FLOOR TOILET	187	561	1915	3	208/1	2.7	N	Y	MARKEL H2503N	1
BB-34	2ND FLOOR JANITOR ROOM	187	561	1915	3	208/1	2.7	N	Y	MARKEL H2503N	1
BB-35	3RD FLOOR JANITOR ROOM	187	561	1915	3	208/1	2.7	N	Y	MARKEL H2503N	1
BB-36	4TH FLOOR JANITOR ROOM	187	561	1915	3	208/1	2.7	N	Y	MARKEL H2503N	1

NOTES:

1. BUILT-IN THERMOSTAT

GAS TO STEAM HUMIDIFIER SCHEDULE

UNIT NO.	LOCATION	SERVICE	FAN CAPACITY CFM	STEAM CAPACITY IN LB/HR.	MBH INPUT	HEATING STAGES	VENT SIZE IN.	GAS INLET IN.	ELECTRICAL DATA FLA	MFS	V/ø/Hz.	INTER-LOCKED WITH	REMOTE CONTROL DEVICES	MANUFACTURER AND MODEL	REMARKS
HU-1	1ST FLOOR MECH. ROOM	AHU-1	36,000	300	400	4	7	1	5.0	15	120/1/60	R.A.HUMIDISTAT	N	DRI-STEEM GTS-400	1
HU-2	4TH FLOOR MECH. ROOM	AHU-1	36,000	300	400	4	7	1	5.0	15	120/1/60	R.A.HUMIDISTAT	N	DRI-STEEM GTS-400	1

NOTES:

1. FOR DUCT TIE-IN, USE SCHEDULE 40 STEEL PIPE, INSULATED WITH 2" OF FIBERGLASS INSULATION.
2. PROVIDE AIR GAP ON DRAIN PIPE FROM COMBUSTION CHAMBER TO OPEN DRAIN IN MECHANICAL ROOM.

EXPANSION TANK SCHEDULE

UNIT NO.	LOCATION	SERVICE	TANK TYPE	SYSTEM VOLUME, GAL.	MEAN DESIGN WATER TEMP, °F	TANK VOLUME, GAL.	PRE-CHARGED PRESSURE, PSIG	BASED ON MANUFACTURER AND MODEL	REMARKS
ET-1	1ST FLOOR MECH. ROOM	HOT WATER SYSTEM	ASME AIR CONTROL	1800	180	200	30	B&G 240	
ET-2	1ST FLOOR MECH. ROOM	CHILLED WATER SYSTEM	ASME AIR CONTROL	720	55	60	30	B&G 60	

ELECTRIC CABINET HEATER SCHEDULE

UNIT NO.	LOCATION	CFM (HI/LO)	HIGH RPM	LOW RPM	MOUNT	CABINET LENGTH (FT.)	DISCHARGE TYPE	CAPACITY BTU/HR	KW	AIR DATA EAT °F	AIR DATA LAT °F	ELECTRICAL DATA VOLTS/ø @ 60HZ	FULL LOAD AMPS	MAX FUSE SIZE	MOTOR STARTER Y/N	DISC. SWITCH Y/N	P'WIRED Y/N	INTER-LOCKED WITH	REMOTE CONTROL DEVICES	BASED ON MANUFACTURER AND MODEL	REMARKS
CUH-1	1st FLOOR SOUTH STAIRHALL	250/200	1050	850	SURFACE	3'-0"	FRONT	10500	3	60	96	208/1	12	15	N	N	Y	N	N	QMARK SERIES 1300	BUILT-IN T-STAT
CUH-2	1st FLOOR EAST STAIRHALL	250/200	1050	850	SURFACE	3'-0"	FRONT	10500	3	60	96	208/1	12	15	N	N	Y	N	N	QMARK SERIES 1300	BUILT-IN T-STAT
CUH-3	2nd FLOOR SOUTH STAIRHALL	250/200	1050	850	SURFACE	3'-0"	FRONT	10500	3	60	96	208/1	12	15	N	N	Y	N	N	QMARK SERIES 1300	BUILT-IN T-STAT
CUH-4	2nd FLOOR EAST STAIRHALL	250/200	1050	850	SURFACE	3'-0"	FRONT	10500	3	60	96	208/1	12	15	N	N	Y	N	N	QMARK SERIES 1300	BUILT-IN T-STAT
CUH-5	3rd FLOOR SOUTH STAIRHALL	250/200	1050	850	SURFACE	3'-0"	FRONT	10500	3	60	96	208/1	12	15	N	N	Y	N	N	QMARK SERIES 1300	BUILT-IN T-STAT
CUH-6	3rd FLOOR EAST STAIRHALL	250/200	1050	850	SURFACE	3'-0"	FRONT	10500	3	60	96	208/1	12	15	N	N	Y	N	N	QMARK SERIES 1300	BUILT-IN T-STAT
CUH-7	4th FLOOR SOUTH STAIRHALL	250/200	1050	850	SURFACE	3'-0"	FRONT	10500	3	60	96	208/1	12	15	N	N	Y	N	N	QMARK SERIES 1300	BUILT-IN T-STAT
CUH-8	4th FLOOR EAST STAIRHALL	250/200	1050	850	SURFACE	3'-0"	FRONT	10500	3	60	96	208/1	12	15	N	N	Y	N	N	QMARK SERIES 1300	BUILT-IN T-STAT

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4	01-29-99	ADDENDUM NO. 2
3	12-30-98	ISSUED FOR BID AND PERMIT
2	11-24-98	50% CD REVIEW
1	09-15-98	DESIGN DEVELOPMENT

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MECHANICAL SCHEDULES

SEAL:

DRAWING NUMBER:

M3-2

DATE:
SCALE: NONE
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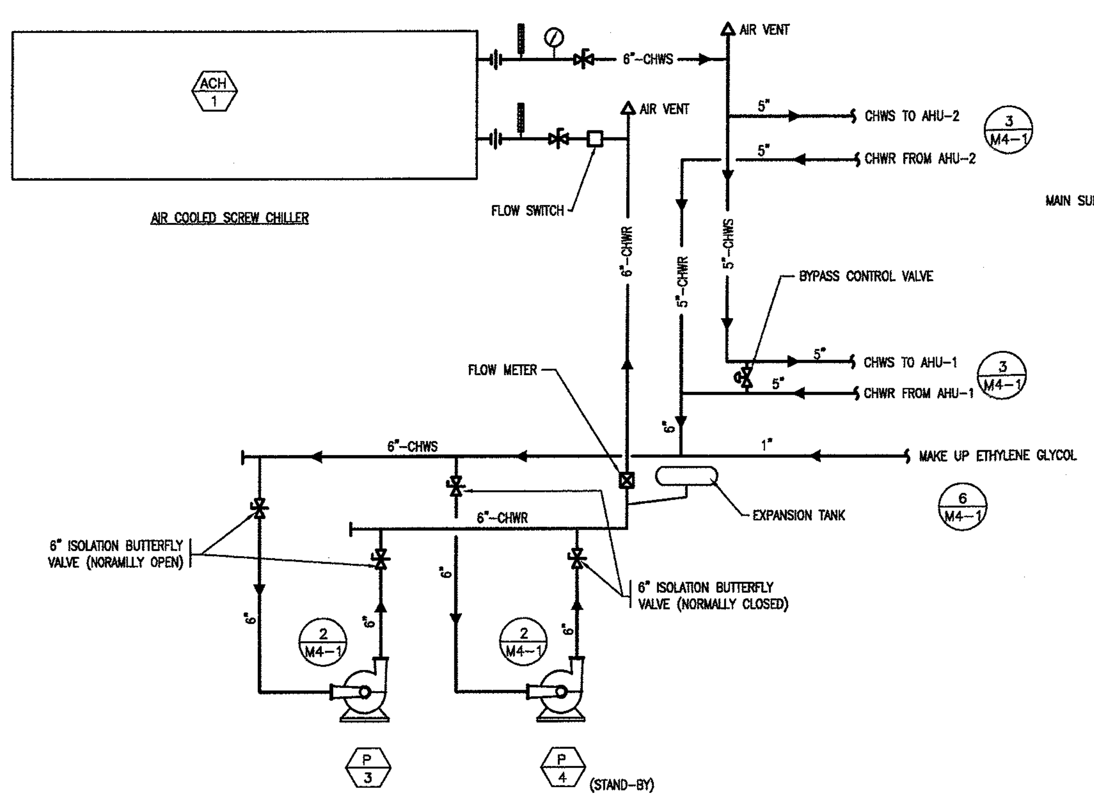

1 CHILLED WATER (ETHYLENE GLYCOL) PIPING DIAGRAM
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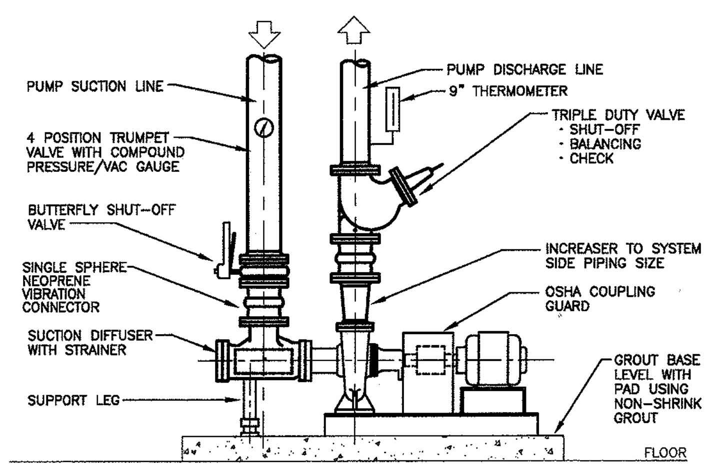
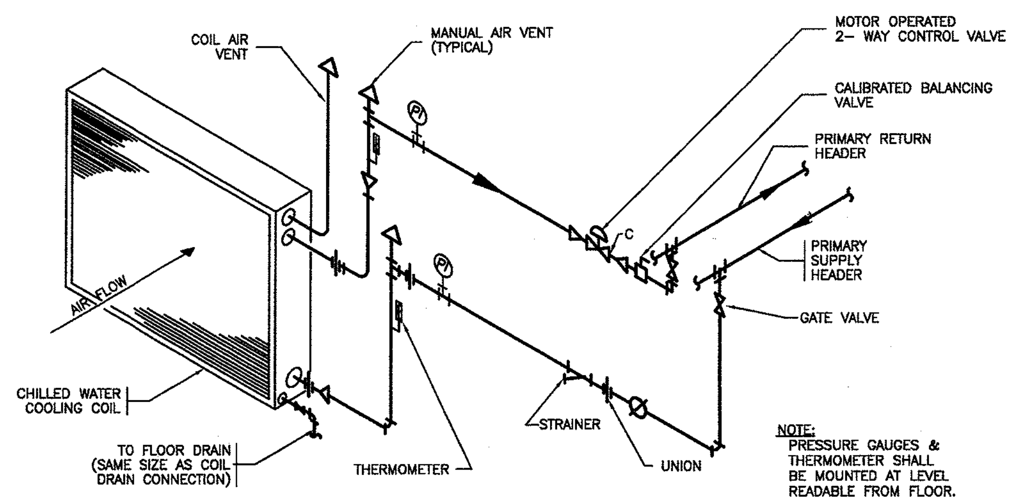


2 END SUCTION PUMP DETAIL
NOT TO SCALE



3 CHILLED WATER COIL PIPING DIAGRAM
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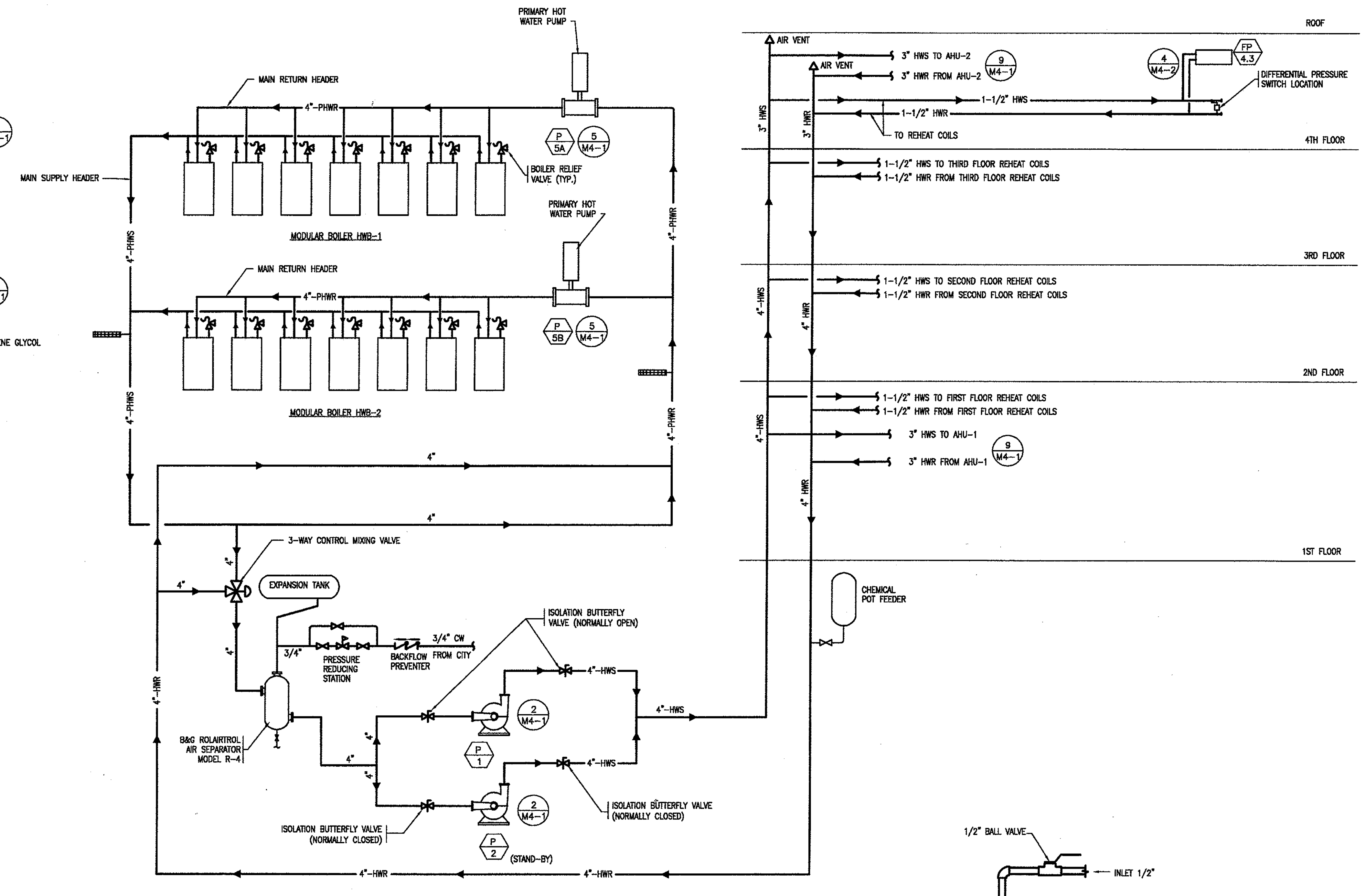

4 HOT WATER SYSTEM PIPING DIAGRAM
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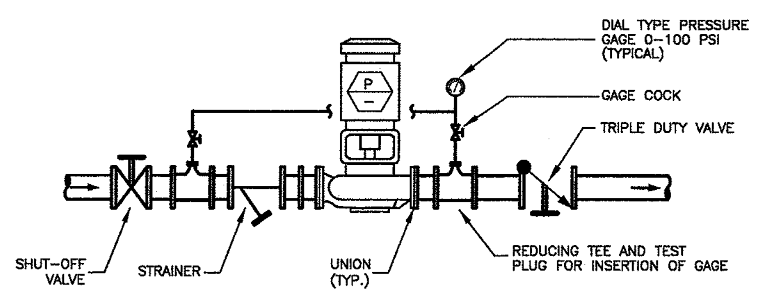

5 CIRCULATING IN-LINE PUMP
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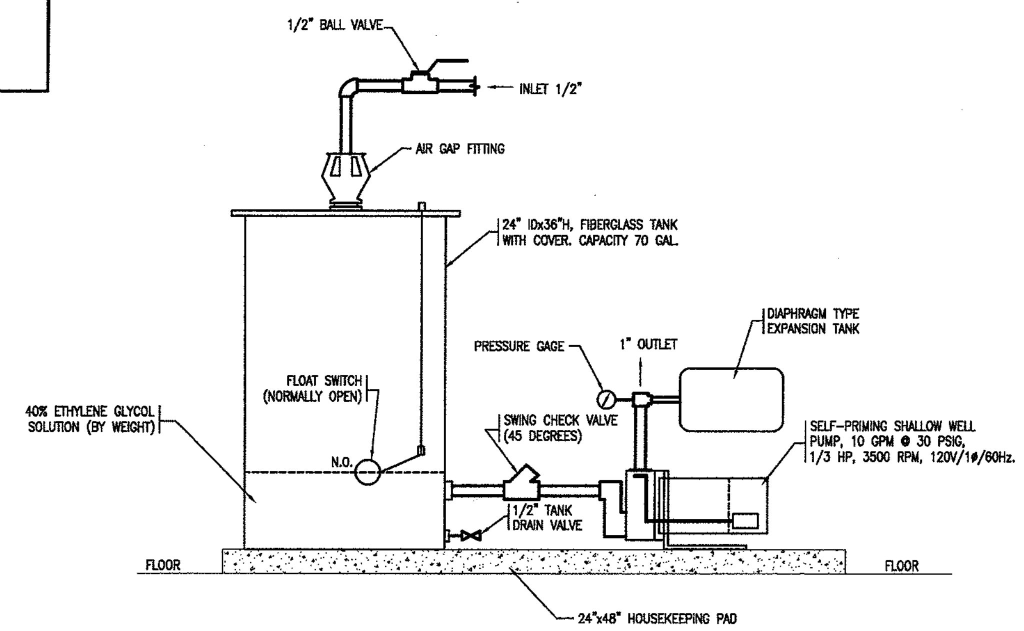

6 GLYCOL FILL SYSTEM
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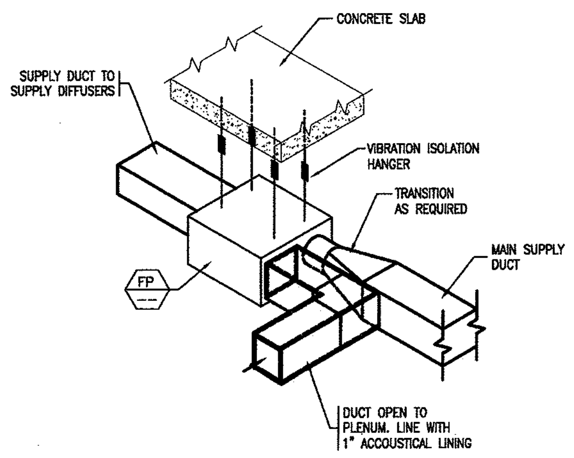
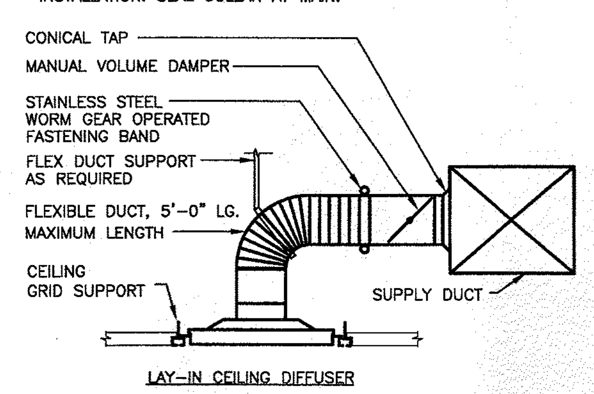
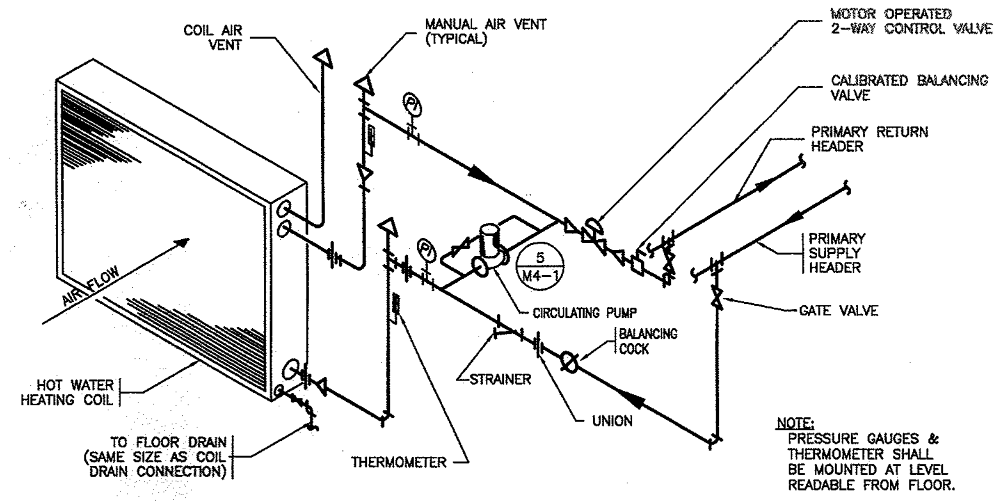


7 TYPICAL FAN POWERED BOX INSTALLATION DETAIL
NOT TO SCALE

NOTE: WHERE POSSIBLE, RE-USE EXISTING DUCT COLLAR AND DAMPER FOR NEW BRANCH INSTALLATION. SEAL COLLAR AT MAIN.



8 TYPICAL SUPPLY DIFFUSER CONNECTION
NOT TO SCALE



9 HOT WATER HEATING COIL PIPING DIAGRAM
NO SCALE

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NO.	DATE	DESCRIPTION
4	03-24-99	ISSUED FOR CONSTRUCTION & FINAL PERMIT
3	12-30-98	ISSUED FOR BID AND PERMIT
2	11-24-98	50% CD REVIEW
1	09-15-98	DESIGN DEVELOPMENT

DRAWING TITLE:
MECHANICAL DIAGRAMS AND DETAILS

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DRAWING NUMBER:
M4-1

DATE:
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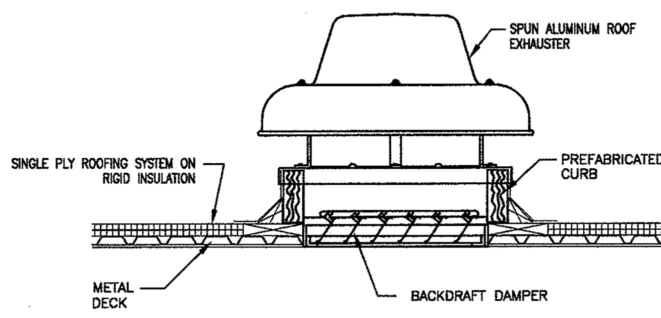
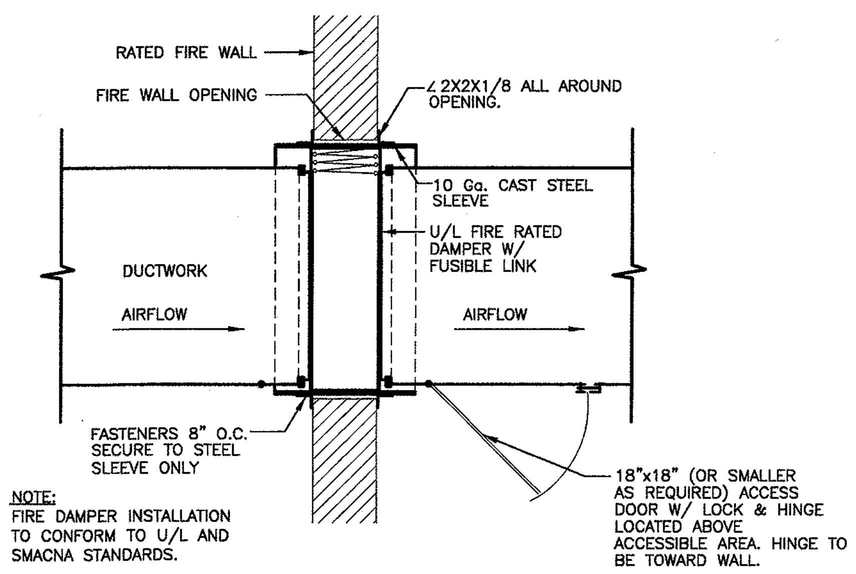
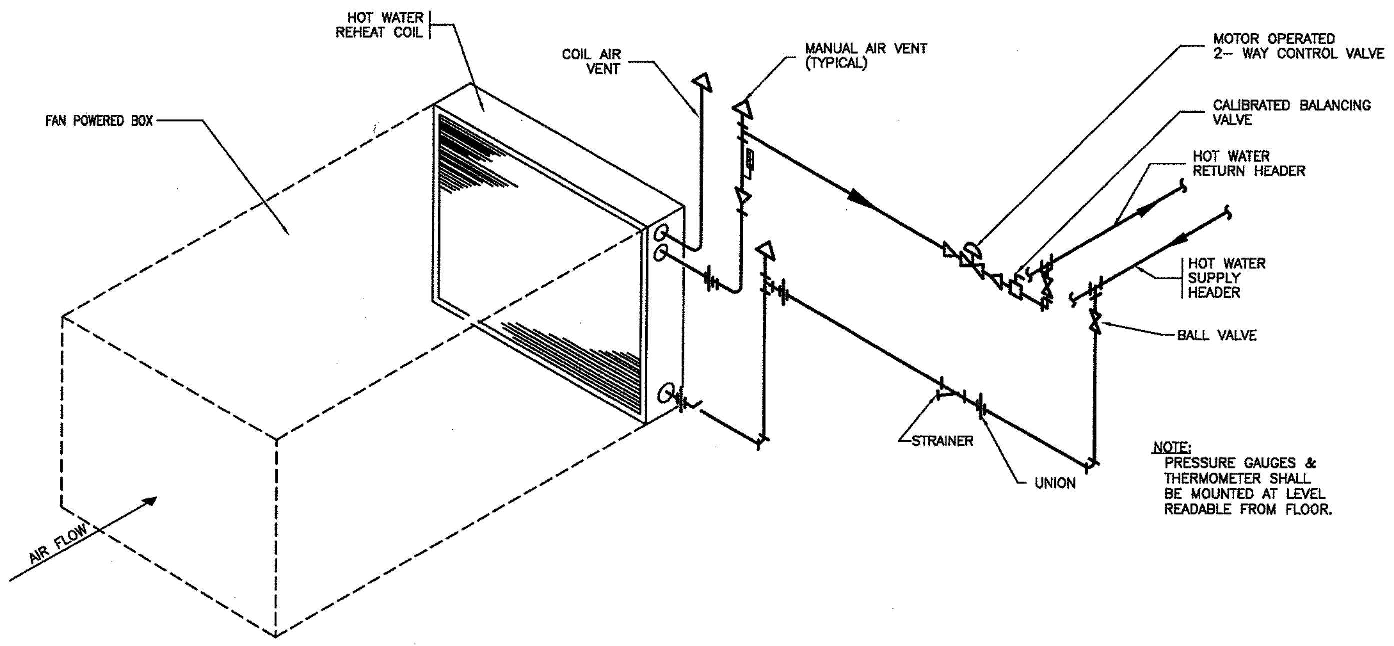


1 ROOF EXHAUSTER + CURB DETAIL
NO SCALE



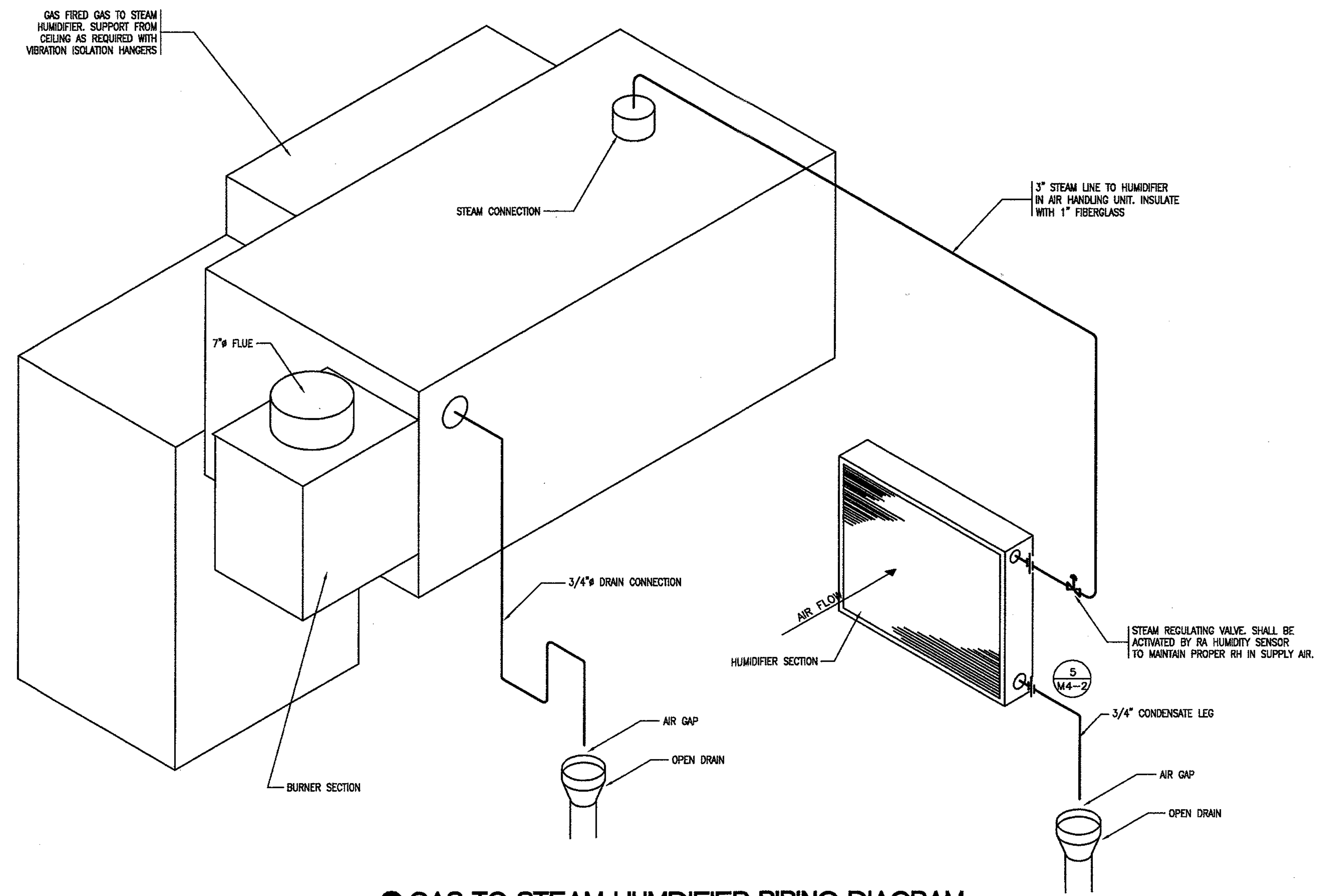
NOTE:
FIRE DAMPER INSTALLATION TO CONFORM TO U/L AND SMACNA STANDARDS.

2 TYPICAL VERTICAL FIRE DAMPER INSTALLATION
NOT TO SCALE



NOTE:
PRESSURE GAUGES & THERMOMETER SHALL BE MOUNTED AT LEVEL READABLE FROM FLOOR.

4 FP BOX HOT WATER REHEAT COIL PIPING DIAGRAM
NO SCALE



3 GAS TO STEAM HUMIDIFIER PIPING DIAGRAM
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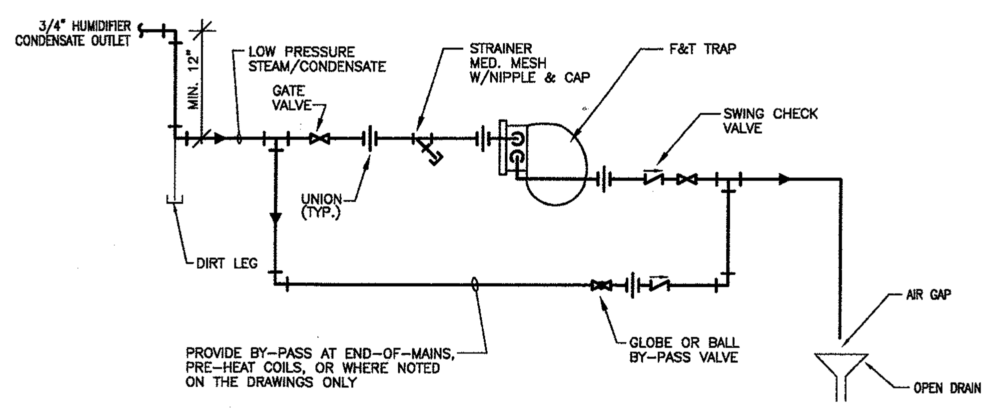
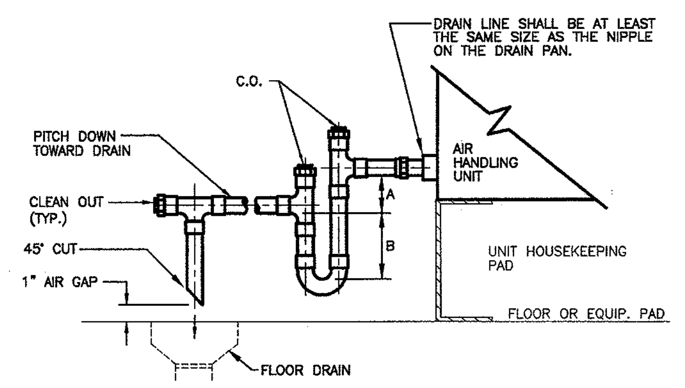


5 CONDENSATE TRAP ASSEMBLY AT HUMIDIFIER SECTION
NOT TO SCALE

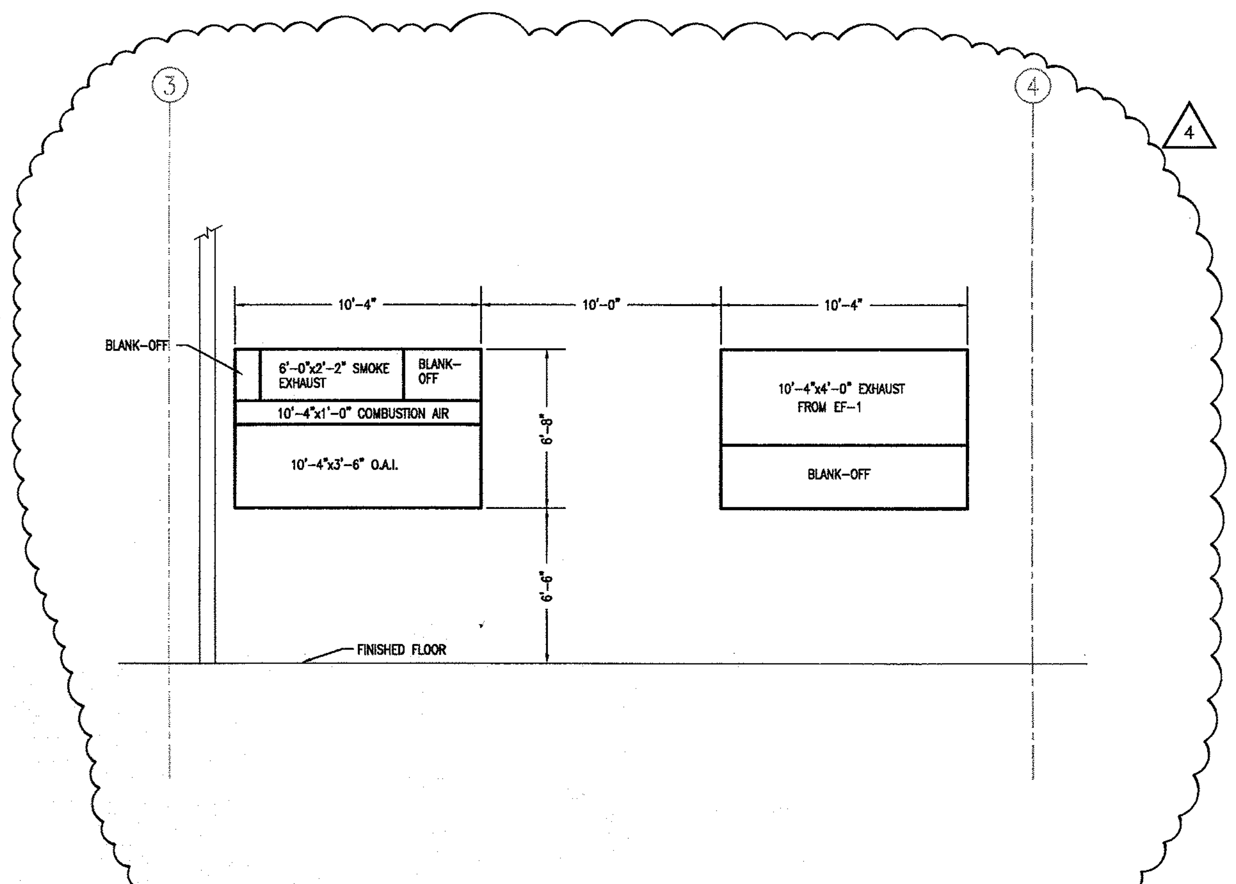


UNIT TYPE	A	B
DRAW THRU	≥ ("X")	≥ 1/2("X")

WHERE "X" = STATIC PRESS. IN COIL SECTION.

NOTE:
CONTRACTOR TO INSTALL AIR HANDLING UNIT AT SUFFICIENT HEIGHT TO INSTALL DRAIN TRAPS AS DETAILED.

6 AHU CONDENSATE DRAIN TRAP DIAGRAM
NO SCALE



7 SECTION AT 1ST FLOOR MECH. ROOM LOUVERS
1/4"=1'-0"

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NO.	DATE	DESCRIPTION
4	03-24-99	ISSUED FOR CONSTRUCTION & FINAL REVIEW
3	12-30-98	ISSUED FOR BID AND PERMIT
2	11-24-98	50% CD REVIEW
1	09-15-98	DESIGN DEVELOPMENT

DRAWING TITLE:
MECHANICAL DIAGRAMS AND DETAILS

SEAL:

DRAWING NUMBER:
M4-2

DATE:
SCALE:
DRAWN: S. SARAF
PROJ. NO.:

SEQUENCE OF OPERATION

TEMPERATURE CONTROL WORK SHALL INCLUDE DESIGN AND INSTALLATION OF A COMPLETE AND OPERATING AUTOMATIC TEMPERATURE CONTROL SYSTEM INCLUDING THE FOLLOWING:

AIR HANDLNG UNIT AHU-1 AND RETURN FAN EF-1

GENERAL

1. SUPPLY AND RETURN FANS SHALL ACTIVATE ON A TIME SCHEDULE. IN GENERAL, THE UNITS SHALL BE DEENERGIZED DURING NIGHT. AHU-1 AND EF-1 SHALL START AT 10% LOAD AND RAMP UP TO DESIGN CFM THROUGH VARIABLE FREQUENCY DRIVES VFD-AHU1 AND VFD-EF1.
2. WHEN THE FAN STARTER IS ENERGIZED, THE SYSTEM SHALL RUN ON A MORNING WARM UP CYCLE AS INDICATED BELOW, THEN THE O.A. DAMPER SHALL OPEN TO THE MINIMUM POSITION. SENSORS SHALL MAINTAIN MINIMUM CFM THRU AIR MEASURING STATION (AMS-3). MINIMUM SETPOINT SHALL BE 9000 CFM (ADJ.).
3. WHEN THE SUPPLY FAN STARTER IS DEENERGIZED, THE OUTSIDE AIR DAMPER AND EXHAUST AIR DAMPER SHALL CLOSE AND RETURN AIR DAMPER SHALL BE FULLY OPEN.
4. SUMMER OR WINTER OPERATION SHALL BE DETERMINED BY OPERATOR.
5. CHILLED WATER (ETHYLENE GLYCOL) VALVE (CV-2) SHALL BE IN FULL BYPASS POSITION WHEN AHU-1 IS DE-ENERGIZED.
6. AIR FLOW CONTROL FOR AHU-1 AND EF-1

   DURING NORMAL OPERATION, VARIABLE FREQUENCY DRIVES (VFD-AHU1 AND VFD-EF1) SHALL MODULATE THE SUPPLY FAN TO MAINTAIN THE STATIC PRESSURE IN THE SYSTEM. A DUCT STATIC PRESSURE SENSOR SP-1 LOCATED 2/3 OF THE LONGEST DISTANCE FROM THE SUPPLY FAN SHALL PROVIDE INPUT TO THE VARIABLE VFD-AHU1 TO SPEED UP OR SLOW DOWN AHU-1. THE RETURN FAN (EF-1) SHALL OPERATE OFF A DIFFERENTIAL CFM READING FROM THE SUPPLY AND RETURN SYSTEM AIR MEASURING STATIONS (AM-1,2). SET POINT OF THE SUPPLY AIR STATIC PRESSURE SENSOR (SP-1) IS INDICATED IN THE PLAN.

WINTER OPERATION

1. DURING NIGHT SETBACK MODE, THE BUILDING SHALL BE MAINTAINED AT 65°F (ADJ.). BASED ON THE TIME SCHEDULE, MORNING WARM UP CYCLE WILL START UP AND RUN FOR TWO (2) HOURS OR UNTIL BUILDING REACHES ITS DESIGN TEMPERATURE OF 70°F (ADJ.). DURING MORNING WARM UP CYCLE, OUTSIDE AIR AND EXHAUST DAMPERS SHALL BE FULLY CLOSED, RETURN DAMPERS SHALL BE FULLY OPEN, HEATING VALVE (CV-1) SHALL BE IN THE FULL OPEN POSITION, VAV AND FAN POWERED BOXES SHALL DELIVER THE MAXIMUM CFM'S AND THE REHEAT COILS AT THE FAN POWERED BOXES SHALL BE FULLY OPEN.
2. DURING REGULAR OPERATION, OUTSIDE AIR DAMPER SHALL BE SET AT THE MINIMUM 25% (ADJ.) POSITION. A TWO WAY HEATING CONTROL VALVE (CV-1) SHALL OPEN TO INTRODUCE HOT WATER INTO THE HEATING COIL LOOP TO MAINTAIN THE DISCHARGE AIR TEMPERATURE (T-3) AT 55°F (ADJ.). A CIRCULATING PUMP SHALL MAINTAIN CONSTANT FLOW THROUGH COIL AT ALL TIMES.
3. A FREEZESTAT (FZ-1) LOCATED ACROSS THE HEATING COIL SHALL TRIGGER A SUPPLY FAN AHU-1 SHUT DOWN AND SEND AN ALARM TO THE MAIN TC PANEL. FREEZESTAT SHALL BE TIED IN SERIES TO THE MOTOR CONTROL CENTER WHICH SHALL DE-ENERGIZE THE SUPPLY FAN AHU-1 AND RETURN FAN EF-1.
4. DURING WINTER OPERATION, CHILLED WATER COOLING COIL (CV-2) SHALL BE IN THE BYPASS POSITION.

SUMMER OPERATION

1. MAIN COOLING COIL SHALL BE MODULATED BY CONTROL VALVE CV-1. AS THE DISCHARGE TEMPERATURE INCREASES, THE THREE WAY MIXING CONTROL VALVE (CV-2) SHALL ALLOW MORE WATER IN THE COIL. THE COIL SHALL MAINTAIN DISCHARGE TEMPERATURE (T-3) AT 55°F (ADJ.)
2. CHILLED WATER VALVE CV-2 SHALL BE IN FULL BYPASS POSITION WHEN AHU-1 IS DE-ENERGIZED.

ZONE CONTROL

1. ALL INTERIOR ZONES SHALL BE CONTROLLED BY VAV BOXES THAT MODULATE BETWEEN A MINIMUM POSITION (25% ADJ.) TO MAXIMUM FULL OPEN.
2. ALL EXTERIOR ZONES ARE CONTROLLED BY FAN POWERED BOXES THAT SUPPLY CONSTANT AIR FLOW WITH 33% AIR FROM PLENUM. ADDITIONAL HEATING IS ACCOMPLISHED BY REHEAT CONTROL AT THE VAV BOX WHEN THE ZONE T-STAT DEMANDS MORE HEAT.

HUMIDIFICATION

1. HUMIDITY CONTROL SHALL BE ACCOMPLISHED BY A STAND ALONE STEAM HUMIDIFIER LOCATED DOWNSTREAM OF THE COOLING COIL IN AHU-1. THE RETURN AIR HUMIDITY SENSOR (H-1) SHALL MODULATE THE STEAM VALVE (CV-3) IN THE HUMIDIFIER SECTION TO MAINTAIN A RELATIVE HUMIDITY OF 50% R.H. (ADJ.) DURING SUMMER AND 35 % (ADJ.) DURING WINTER. A HIGH HUMIDITY ALARM SHALL BE GIVEN IF SA HUMIDISTAT (H-2) INDICATES HIGH HUMIDITY IN SUPPLY AIR.

ECONOMIZER MODE

1. WHEN THE RETURN AIR ENTHALPY IS GREATER THAN OUTDOOR AIR ENTHALPY, THE MIXED AIR DAMPER SHALL BE MODULATED BY THE MIXED AIR TEMPERATURE SENSOR (T-1) TO MAINTAIN THE SETPOINT. WHEN THE RETURN AIR ENTHALPY IS LESS THAN THE OUTSIDE AIR ENTHALPY, THE MIXED AIR DAMPER SHALL BE MODULATED TO 100% OUTSIDE AIR.

FILTER MONITORING

1. A MAINTAINENCE ALARM FROM THE TEMPERATURE CONTROL PANEL SHALL BE GENERATED WHEN THE DIFFERENTAIL PRESSURE ACROSS THE FILTER (F-1) IS GREATER THAN 1.0" W.C.

HIGH STATIC LIMIT

1. A HIGH STATIC LIMIT SWITCH (HL-1 AND HL-2) LOCATED DOWNSTREAM OF THE SUPPLY FAN AND UPSTREAM OF THE RETURN FAN SHALL SIGNAL THE VFD TO SLOW DOWN THE FAN BELOW THE HI-STATIC LIMIT OF THE FAN. A HIGH PRESSURE ALARM LIGHT ON THE LOCAL PANEL AND REMOTE ALARM DISPLAY SHALL BE ACTIVATED.

SMOKE CONTROL SYSTEM

1. WHEN SMOKE DETECTORS IN THE SUPPLY (SD-1) AND RETURN (SD-2) DUCT SYSTEM DETEC FIRE AND SMOKE, THE TC PANEL SHALL DE-ENERGIZE AHU-1 AND EF-1 AND CLOSE OUTSIDE AIR DAMPERS.

ATRIUM SMOKE EXHAUST SYSTEM

1. THE SMOKE EXHAUST SYSTEM SHALL BE TIED INTO THE FIRE ALARM PANEL WHICH PROVIDES OVERIDES OVER THE TEMPERATURE CONTROL SYSTEM.
2. THE FIRE SYSTEM SMOKE DETECTORS LOCATED IN THE ATRIUM AND TIED TO THE FIRE ALARM PANEL, UPON DETECTION OF FIRE AND SMOKE SHALL DO THE FOLLOWING:

   A. SUPPLY FANS AHU-1, AHU-2 AND RETURN FANS EF-1 AND EF-2 SHALL BE DE-ENERGIZED. THIS SHALL BE ACCOMPLISHED BY TYING THE SMOKE DETECTOR WIRING IN SERIES WITH THE MOTOR CONTROLLERS OF THESE FANS. ALL OUTSIDE AIR DAMPERS TIED TO THE AIR HANDLING UNITS AHU-1 AND AHU-2 SHALL BE CLOSED. SMOKE DETERCTORS SHALL ALSO PROVIDE A SIGNAL TO THE TEMPERATURE CONTROL PANEL AND AN ALARM SHALL BE GENERATED.

   B. SMOKE EXHAUST FANS SEF-1 AND SEF-2 SHALL BE ENERGIZED TO EXHAUST THE SMOKE FROM THE BUILDING. THIS SHALL BE DONE AUTOMATICALLY FROM THE FIRE ALARM PANEL. MANUAL OVERRIDE SWITCHES SHALL BE PROVIDED FOR THE FIRE DEPARTMENT USE. EXHAUST MAKE UP DAMPER D-4 SHALL BE FULLY OPEN WHEN THE SMOKE EXHAUST FANS ARE ENERGIZED AND SHALL CLOSE WHEN THEY ARE DE-ENERGIZED.

KITCHEN EXHAUST SYSTEM

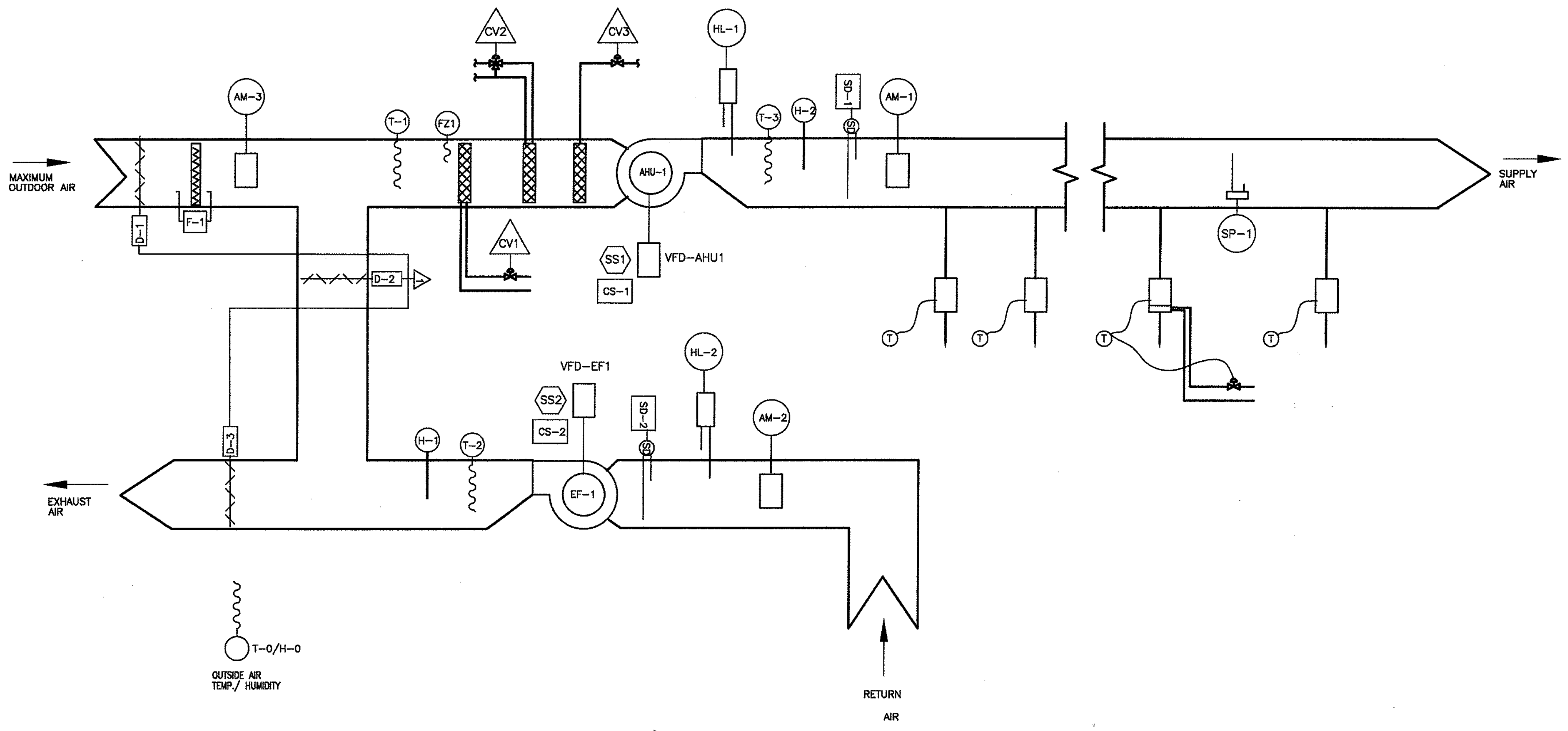
KITCHEN EXHAUST FAN ON FIRST FLOOR (KE-1) SHALL BE INTERLOCKED TO THE HOOD OPERATION AND SHALL TURN ON WHEN THE HOOD IS USED.

PAINT BOOTH EXHAUST SYSTEM

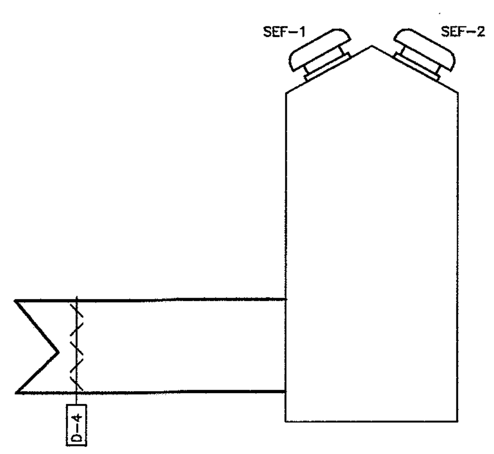
PAINT BOOTH EXHAUST FAN ON ROOF (HE-1) SHALL BE INTERLOCKED TO THE PAINT HOOD OPERATION AND SHALL TURN ON WHEN THE HOOD IS USED.

BOOKMOBILE EXHAUST SYSTEM

THE BOOKMOBILE EXHAUST FAN SHALL OPERATE FROM A LOCAL THERMOSTAT MOUNTED ON THE WALL OF THE BOOKMOBILE AREA. WHEN THE TEMPERATURE IN THE BOOKMOBILE EXCEEDS 85°F (ADJ.), THE EXHAUST FAN SHALL START. THE EXHAUST FAN SHALL STOP WHEN THE TEMPERATURE OF THE BOOKMOBILE REACHES 85°F (ADJ.)



1 AHU-1 TEMPERATURE CONTROL DIAGRAM
NOT TO SCALE



2 ATRIUM SMOKE EXHAUST DIAGRAM
NOT TO SCALE

LEGEND:

- ○ ANALOG INPUT
- △ ANALOG OUTPUT
- □ DIGITAL INPUT
- ⬡ DIGITAL OUTPUT

INPUT/OUTPUT SUMMARY - VAV AIR HANDLING SYSTEMS

I/O TYPE —— / CONTROL POINT	DIGITAL OUTPUTS							ANALOG OUTPUTS							DIGITAL INPUTS						ANALOG INPUTS							CONTROL LOOP ALGORITHM							APPLICATION SOFTWARE													Supplementary Notes
	OFF/AUTO OR OPEN/CLOSE	OFF/ AUTO/ ON	ENABLE/DISABLE					VANE ACTUATOR POSITION	AFD SPEED REFERENCE(4-20 mA)	VALVE POSITION ADJ.	DAMPER POSITION ADJ.	HUMIDIFIER OUTPUT ADJ.	OTHER ( )		DIFFERENTIAL PRESS. SWITCH	CURRENT SWITCH	OTHER CONTACT CLOSURES	WATER LEVEL SWITCH	FLOW SWITCH		TEMPERATURE	STATIC PRESSURE	DEW POINT OR HUMIDITY	AIRFLOW MEASUREMENT	PULSE ACCUMULATOR	AVERAGING TYPE T-STAT	PROBE TYPE T-STAT	PROPORTIONAL (P)	P- INTEGRAL (I)	P- I - DERIVATIVE (D)					HIGH/LOW ALARMS	MAINTENANCE ALARM	AUTO ALARM SEQUENCES	TIME OR EVENT PROGRAM	SCHEDULED START/STOP	OPTIMUM START/STOP	DEMAND LIMITING	ENTHALPY ECONOMIZER	POINT TRENDING	SUPPLY/RETURN AIRFLOW CTRL.	RUN TIME TOTALIZATION	TEMP. RESET SCHEDULE	STATUS ALARM	
DISCHARGE AIR TEMPERATURE (T-3)																					x					x									x						x		x			x		
MIXED AIR TEMPERATURE (T-1)																					x					x																	x					
OUTSIDE AIR TEMP./HUMIDITY (T-O, H-O)																					x		x																				x					
RETURN AIR TEMPERATURE (T-2)																					x						x																x					
RETURN AIR HUMIDITY (H-1)																							x																									
SUPPLY AIR HUMIDITY (H-2)																							x												x													
SUPPLY AIR STATIC PRESSURE RISER1 (SP-1) 2/3 DIST FROM FAN																						x													x								x					
SUPPLY FAN STATIC PRESSURE (HL-1)																						x													x													
RETURN FAN STATIC PRESSURE (HL-2)																						x													x													
SUPPLY FAN AIRFLOW CONTROL (VFD-AHU1)									x																					x														x				
EXHAUST FAN AIRFLOW CONTROL (VFD-EF1)									x																					x														x				
VARIABLE O.A. DMPR. (D-3) ⚠1											x																															x						
RETURN AIR DAMPER (D-2) ⚠1											x																															x						
MAXIMUM OUTSIDE AIR DAMPER (D-1) ⚠1											x																																					
HOT WATER HEATING COIL VALVE (CV-1)										x																				x																		
CHILLED WATER COOLING COIL VALVE (CV-2)										x																				x																		
HUMIDIFIER STEAM CONTROL VALVE (CV-3)												x																		x																		
FREEZESTAT (FZ-1)																	x																			x	x											
MAIN FILTER DIFFERENTIAL PRESSURE (F-1)															x																					x												
SUPPLY AIR SMOKE DETECTOR (SD-1)																	x																			x	x											
EXHAUST AIR SMOKE DETECTOR (SD-2)																	x																			x	x											
EXHAUST FAN STATUS (CS-2)																x																						x									x	
SUPPLY FAN STATUS (CS-1)																x																															x	
SUPPLY FAN START/ STOP (SS-1)		x																																					x						x			
EXHAUST FAN START/ STOP (SS-2)		x																																					x						x			
VAV AIR FLOW CONTROL (ALL VAV BOXES)											x																			x																		
FAN POWERED BOX REHEAT VALVE (ALL FAN POWERED BOXES)										x																				x																		
SUPPLY SIDE AIR MEASURING STATION (AM-1)																								x																			x					
RETURN SIDE AIR MEASURING STATION (AM-2)																								x																			x					
OUTSIDE AIR MEASURING STATION (AM-3)																								x																			x					

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4	03-24-99	ISSUED FOR CONSTRUCTION & FINAL REVIEW
3	12-30-98	ISSUED FOR BID AND PERMIT
2	11-24-98	50% CD REVIEW
1	09-15-98	DESIGN DEVELOPMENT

DRAWING TITLE:

TEMPERATURE CONTROL DIAGRAM AHU-1

SEAL:

DRAWING NUMBER: **M5-1**

DATE:
SCALE:
DRAWN: S. SARAF
PROJ. NO.:

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03-23-1999 11:16:42(X-REF) R:\DOCUMENT\06252801\COMMON\DWG\00TTBD$0.dwg

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SEQUENCE OF OPERATION

TEMPERATURE CONTROL WORK SHALL INCLUDE DESIGN AND INSTALLATION OF A COMPLETE AND OPERATING AUTOMATIC TEMPERATURE CONTROL SYSTEM INCLUDING THE FOLLOWING:

AIR HANDLING UNIT AHU-2 AND RETURN FAN EF-2

GENERAL

1. SUPPLY AND RETURN FANS SHALL ACTIVATE ON A TIME SCHEDULE. IN GENERAL, THE UNITS SHALL BE DEENERGIZED DURING NIGHT. AHU-2 AND EF-2 SHALL START AT 10% LOAD AND RAMP UP TO DESIGN CFM THROUGH VARIABLE FREQUENCY DRIVES VFD-AHU2 AND VFD-EF2.
2. WHEN THE FAN STARTER IS ENERGIZED, THE SYSTEM SHALL RUN ON A MORNING WARM UP CYCLE AS INDICATED BELOW, THEN THE O.A. DAMPER SHALL OPEN TO THE MINIMUM POSITION. SENSORS SHALL MAINTAIN MINIMUM CFM THRU AIR MEASURING STATION (AMS-3). MINIMUM SETPOINT SHALL BE 9000 CFM (ADJ.).
3. WHEN THE SUPPLY FAN STARTER IS DEENERGIZED, THE OUTSIDE AIR DAMPER AND EXHAUST AIR DAMPER SHALL CLOSE AND RETURN AIR DAMPER SHALL BE FULLY OPEN.
4. SUMMER OR WINTER OPERATION SHALL BE DETERMINED BY OPERATOR.
5. CHILLED WATER (ETHYLENE GLYCOL) VALVE (CV-2) SHALL BE IN FULL BYPASS POSITION WHEN AHU-2 IS DE-ENERGIZED.
6. AIR FLOW CONTROL FOR AHU-2 AND EF-2

   DURING NORMAL OPERATION, VARIABLE FREQUENCY DRIVES (VFD-AHU1 AND VFD-EF1) SHALL MODULATE THE SUPPLY FAN TO MAINTAIN THE STATIC PRESSURE IN THE SYSTEM. A DUCT STATIC PRESSURE SENSOR SP-2 LOCATED 2/3 OF THE LONGEST DISTANCE FROM THE SUPPLY FAN AHU-2 SHALL PROVIDE INPUT TO THE VARIABLE VFD-AHU2 TO SPEED UP OR SLOW DOWN AHU-2. THE RETURN FAN (EF-2) SHALL OPERATE OFF A DIFFERENTIAL CFM READING FROM THE SUPPLY AND RETURN SYSTEM AIR MEASURING STATIONS(AM-1,2). SET POINT OF THE SUPPLY AIR STATIC PRESSURE SENSOR (SP-2) IS INDICATED IN THE PLAN.

WINTER OPERATION

1. DURING NIGHT SETBACK MODE, THE BUILDING SHALL BE MAINTAINED AT 65°F (ADJ.). BASED ON THE TIME SCHEDULE, MORNING WARM UP CYCLE WILL START UP AND RUN FOR TWO (2) HOURS OR UNTIL BUILDING REACHES ITS DESIGN TEMPERATURE OF 70°F (ADJ.). DURING MORNING WARM UP CYCLE, OUTSIDE AIR AND EXHAUST DAMPERS SHALL BE FULLY CLOSED, RETURN DAMPERS SHALL BE FULLY OPEN, HEATING VALVE (CV-1) SHALL BE IN THE FULL OPEN POSITION, VAV AND FAN POWERED BOXES SHALL DELIVER THE MAXIMUM CFM'S AND THE REHEAT COILS AT THE FAN POWERED BOXES SHALL BE FULLY OPEN.
2. DURING REGULAR OPERATION, OUTSIDE AIR DAMPER SHALL BE SET AT THE MINIMUM 25% (ADJ.) POSITION. A TWO WAY HEATING CONTROL VALVE (CV-1) SHALL OPEN TO INTRODUCE HOT WATER INTO THE HEATING COIL LOOP TO MAINTAIN THE DISCHARGE AIR TEMPERATURE (T-3) AT 55°F (ADJ.). A CIRCULATING PUMP SHALL MAINTAIN CONSTANT FLOW THROUGH COIL AT ALL TIMES.
3. A FREEZESTAT (FZ-1) LOCATED ACROSS THE HEATING COIL SHALL TRIGGER A SUPPLY FAN AHU-1 SHUT DOWN AND SEND AN ALARM TO THE MAIN TC PANEL. FREEZESTAT SHALL BE TIED IN SERIES TO THE MOTOR CONTROL CENTER WHICH SHALL DE-ENERGIZE THE SUPPLY FAN AHU-2 AND RETURN FAN EF-2.
4. DURING WINTER OPERATION, CHILLED WATER COOLING COIL (CV-2) SHALL BE IN THE BYPASS POSITION.

SUMMER OPERATION

1. MAIN COOLING COIL SHALL BE MODULATED BY CONTROL VALVE CV-1. AS THE DISCHARGE TEMPERATURE INCREASES, THE THREE WAY MIXING CONTROL VALVE (CV-2) SHALL ALLOW MORE WATER IN THE COIL. THE COIL SHALL MAINTAIN DISCHARGE TEMPERATURE (T-3) AT 55°F (ADJ.)
2. CHILLED WATER VALVE CV-2 SHALL BE IN FULL BYPASS POSITION WHEN AHU-1 IS DE-ENERGIZED.

ZONE CONTROL

1. ALL INTERIOR ZONES SHALL BE CONTROLLED BY VAV BOXES THAT MODULATE BETWEEN A MINIMUM POSITION (25% ADJ.) TO MAXIMUM FULL OPEN.
2. ALL EXTERIOR ZONES ARE CONTROLLED BY FAN POWERED BOXES THAT SUPPLY CONSTANT AIR FLOW WITH 33% AIR FROM PLENUM. ADDITIONAL HEATING IS ACCOMPLISHED BY REHEAT CONTROL AT THE VAV BOX WHEN THE T-STAT DEMANDS MORE HEAT.

HUMIDIFICATION

1. HUMIDITY CONTROL SHALL BE ACCOMPLISHED BY A STAND ALONE STEAM HUMIDIFIER LOCATED DOWNSTREAM OF THE COOLING COIL IN AHU-1. THE RETURN AIR HUMIDITY SENSOR (H-1) SHALL MODULATE THE STEAM VALVE (CV-3) IN THE HUMIDIFIER SECTION TO MAINTAIN A RELATIVE HUMIDITY OF 50% R.H. (ADJ.) DURING SUMMER AND 35 % (ADJ.) DURING WINTER. A HIGH HUMIDITY ALARM SHALL BE GIVEN IF SA HUMIDISTAT (H-2) INDICATES HIGH HUMIDITY IN SUPPLY AIR.

ECONOMIZER MODE

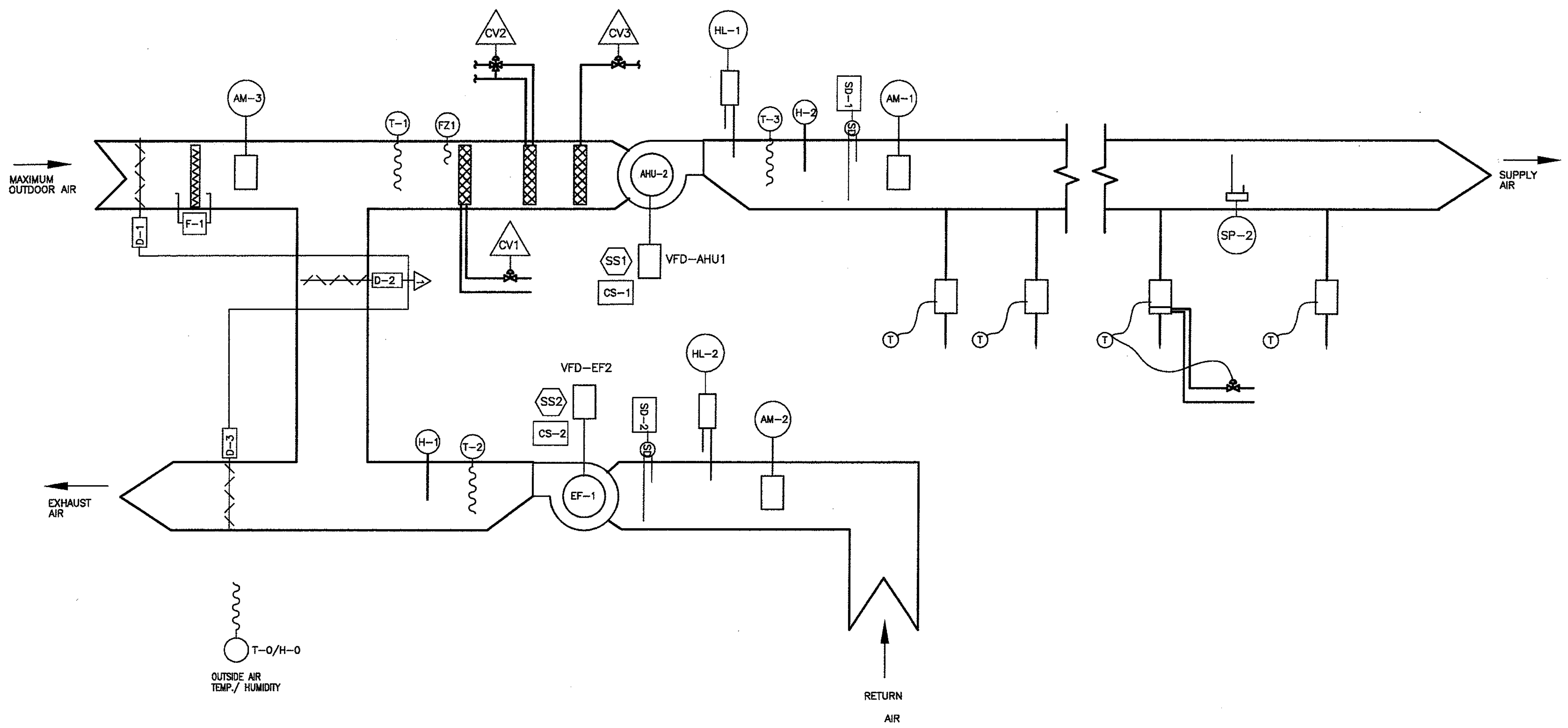
1. WHEN THE RETURN AIR ENTHALPY IS GREATER THAN OUTDOOR AIR ENTHALPY, THE MIXED AIR DAMPER SHALL BE MODULATED BY THE MIXED AIR TEMPERATURE SENSOR (T-1) TO MAINTAIN THE SETPOINT. WHEN THE RETURN AIR ENTHALPY IS LESS THAN THE OUTSIDE AIR ENTHALPY, THE MIXED AIR DAMPER SHALL BE MODULATED TO 100% OUTSIDE AIR.

FILTER MONITORING

1. A MAINTAINENCE ALARM FROM THE TEMPERATURE CONTROL PANEL SHALL BE GENERATED WHEN THE DIFFERENTAIL PRESSURE ACROSS THE FILTER (F-1) IS GREATER THAN 1.0" W.C.

HIGH STATIC LIMIT

1. A HIGH STATIC LIMIT SWITCH (HL-1 AND HL-2) LOCATED DOWNSTREAM OF THE SUPPLY FAN AND UPSTREAM OF THE RETURN FAN SHALL SIGNAL THE VFD TO SLOW DOWN THE FAN BELOW THE HI-STATIC LIMIT OF THE FAN. A HIGH PRESSURE ALARM LIGHT ON THE LOCAL PANEL AND REMOTE ALARM DISPLAY SHALL BE ACTIVATED.



1 AHU-2 TEMPERATURE CONTROL DIAGRAM
NOT TO SCALE

LEGEND:

- ○ ANALOG INPUT
- △ ANALOG OUTPUT
- □ DIGITAL INPUT
- ⬡ DIGITAL OUTPUT

INPUT/OUTPUT SUMMARY - VAV AIR HANDLING SYSTEMS

I/O TYPE → / CONTROL POINT ↓	DIGITAL OUTPUTS: OFF/AUTO OR OPEN/CLOSE	DIGITAL OUTPUTS: OFF/ AUTO/ ON	DIGITAL OUTPUTS: ENABLE/DISABLE	ANALOG OUTPUTS: VANE ACTUATOR POSITION	ANALOG OUTPUTS: AFD SPEED REFERENCE(4-20 mA)	ANALOG OUTPUTS: VALVE POSITION ADJ.	ANALOG OUTPUTS: DAMPER POSITION ADJ.	ANALOG OUTPUTS: HUMIDIFIER OUTPUT ADJ.	ANALOG OUTPUTS: OTHER ( )	DIGITAL INPUTS: DIFFERENTIAL PRESS. SWITCH	DIGITAL INPUTS: CURRENT SWITCH	DIGITAL INPUTS: OTHER CONTACT CLOSURES	DIGITAL INPUTS: WATER LEVEL SWITCH	DIGITAL INPUTS: FLOW SWITCH
DISCHARGE AIR TEMPERATURE (T-3)														
MIXED AIR TEMPERATURE (T-1)														
OUTSIDE AIR TEMP./HUMIDITY (T-0, H-0)														
RETURN AIR TEMPERATURE (T-2)														
RETURN AIR HUMIDITY (H-1)														
SUPPLY AIR HUMIDITY (H-2)														
SUPPLY AIR STATIC PRESSURE RISER1 (SP-2) 2/3 DIST FROM AHU-2														
SUPPLY FAN STATIC PRESSURE (HL-1)														
RETURN FAN STATIC PRESSURE (HL-2)														
SUPPLY FAN AIRFLOW CONTROL (VFD-AHU2)					x									
EXHAUST FAN AIRFLOW CONTROL (VFD-EF2)					x									
VARIABLE O.A. DMPR. (D-3) ⚠							x							
RETURN AIR DAMPER (D-2) ⚠							x							
MAXIMUM OUTSIDE AIR DAMPER (D-1) ⚠							x							
HOT WATER HEATING COIL VALVE (CV-1)						x								
CHILLED WATER COOLING COIL VALVE (CV-2)						x								
HUMIDIFIER STEAM CONTROL VALVE (CV-3)								x						
FREEZESTAT (FZ-1)												x		
MAIN FILTER DIFFERENTIAL PRESSURE (F-1)										x				
SUPPLY AIR SMOKE DETECTOR (SD-1)												x		
EXHAUST AIR SMOKE DETECTOR (SD-2)												x		
EXHAUST FAN STATUS (CS-2)											x			
SUPPLY FAN STATUS (CS-1)											x			
SUPPLY FAN START/ STOP (SS-1)		x												
EXHAUST FAN START/ STOP (SS-2)		x												
VAV AIR FLOW CONTROL (ALL VAV BOXES)							x							
FAN POWERED BOX REHEAT VALVE (ALL FAN POWERED BOXES)						x								
SUPPLY SIDE AIR MEASURING STATION (AM-1)														
RETURN SIDE AIR MEASURING STATION (AM-2)														
OUTSIDE AIR MEASURING STATION (AM-3)														

CONTROL POINT	ANALOG INPUTS: TEMPERATURE	ANALOG INPUTS: STATIC PRESSURE	ANALOG INPUTS: DEW POINT OR HUMIDITY	ANALOG INPUTS: AIRFLOW MEASUREMENT	ANALOG INPUTS: PULSE ACCUMULATOR	ANALOG INPUTS: AVERAGING TYPE T-STAT	ANALOG INPUTS: PROBE TYPE T-STAT	CONTROL LOOP ALGORITHM: PROPORTIONAL (P)	CONTROL LOOP ALGORITHM: P- INTEGRAL (I)	CONTROL LOOP ALGORITHM: P- I - DERIVATIVE (D)	APPLICATION SOFTWARE: HIGH/LOW ALARMS	APPLICATION SOFTWARE: MAINTENANCE ALARM	APPLICATION SOFTWARE: AUTO ALARM SEQUENCES	APPLICATION SOFTWARE: TIME OR EVENT PROGRAM	APPLICATION SOFTWARE: SCHEDULED START/STOP	APPLICATION SOFTWARE: OPTIMUM START/STOP	APPLICATION SOFTWARE: DEMAND LIMITING	APPLICATION SOFTWARE: ENTHALPY ECONOMIZER	APPLICATION SOFTWARE: POINT TRENDING	APPLICATION SOFTWARE: SUPPLY/RETURN AIRFLOW CTRL.	APPLICATION SOFTWARE: RUN TIME TOTALIZATION	APPLICATION SOFTWARE: TEMP. RESET SCHEDULE	APPLICATION SOFTWARE: STATUS ALARM	Supplementary Notes
DISCHARGE AIR TEMPERATURE (T-3)	x					x					x						x		x			x		
MIXED AIR TEMPERATURE (T-1)	x					x													x					
OUTSIDE AIR TEMP./HUMIDITY (T-0, H-0)	x		x																x					
RETURN AIR TEMPERATURE (T-2)	x						x												x					
RETURN AIR HUMIDITY (H-1)			x																					
SUPPLY AIR HUMIDITY (H-2)			x								x													
SUPPLY AIR STATIC PRESSURE RISER1 (SP-2) 2/3 DIST FROM AHU-2		x									x								x					
SUPPLY FAN STATIC PRESSURE (HL-1)		x									x													
RETURN FAN STATIC PRESSURE (HL-2)		x									x													
SUPPLY FAN AIRFLOW CONTROL (VFD-AHU2)										x										x				
EXHAUST FAN AIRFLOW CONTROL (VFD-EF2)										x										x				
VARIABLE O.A. DMPR. (D-3) ⚠																		x						
RETURN AIR DAMPER (D-2) ⚠																		x						
MAXIMUM OUTSIDE AIR DAMPER (D-1) ⚠																								
HOT WATER HEATING COIL VALVE (CV-1)										x														
CHILLED WATER COOLING COIL VALVE (CV-2)										x														
HUMIDIFIER STEAM CONTROL VALVE (CV-3)										x														
FREEZESTAT (FZ-1)												x	x											
MAIN FILTER DIFFERENTIAL PRESSURE (F-1)												x												
SUPPLY AIR SMOKE DETECTOR (SD-1)												x	x											
EXHAUST AIR SMOKE DETECTOR (SD-2)												x	x											
EXHAUST FAN STATUS (CS-2)														x									x	
SUPPLY FAN STATUS (CS-1)																							x	
SUPPLY FAN START/ STOP (SS-1)															x						x			
EXHAUST FAN START/ STOP (SS-2)															x						x			
VAV AIR FLOW CONTROL (ALL VAV BOXES)										x														
FAN POWERED BOX REHEAT VALVE (ALL FAN POWERED BOXES)										x														
SUPPLY SIDE AIR MEASURING STATION (AM-1)				x															x					
RETURN SIDE AIR MEASURING STATION (AM-2)				x															x					
OUTSIDE AIR MEASURING STATION (AM-3)				x															x					

NO.	DATE	DESCRIPTION
4	03-24-99	ISSUED FOR CONSTRUCTION & FINAL REVIEW
3	12-30-98	ISSUED FOR BID AND PERMIT
2	11-24-98	50% CD REVIEW
1	09-15-98	DESIGN DEVELOPMENT

DRAWING TITLE:

TEMPERATURE CONTROL DIAGRAM AHU-2

SEAL:

DRAWING NUMBER:
M5-2

DATE:
SCALE:
DRAWN: S. SARAF
PROJ. NO.:

SEQUENCE OF OPERATION

TEMPERATURE CONTROL WORK SHALL INCLUDE DESIGN AND INSTALLATION OF A COMPLETE AND OPERATING AUTOMATIC TEMPERATURE CONTROL SYSTEM INCLUDING THE FOLLOWING:

THE TEMPERATURE CONTROL SYSTEM SHALL HAVE A MANUAL CHANGEOVER FROM COOLING TO HEATING AND VICE VERSA.

CHILLED WATER SYSTEM:

1. CHILLER START UP:

   CHILLER STARTUP WILL BE DONE FROM THE CHILLER DDC CONTROLLER ONCE THE MANUAL CHANGEOVER TO COOLING IS PERFORMED.

   THE CHILLER SHALL BE IN WAIT FOR FLOW MODE UNTIL THE FLOW SWITCH (FS-1) INDICATES THE PRESENCE OF CHILLED WATER FLOW. IF FLOW IS NOT PROVEN, AN ALARM INDICATION INCLUDING HORN & STROBE LIGHT WILL BE TURNED ON.

   ONCE FLOW IS ESTABLISHED, THE CHILLER DDC CONTROLLER SHALL SAMPLE THE LEAVING CHILLED WATER TEMPERATURE (T-2) AND COMPARE IT AGAINST THE LEAVING WATER SET POINT (45°F ADJ.) TEMPERATURE AND START UP DELTA TEMPERATURE (10°F ADJ.) WHICH IS PROGRAMMED INTO THE CHILLER DDC CONTROLLER.

2. CHILLED WATER PUMP OPERATION:

   ONCE THE MANUAL CHANGEOVER TO THE COOLING SYSTEM IS PERFORMED, THE VFD CONTROLLER FOR P-3 (VFD-P3) SHALL START PUMP P-3 AND START FLOW IN THE CHILLED WATER SYSTEM.

   THE CHILLED WATER FLOW CONTROL SHALL BE ACCOMPLISHED BY A DIFFERENTIAL PRESSURE SWITCH (DPS-9) LOCATED ACROOSS THE COOLING COIL FOR AHU-1. THIS DPS SHALL ENSURE A PRESSURE DROP OF 10 PSI ACROSS THE COOLING COIL. AS THE COOLING LOAD AND SYSTEM PRESSURE DROP CHANGES AT DPS-9, VFD-P3 SHALL INCREASE OR DECREASE THE PUMP SPEED TO ACCOUNT FOR THE LOAD VARIATION. WHEN THE FLOW IN THE SYSTEM AS INDICATED BY THE FLOW METER (FM-1) DECREASES BELOW 300 GPM (ADJ.), THE BYPASS VALVE CV-1 SHALL OPEN TO MAINTAIN A MINIMUM FLOW OF 300 GPM (ADJ.) IN THE SYSTEM.

   PUMPS P-3 AND P-4 SHALL BE OPERATED ON A SCHEDULED BASIS. IT IS RECOMMENDED TO RUN ONE PUMP FOR ABOUT 1 WEEK (ADJ.) BEFORE THE OTHER PUMP IS STARTED. THIS IS TO ENSURE UNIFORM WEAR OF THE ENTIRE PUMPING SYSTEM. BOTH PUMPS SHALL NOT OPERATE AT THE SAME TIME.

   IF FOR ANY REASON, IT IS NOT POSSIBLE TO MAINTAIN A FLOW OF 300 GPM (ADJ.) THRU THE SYSTEM, THE CHILLER SHALL SHUT DOWN AND A LOW FLOW ALARM SHALL TURN ON.

3. CHILLER OPERATION:

   THE CHILLER SHALL CONTINUE TO OPERATE AND MAINTAIN THE DISCHARGE WATER TEMPERATURE OF 45°F (ADJ.) MEASURED BY T-2. COOLING CAPACITY SHALL BE VARIED BY LOADING AND UNLOADING THE COMPRESSORS PER THE PUMPDOWN CYCLE OF THE CHILLER.

HOT WATER SYSTEM:

HOT WATER BOILER PRIMARY LOOP

1. UPON MANUAL CHANGEOVER TO HEATING MODE, THE FOLLOWING SHALL HAPPEN.

   THE PRIMARY BOILER PUMP P-5A SHALL START TO PUMP WATER THRU THE MODULAR BOILER HWB-1. BOILER HWB-2 AND PUMP P-5B ARE STAND BY AND SHALL BE OPERATED ON A SCHEDULED BASIS.

   THE BOILER SHALL AUTOMATICALLY FIRE UP AND MAINTAIN THE PRIMARY BOILER LOOP AT 200°F. THE MODULAR BOILER CAPACITY CONTROL IS DONE AUTOMATICALLY BY MODULAR BOILER CONTROL PANEL TO MAINTAIN A CONSTANT WATER TEMPERATURE IN THE COMMON MANIFOLD. THE BOILERS SHALL BE PIPED IN A REVERSE RETURN FASHION SUCH THAT RETURN HOT WATER PASSES THRU EACH OF THE BOILERS BEFORE REACHING THE PRIMARY LOOP.

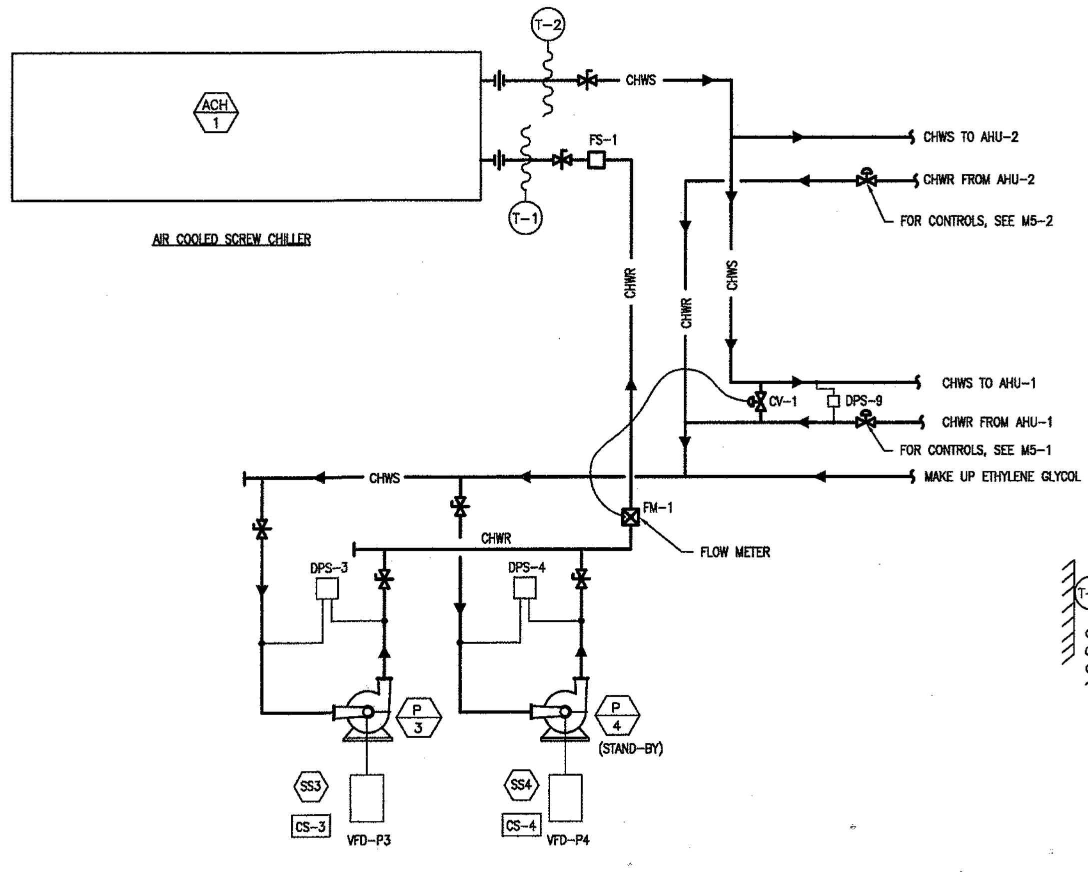
2. VARIABLE FLOW CONTROL BETWEEN PRIMARY AND SECONDARY LOOP

   A PRIMARY/SECONDARY MIXING VALVE SHALL ALLOW FLOW OF WATER BETWEEN THE PRIMARY AND SECONDARY LOOP SO AS TO MAINTAIN THE PRIMARY LOOP NO LOWER THAN 145°F (ADJ.) TO PRVENT BOILER THERMAL SHOCK.

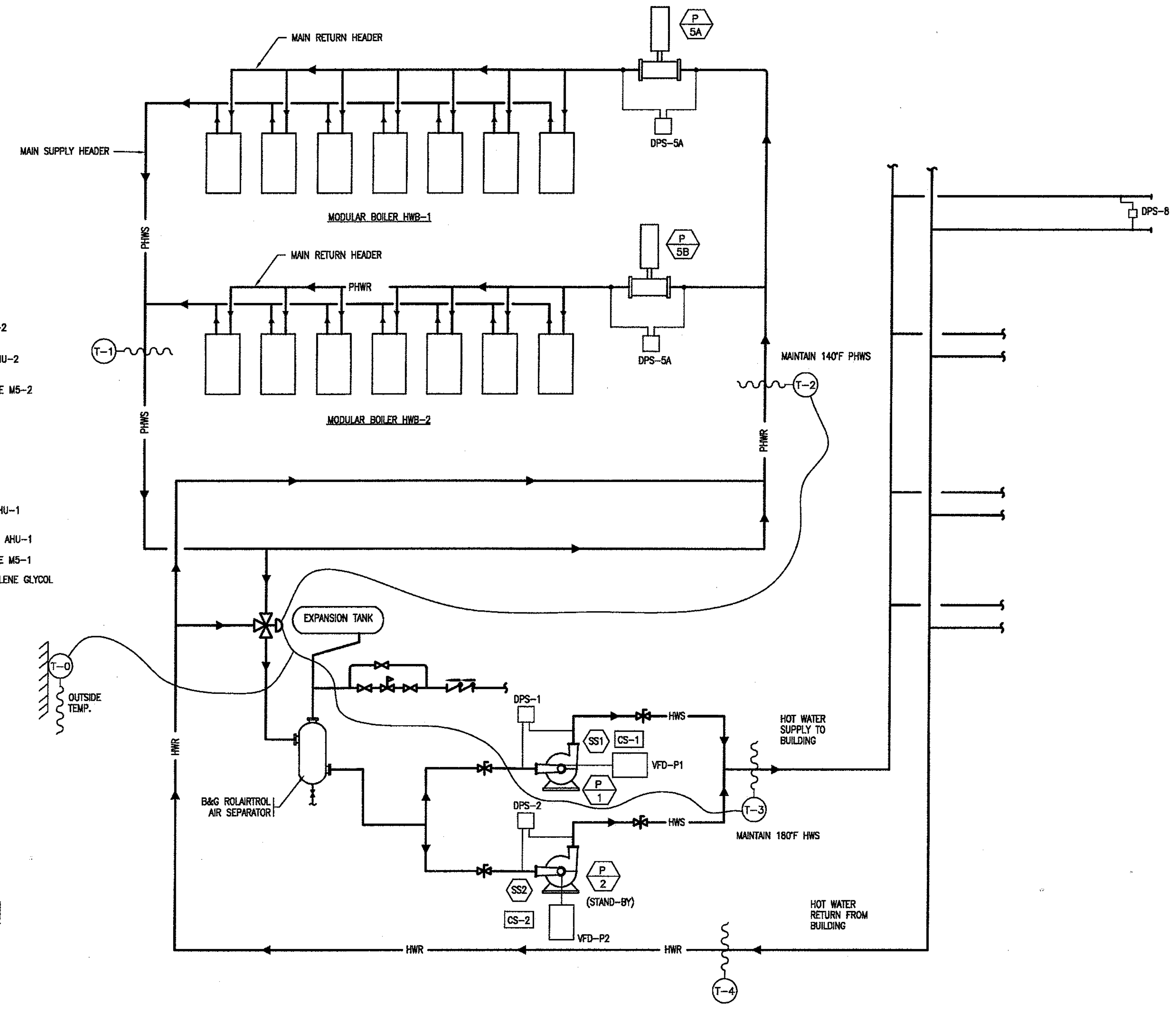
   UPON CALL OF HEATING IN THE SECONDARY LOOP, THE MIXING VALVE SHALL ALLOW THE HOTTER WATER FROM THE PRIMARY LOOP TO MIX WITH THE RETURN WATER FROM THE SECONDARY LOOP SO AS TO MAINTAIN A SECONDARY HOT WATER SUPPLY TEMPERATURE OF 180°F (ADJ.). THE RETURN LINE FROM THE SECONARY LOOP MAKES UP THE WATER LOST IN THE PRIMARY LOOP. AT ALL TIMES, THE MIXING VALVE ENSURES THE INTEGRITY OF THE PRIMARY BOILER LOOP WATER TEMPERATURE. IF THE PRIMARY HOT WATER LOOP DROPS BELOW 140°F, BOILERS SHALL SHUT DOWN. AND A LOW TEMPERATURE ALARM SHALL SOUND. SECONDARY WATER TEMPERATURE SHALL VARY ACCORDING TO A RESET WATER TEMPERATURE BASED ON OUTDOOR TEMPERATURE.

SECONDARY PUMP FLOW CONTROL

1. SECONDARY PUMPS P-1 AND P-2 (STAND-BY) OPERATE ON A SCHEDULED BASIS. EACH PUMP SHALL OPERATE FOR ONE WEEK (ADJ.) AT ONE TIME SO AS TO ENSURE UNIFORM WEAR OF PUMPS. AT NO TIME SHALL BOTH THE PUMPS BE ON SIMULTANEOUSLY.
2. PUMP START/STOP AND FLOW CONTROL SHALL BE ACCOMPLISHED BY VFD-P1 (FOR PUMP P-1). THE FLOW CONTROL SHALL BE ACCOMPLISED BY A DIFFERENTIAL PRESSURE SWITCH (DPS-8) LOCATED BEYOND THE LONGEST RUN OF THE HOT WATER PIPING SYSTEM. THIS DPS SHALL ENSURE A PRESSURE DROP OF 10 PSI (ADJ.) ACROSS THE SUPPLY AND RETURN LINE. AS THE PRESSURE DROP IN THE SYSTEM VARIES, THE VARIABLE FREQUENCY DRIVE ASSOCIATED WITH THE PUMP IN OERATION INCREASE OR DECREASE PUMP SPEED TO CONTROL REQUIRED FLOW THROUGH THE SYSTEM.



1 CHILLED WATER (ETHYLENE GLYCOL) CONTROLS DIAGRAM
NOT TO SCALE



2 HOT WATER SYSTEM CONTROLS DIAGRAM
NOT TO SCALE

INPUT/OUTPUT SUMMARY - CHILLED WATER SYSTEM

I/O TYPE	DIGITAL OUTPUTS			ANALOG OUTPUTS			DIGITAL INPUTS					ANALOG INPUTS					CONTROL LOOP ALGORITHM				APPLICATION SOFTWARE													
CONTROL POINT	OFF/AUTO OR OPEN/CLOSE	OFF/ AUTO/ ON	ENABLE/DISABLE	VALVE POSITION ADJ.	VFD SPEED REF. (4-20 mA)	OTHER ( )	DIFFERENTIAL PRESS. SWITCH	CURRENT SWITCH	OTHER CONTACT CLOSURES	WATER LEVEL SWITCH	FLOW SWITCH	TEMPERATURE	PRESSURE	DEW POINT OR HUMIDITY	FLOW MEASUREMENT	PULSE ACCUMULATOR	PROPORTIONAL (P)	P- INTEGRAL (I)	P- I - DERIVATIVE (D)		HIGH/LOW ALARMS	MAINTENANCE ALARM	AUTO ALARM SEQUENCES	TIME OR EVENT PROGRAM	SCHEDULED START/STOP	DUTY CYCLE	DEMAND LIMITING	ENTHALPY ECONOMIZER	POINT TRENDING	TEMPERATURE CONTROL	RUN TIME TOTALIZATION	TEMPERATURE RESET SCHEDULE	STATUS	SUPPLEMENTARY NOTES
CHILLER ENTERING CHILLED WATER TEMPERATURE (T-1)												x									x								x					
CHILLER LEAVING CHILLED WATER TEMP. (T-2)												x									x													
CHILLER START/ STOP (CH-1, CH-2)		x						x																										
CHILLED WATER PUMP P-3 START/ STOP		x																															x	
CHILLED WATER PUMP P-3 STATUS (DPS-3)							x														x													
CHILLED WATER PUMP P-4 START/ STOP		x																															x	STAND BY
CHILLED WATER PUMP P-4 STATUS (DPS-4)							x														x													STAND BY
FLOW METER (FM-1)															x						x													
FLOW SWITCH AT CHILLER (FS-1)											x										x													
DIFFERENTIAL PRESSURE SWITCH (DPS-9)							x																											
SYSTEM BYPASS CONTROL VALVE (CV-1)				x																														
PUMP P-3 FLOW CONTROL (VFD-P3)					x															x														
PUMP P-4 FLOW CONTROL (VFD-P4)					x															x														

INPUT/OUTPUT SUMMARY - HOT WATER SYSTEM

I/O TYPE	DIGITAL OUTPUTS			ANALOG OUTPUTS			DIGITAL INPUTS					ANALOG INPUTS					CONTROL LOOP ALGORITHM			APPLICATION SOFTWARE													
CONTROL POINT	OFF/AUTO OR OPEN/CLOSE	OFF/ AUTO/ ON	ENABLE/DISABLE	VALVE POSITION ADJ.	VFD SPEED REF.(4-20mA)	OTHER ( )	DIFFERENTIAL PRESS. SWITCH	CURRENT SWITCH	OTHER CONTACT CLOSURES	WATER LEVEL SWITCH	FLOW SWITCH	TEMPERATURE	PRESSURE	DEW POINT OR HUMIDITY	VELOCITY PRESSURE OR VELOCITY	PULSE ACCUMULATOR	PROPORTIONAL (P)	P- INTEGRAL (I)	P- I - DERIVATIVE (D)	HIGH/LOW ALARMS	MAINTENANCE ALARM	AUTO ALARM SEQUENCES	TIME OR EVENT PROGRAM	SCHEDULED START/STOP	DUTY CYCLE	DEMAND LIMITING	ENTHALPY ECONOMIZER	POINT TRENDING	TEMPERATURE CONTROL	RUN TIME TOTALIZATION	TEMPERATURE RESET SCHEDULE	STATUS	SUPPLEMENTARY NOTES
OUTDOOR TEMPERATURE (T-0)												x																					
BOILER START/STOP		x																		x								x					
SECONDARY HOT WATER PUMP P-1 START/STOP SS1		x																														x	
SECONDARY HOT WATER PUMP P-1 STATUS DPS-1							x													x													
SECONDARY HOT WATER PUMP P-2 START/STOP SS2		x																														x	STAND BY
SECONDARY HOT WATER PUMP P-2 STATUS DPS-2							x													x													STAND BY
PRIMARY HW PUMP P-5A START/STOP		x																														x	
PRIMARY HW PUMP P-5A STATUS DPS-5A							x													x													
PRIMARY/SECONDARY MIXING VALVE CONTROL				x																													
PRIMARY LOOP SUPPLY TEMPERATURE T-1												x								x								x					
PRIMARY LOOP RETURN TEMPERATURE T-2												x																x					
SECONDARY LOOP SUPPLY TEMPERATURE T-3												x																x					
SECONDARY LOOP RETURN TEMPERATURE T-4												x																x					
PRIMARY HW PUMP P-5B START/STOP		x																															STAND BY
PRIMARY HW PUMP P-5B STATUS DPS-5B							x													x													STAND BY
AHU-1 PUMP P-6 START/STOP		x																															
AHU-1 PUMP P-6 STATUS DPS-6							x													x													
AHU-2 PUMP P-7 START/STOP		x																															
AHU-2 PUMP P-7 STATUS DPS-7							x													x													
PUMP P-1 FLOW CONTROL (VFD-P1)					x														x														
PUMP P-2 FLOW CONTROL (VFD-P2)					x														x														
DIFF. PRESSURE SWITCH DPS-8 (LOCATED AT END)							x																										

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DRAWING TITLE:

TEMPERATURE CONTROL DIAGRAM WATER SYSTEMS

SEAL:

DRAWING NUMBER: M5-3

DATE:
SCALE:
DRAWN: S. SARAF
PROJ. NO.: