

A
B
C
D
E
F

three inches = one foot
one and one half inches = one foot
one inch = one foot
three quarters inch = one foot
three eighths inch = one foot
one quarter inch = one foot
one eighth inch = one foot

ABBREVIATIONS:

AAV
ABV
AFF
AHU
ALT
APPROX
ASSOC
ATC
AUTO
AUX
AVG
AWT
BC
BD
BDD
BHP
BLDG
BLW
BTM
BTUH
CAP
CCW
CFM
CHAR
CLG
CO
COL
COMB
COND
CONN
CONT
CONST
COP
CUH
CV
Cv
CW
CWR
CWS
CWS&R
Db
DIFF
DISCH
DHW
DN
DP
DWG
DWH
DX
EA
EAT
EC
EER
EF
EFF
EL
ELECT
ELEV
ENCL
ENT
EP
EQUIP
ER
ERC
ERW
ESP
EXH
EXIST
EXP
EWT
°F
FA
FC

FCD
FCU
FD
FLA
FLR
FNL
FPM
FR
FT
GALV
GC
GWR
GWS
GLV
GPM
GV
HC
HD
HORIZ
HP
HR
HTG
HUH
HVAC
HW
HWR
HWS
HWS&R
HZ
IER
IN
IVS
JB
KEM
KHE
KHS
KW
KWH
LAT
LBS
LF
LTG
LVG
LWT
MAV
MBH
MC
MCC
MECH
MER
MFG
MIN
MISC
MOD
MTD
N/A
NC
NO
No
NOM
NTS
OA
OPNG
P
PC
PNL
PRESS
PSIG
PSIA

FLOW CONTROL DEVICE
FAN COIL UNIT
FIRE DAMPER/FLOOR DRAIN
FULL LOAD AMPS
FLOOR
FUNNEL
FEET PER MINUTE
FROM
FIN-TUBE/FEET
GALVANIZED
GENERAL CONTRACTOR
GLYCOL WATER RETURN
GLYCOL WATER SUPPLY
GLOBE VALVE
GALLONS PER MINUTE
GATE VALVE
HEATING CONTRACTOR
HEAD
HORIZONTAL
HORSEPOWER/HEAT PUMP
HOUR
HEATING
HORIZONTAL UNIT HEATER
HEATING VENTILATION AND AIR CONDITIONING
HOT WATER
HOT WATER RETURN
HOT WATER SUPPLY
HOT WATER SUPPLY AND RETURN
HERTZ
INVERTED ECCENTRIC REDUCER (TOPS FLAT)
INCHES
ISOLATION VALVE STATION
JUNCTION BOX
KITCHEN EQUIPMENT MANUFACTURER
KITCHEN HOOD EXHAUST
KITCHEN HOOD UNIT
KILOWATT
KILOWATT HOUR
LEAVING AIR TEMPERATURE, °F
POUNDS
LINEAR FEET
LIGHTING
LEAVING
LEAVING WATER TEMPERATURE, °F
MANUAL AIR VENT
THOUSAND BTUH
MECHANICAL CONTRACTOR
MOTOR CONTROL CENTER
MECHANICAL
MECHANICAL EQUIPMENT ROOM
MANUFACTURER
MINIMUM
MISCELLANEOUS
MOTOR OPERATED DAMPER
MOUNTED
NOT APPLICABLE
NORMALLY CLOSED/NOISE CRITERIA
NORMALLY OPEN
NUMBER
NOMINAL
NOT TO SCALE
OUTSIDE AIR
OPENING
PUMP
PLUMBING CONTRACTOR
PANEL
PRESSURE
POUNDS PER SQUARE INCH GAGE
POUNDS PER SQUARE INCH ABSOLUTE

QTY
RA
RADP
REFRIG
REQD
REV
RF
RGC
RGCP
RGW
RH
RLA
RM
RPM
RRC
RRCP
RRW
RV
SA
SD
SDCL
SDC-I
SDCP-I
SDCR
SF
SP
SPEC
SQ
SOFT
STD
STR
SV
TCV
TD
TDV
TEMP
TOT
TRANS
TS
TSP
TSTAT
TYP
UG
V
VCD
VEL
VFD
VOL
VTR
W
W/
WO
Wb
WC
WG
WTD
ZCV

QUANTITY
RELIEF/RETURN AIR
RADIANT PANEL
REFRIGERANT
REQUIRED
REVISION
RETURN/RELIEF FAN
RELIEF/RETURN GRILLE CEILING
RELIEF/RETURN GRILLE CEILING PREFORATED
RELIEF/RETURN GRILLE WALL
RELATIVE HUMIDITY
RUNNING LOAD AMPS
ROOM
REVOLUTIONS PER MINUTE
RETURN REGISTER CEILING
RETURN REGISTER CEILING PERFORATED
RETURN REGISTER WALL
RELIEF VALVE
SUPPLY AIR
SMOKE DETECTOR
SUPPLY DIFFUSER CEILING LINEAR
SUPPLY DIFFUSER CEILING - (THROW)
SUPPLY DIFFUSER CEILING PERFORATED - (THROW)
SUPPLY DIFFUSER CEILING ROUND
SUPPLY FAN/SQUARE FEET
STATIC PRESSURE (INCHES OF WATER)
SPECIFICATION
SQUARE
SQUARE FOOT
STANDARD
STRAINER
SAFETY VALVE
TEMPERATURE CONTROL VALVE
TEMPERATURE DIFFERENCE
TRIPLE DUTY VALVE
TEMPERATURE
TOTAL
TRANSITION
TIP SPEED
TOTAL STATIC PRESSURE
THERMOSTAT
TYPICAL
UNDERGROUND
VOLTAGE, VALVE
VOLUME CONTROL DAMPER, (MANUAL)
VELOCITY
VARIABLE FREQUENCY DRIVE
VOLUME
VENT THROUGH ROOF
WIDTH
WITH
WITHOUT
WET BULB TEMPERATURE, °F
WATER COLUMN
WATER GAUGE
WATER TEMPERATURE DROP, °F
ZONE CONTROL VALVE

GENERAL NOTES

1. THE HEATING CONTRACTOR SHALL COORDINATE WITH OTHER CONTRACTORS IN THE LOCATION OF DUCTWORK, PIPING, ETC.

2. ALL DUCTWORK AND PIPING SHALL BE INSTALLED AS HIGH AS POSSIBLE UNLESS NOTED OTHERWISE.

3. DO NOT SCALE DRAWINGS - ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE SITE. NOTIFY ARCHITECT OF ANY DEVIATIONS FROM THE DRAWINGS.

4. THE DRAWINGS ARE DIAGRAMMATIC AND SHOW ONLY THE GENERAL ARRANGEMENTS OF ALL PIPING AND EQUIPMENT. BECAUSE OF SMALL SCALE OF THE DRAWINGS IT IS NOT POSSIBLE TO SHOW OR INDICATE ALL OFFSETS, FITTINGS, AND ACCESSORIES WHICH MAY BE REQUIRED TO AVOID EXISTING PIPING OR STRUCTURAL FEATURES.

5. ALL PIPING, CONDUIT, DUCTWORK, ETC. SHALL BE INSTALLED IN A MANNER WHICH WILL NOT DEFACE OR ALTER ANY AREAS. ROUTING OF THE ABOVE EQUIPMENT SHALL BE APPROVED BY THE ARCHITECT PRIOR TO INSTALLATION.

6. ALL WORK PERFORMED ON THIS BUILDING SHALL BE IN COMPLIANCE WITH ALL PERTINENT CODES, RULES, ORDINANCES, AND REGULATIONS OF THE LOCAL, STATE, AND NATIONAL GOVERNING AUTHORITIES.

7. ALL WORK PERFORMED UNDER AND IN CONNECTION WITH THESE DRAWINGS AND SPECIFICATIONS SHALL BE IN STRICT COMPLIANCE WITH THE LATEST SAFETY AND HEALTH STANDARDS.

8. REPORT ANY DISCREPANCIES FOUND IN THE DRAWINGS AND/OR IN THE SPECIFICATIONS DURING THE BIDDING PROCESS FOR CLARIFICATION BY THE ARCHITECT.

9. HEATING CONTRACTOR SHALL PROVIDE AND INSTALL ACCESS PANELS AS REQUIRED FOR ACCESS TO VALVES, TRAPS, CLEAN OUTS, CONTROLS, FIRE DAMPERS, ETC. THE CONTRACTOR SHALL COORDINATE INSTALLATION OF ACCESS PANELS WITH FINISH WORK AND ALL OTHER TRADES.

10. THE HEATING CONTRACTOR SHALL FURNISH SHOP DRAWINGS OF ANY RELOCATED PIPING, DUCTWORK, EQUIPMENT, ETC., FOR APPROVAL PRIOR TO RELOCATION OF ITEM.

11. ALL PIPING AND DUCTWORK TO BE LOCATED AND COORDINATED WITH ARCHITECTURAL PLANS. ALL PIPING AND DUCTWORK SHALL BE CONCEALED IN FINISHED AREAS.

12. ALL PIPE PENETRATIONS THROUGH CHASES, WALLS, OR FLOORS WHICH ARE FIRE-RATED, SHALL BE PROPERLY SEALED TO MAINTAIN FIRE PROTECTION. HEATING CONTRACTOR SHALL SUBMIT PROPOSED UL SYSTEM FOR REVIEW.

13. ALL DUCTS THAT PENETRATE CHASES, WALLS, OR FLOORS WHICH ARE FIRE-RATED, SHALL BE INSTALLED WITH FIRE DAMPERS IN ACCORDANCE WITH NFPA 90A. THIS APPLIES EVEN IF THEY ARE NOT SPECIFICALLY SHOWN ON THE DRAWING.

14. ANY PHYSICAL INSTALLATION MODIFICATIONS, DUE TO FIELD CONDITIONS, SHALL BE RESOLVED BY THE HEATING CONTRACTOR IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE MECHANICAL ENGINEER.

15. THE HEATING CONTRACTOR SHALL PAY FOR ALL FEES AND PERMITS AS NECESSARY TO COMPLETE THE INSTALLATION.

16. THE HEATING CONTRACTOR SHALL COORDINATE THE LOCATION OF DUCTWORK WITH ALL NEW PIPING BEING INSTALLED.

17. ALL PIPING AND DUCTS IN FINISHED ROOMS OR SPACES SHALL BE CONCEALED IN FURRED CHASES OR ABOVE SUSPENDED CEILING.

18. FIRST FIGURE OF DUCT SIZE INDICATES DIMENSION OF FACE SHOWN OR INDICATED.

MECHANICAL LEGEND - MISC.

SUPPLY DIFFUSER, 4-WAY THROW UNLESS NOTED OTHERWISE

VAV BOX WITH REHEAT COIL

AIR FLOW ARROW

DIFFERENTIAL PRESSURE SENSOR

DOOR UNDERCUT 1" ABOVE FINISHED FLOOR

DUCT MOUNTED STATIC PRESSURE SENSOR

FLOW METER, DDC

HUMIDISTAT, ELECTRIC

PRESSURE SENSOR

REFRIGERANT SENSOR

SMOKE DETECTOR

STATIC PRESSURE SENSOR

THERMOSTAT, ELECTRIC

THERMOSTAT, ELECTRONIC

CONNECTION BETWEEN NEW AND EXISTING

DISCONNECTION POINT

REVISION NUMBER

1
DETAIL NUMBER OR SECTION LETTER
M-501
DRAWING NUMBER WHERE DETAIL IS DRAWN

1
DETAIL NUMBER OR SECTION LETTER
M101|M501
DRAWING NUMBER WHERE DETAIL IS DRAWN
DRAWING NUMBER WHERE SYMBOL IS USED

A
SECTION LETTER
M-301
DRAWING NUMBER WHERE SHOWN

A
SECTION LETTER
M101|M301
DRAWING NUMBER WHERE SECTION IS DRAWN
DRAWING NUMBER WHERE SECTION IS CUT

DUCTWORK LEGEND

FLEXIBLE DUCTWORK

DUCT (SHOWN x HIDDEN)

ROUND DUCT (DIAMETER)

FLAT OVAL (SHOWN x HIDDEN)

FLEXIBLE CONNECTION

ACOUSTIC DUCT LINING

VOLUME CONTROL DAMPER

DUCT TRANSITION

MOTOR OPERATED DAMPER

FIRE DAMPER

SMOKE DAMPER

COMBINATION FIRE / SMOKE DAMPER

CONICAL TAKEOFF CONNECTION

STRAIGHT ROUND TAKEOFF CONNECTION

CONICAL "T" CONNECTION

STRAIGHT "T" CONNECTION

SUPPLY/OUTDOOR/MAKE-UP AIR RECTANGULAR DUCT SECTION

RETURN/TRANSFER/RELIEF AIR RECTANGULAR DUCT SECTION

EXHAUST AIR RECTANGULAR DUCT SECTION

SUPPLY/OUTDOOR/MAKE-UP AIR OVAL DUCT SECTION

RETURN/TRANSFER/RELIEF AIR OVAL DUCT SECTION

EXHAUST AIR OVAL DUCT SECTION

SUPPLY/OUTDOOR/MAKE-UP AIR ROUND DUCT SECTION

RETURN/TRANSFER/RELIEF AIR ROUND DUCT SECTION

EXHAUST AIR ROUND DUCT SECTION

LOUVER IN WALL

SQUARE ELBOW WITH TURNING VANES

RADIUS ELBOW

RECTANGULAR BOOT CONNECTION

BELLMOUTH TAKEOFF CONNECTION

CONICAL TAKEOFF CONNECTION

MECHANICAL PIPING LEGEND

3-WAY CONTROL VALVE, ELECTRIC

PRESSURE GAUGE WITH COCK, WATER

AIR VENT WITH COCK

PRESSURE REDUCING VALVE, WATER

PRESSURE TEMPERATURE TAP

RELIEF VALVE, WATER

RISE IN PIPE

SIDE CONNECTION

STUB UP

SUCTION DIFFUSER

TEMPERATURE CONTROL VALVE

THERMOMETER WITH SEPERABLE WELL

TRIPLE DUTY VALVE

UNION

VALVE, SEE SPECIFICATIONS FOR TYPE

VACUUM BREAKER

VALVE WITH HOSE END

FLOW CONTROL DEVICE

FLOW CONTROL DEVICE WITH FLOW METER

WELL

WYE STRAINER

WYE STRAINER WITH BALL VALVE

PIPE SECTION

PIPE DOWN

ISOLATION VALVE STATION

PIPE CONNECTION

INVERTED ECCENTRIC REDUCER

VA FORM DB-6231, OCT 1978

A

B

C

D

E

F

A

B

C

D

E

F

three inches = one foot

one and one half inches = one foot

one inch = one foot

three quarters inch = one foot

one half inch = one foot

three eighths inch = one foot

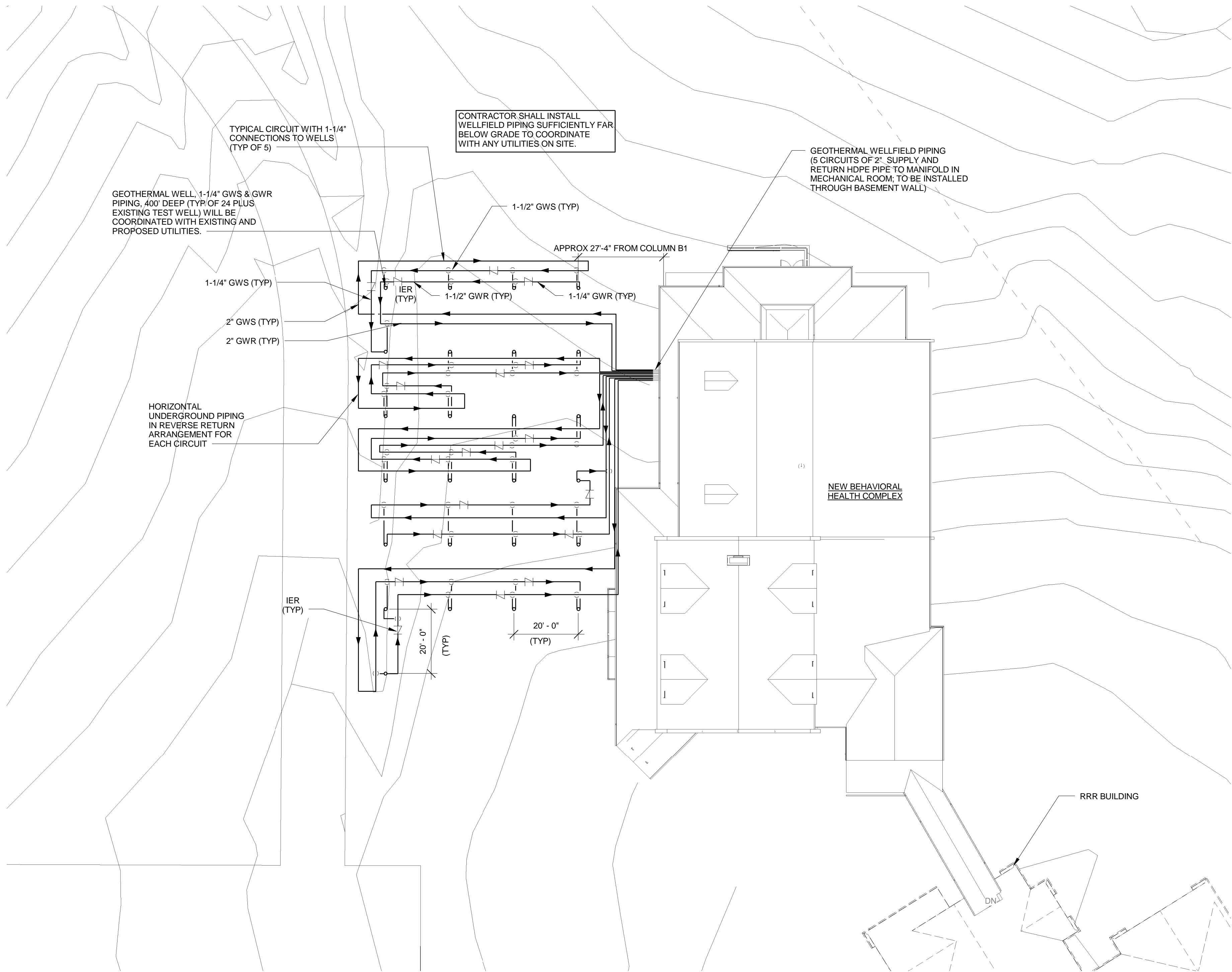
one quarter inch = one foot

one eighth inch = one foot

one quarter inch = one foot

one eighth inch = one foot

one eighth inch = one foot



1 SITE PLAN - MECHANICAL
SCALE: 1" = 20'-0"

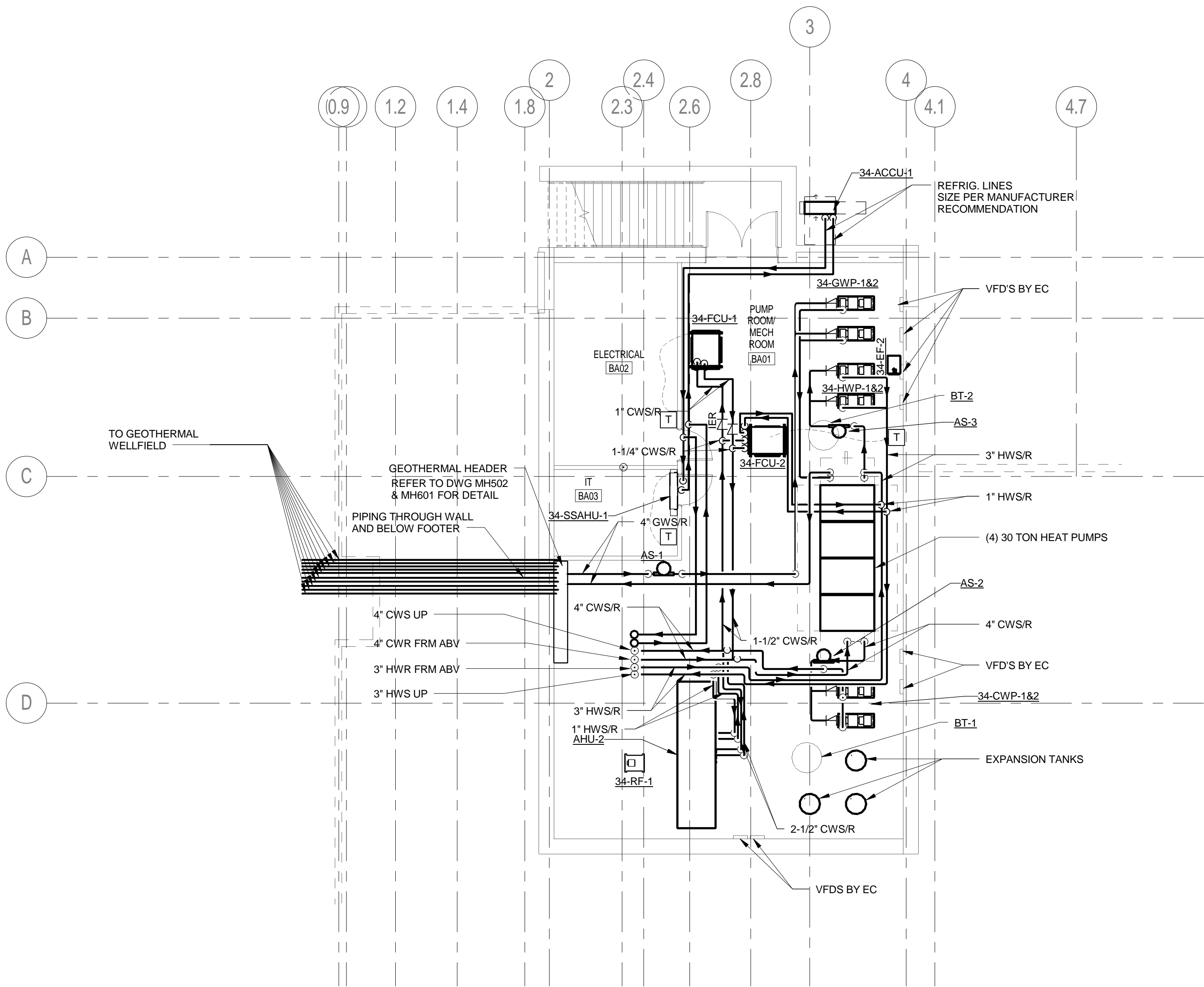
FULLY SPRINKLERED
100% CONSTRUCTION DOCUMENTS

Revisions		Date		CONSULTANTS:					 		ARCHITECT:		Project Number 3468		Scale 1" = 20'-0"		Drawing Title SITE PLAN - MECHANICAL		Project Title Behavioral Health Complex		VA Project Number 595-109		Office of Facilities Management		
				Drawing Number 34		Approved: Project Director		2520 Renaissance Boulevard, Suite 110 King of Prussia, PA 19406 t: 610.270.0599 f: 610.270.0995 www.arrayhfs.com			Location 1700 South Lincoln Ave. Lebanon, PA 17042		Building Number 34												
				Civil Engineer 		Structural Engineer 		MEP Engineer 		Environmental Consultant 		Cost Estimator 		 A R R A Y healthcare facilities solutions								MH101 Dwg. 72 of 123			
600 Parsippany Road, Suite 301 Limerick, PA 19468 Tel (973) 576-9953 Fax (973) 739-9710		180 W. Ridge Pike Limerick, PA 19468 Tel (214) 329-5559		1407 Scalp Avenue Johnstown, PA 15804 Tel (814) 269-9300 Fax (814) 269-9301		1047 North Park Road, P.O. Box 6307 Reading, PA 19610 Tel (610) 621-2000		221 Chestnut Street, Suite 200 Philadelphia, PA 19106 Tel (215) 923-8888																	



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VA FORM 08-6231, OCT 1978



1 BASEMENT FLOOR PLAN - PIPING
SCALE: 1/8" = 1'-0"

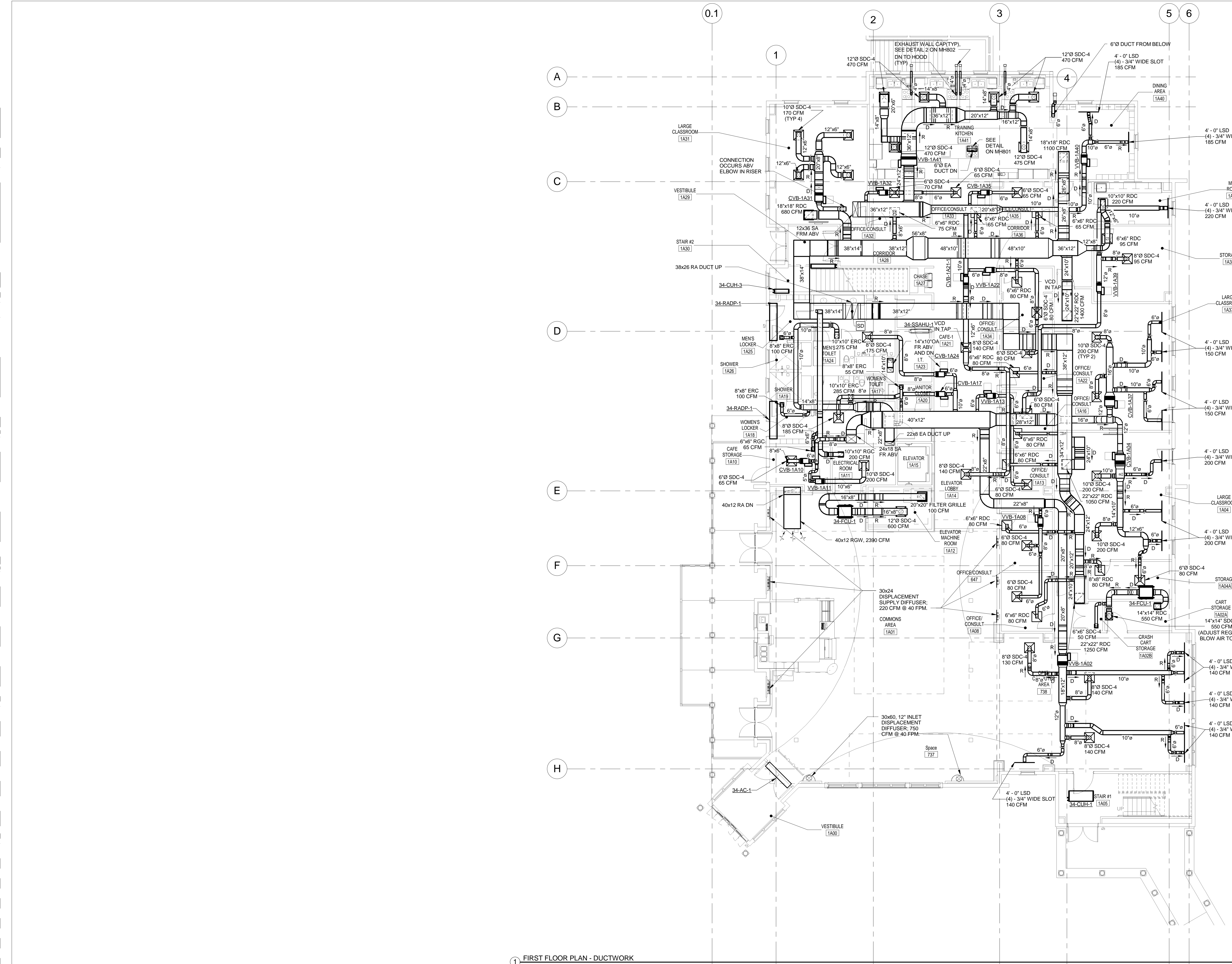
MECHANICAL PIPING NOTED

- ALL DOWNFEED BRANCHES AND EQUIPMENT SHALL HAVE DRAIN COCKS INSTALLED AT LOWEST POINT.
- ALL HORIZONTAL LINES SHALL BE RUN LEVEL WITHOUT POCKETS. WHERE POCKETS OCCUR, AUTO AIR VENTS SHALL BE INSTALLED AT EACH VERTICAL RISE.
- ALL UPFEED RISERS SHALL BE MADE WITH TOP CONNECTIONS AT MAIN. ALL DOWNFEED RISERS SHALL BE MADE WITH BOTTOM CONNECTIONS AT MAIN.
- CHANGES OF PIPE SIZES ON HORIZONTAL RUNS SHALL BE MADE WITH INVERTED ECCENTRIC REDUCERS WITH TOP OF PIPE LEVEL.
- ARROWS ON SUPPLY AND RETURN LINES INDICATE DIRECTION OF FLOW.
- PROVIDE VALVE WITH HOSE END ON ALL LOW POINTS OF PIPING SYSTEM AND AUTO AIR VENTS AT ALL HIGH POINTS OF THE PIPING SYSTEM UNLESS NOTED OTHERWISE.
- FOR TYPICAL WATER AND REFRIGERANT PIPING CONNECTIONS TO EQUIPMENT, SEE STANDARD DETAILS.
- WATER PIPE CONNECTIONS TO AIR HEATING AND COOLING COILS SHALL BE MADE SO THERE WILL BE COUNTER FLOW BETWEEN WATER AND AIR.
- DIELECTRIC UNIONS AND FLANGES SHALL BE USED ON ALL CONNECTIONS BETWEEN DISSIMILAR METALS.
- ALL LINES NOTED "BELOW FLR." OR "ABV. CLG." SHALL BE CONCEALED IN JOIST SPACE, THROUGH JOISTS, OR BETWEEN JOISTS, UNLESS CEILING IS FURRED OR LINES ARE BELOW SLAB ON GRADE.
- THERMOSTAT LOCATIONS ONLY APPROVED AFTER FINAL FURNITURE LAYOUT IS APPROVED BY CONTRACTOR

FULLY SPRINKLERED
100% CONSTRUCTION DOCUMENTS

<div>CONSULTANTS:</div> <div><div><div>Civil Engineer</div><div>Dowberry</div><div>600 Parsippany Road, Suite 301 Parsippany, NJ 07054-3715 Tel (973) 576-9953 Fax (973) 739-9710</div></div><div><div>Structural Engineer</div><div>WZIG</div><div>180 W. Ridge Pike Limerick, PA 19468 Tel (214) 329-5559</div></div><div><div>MEP Engineer</div><div>HELENZ COMPANY</div><div>1407 Scalp Avenue Johnstown, PA 15904 Tel (814) 269-9300 Fax (814) 269-9301</div></div><div><div>Environmental Consultant</div><div>SSM</div><div>1047 North Park Road, P.O. Box 6307 Reading, PA 19610 Tel (610) 621-2000</div></div><div><div>Cost Estimator</div><div>INTERNATIONAL CONSULTANTS, INC.</div><div>221 Chestnut Street, Suite 200 Philadelphia, PA 19106 Tel (215) 923-8888</div></div></div>		<div>ARCHITECT:</div> <div><div>ARRAY</div><div>healthcare facilities solutions</div></div> <div><div>Project Number</div><div>3468</div></div> <div><div>Scale</div><div>1/8" = 1'-0"</div></div> <div><div>2520 Renaissance Boulevard, Suite 110 King of Prussia, PA 19406</div><div>t: 610.270.0599 f: 610.270.0995 www.arrayhfs.com</div></div>	<div><div>Drawing Title</div><div>BASEMENT FLOOR PLAN - PIPING</div></div> <div><div>Approved: Project Director</div><div></div></div>	<div><div>Project Title</div><div>Behavioral Health Complex</div></div> <div><div>Location</div><div>1700 South Lincoln Ave. Lebanon, PA 17042</div></div> <div><div>Date</div><div>07/27/2012</div><div>Checked</div><div>TME</div><div>Drawn</div><div>DJA</div></div>	<div><div>VA Project Number</div><div>595-109</div></div> <div><div>Building Number</div><div>34</div></div> <div><div>Drawing Number</div><div>MH202</div></div> <div><div>Dwg. 74 of 123</div></div>	<div><div>Office of Facilities Management</div><div> Department of Veterans Affairs</div></div>
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three inches = one foot
one and one half inches = one foot
one inch = one foot
three quarters inch = one foot
one half inch = one foot
three eighths inch = one foot
one quarter inch = one foot
one eighth inch = one foot



1 FIRST FLOOR PLAN - DUCTWORK
SCALE: 1/8" = 1'-0"

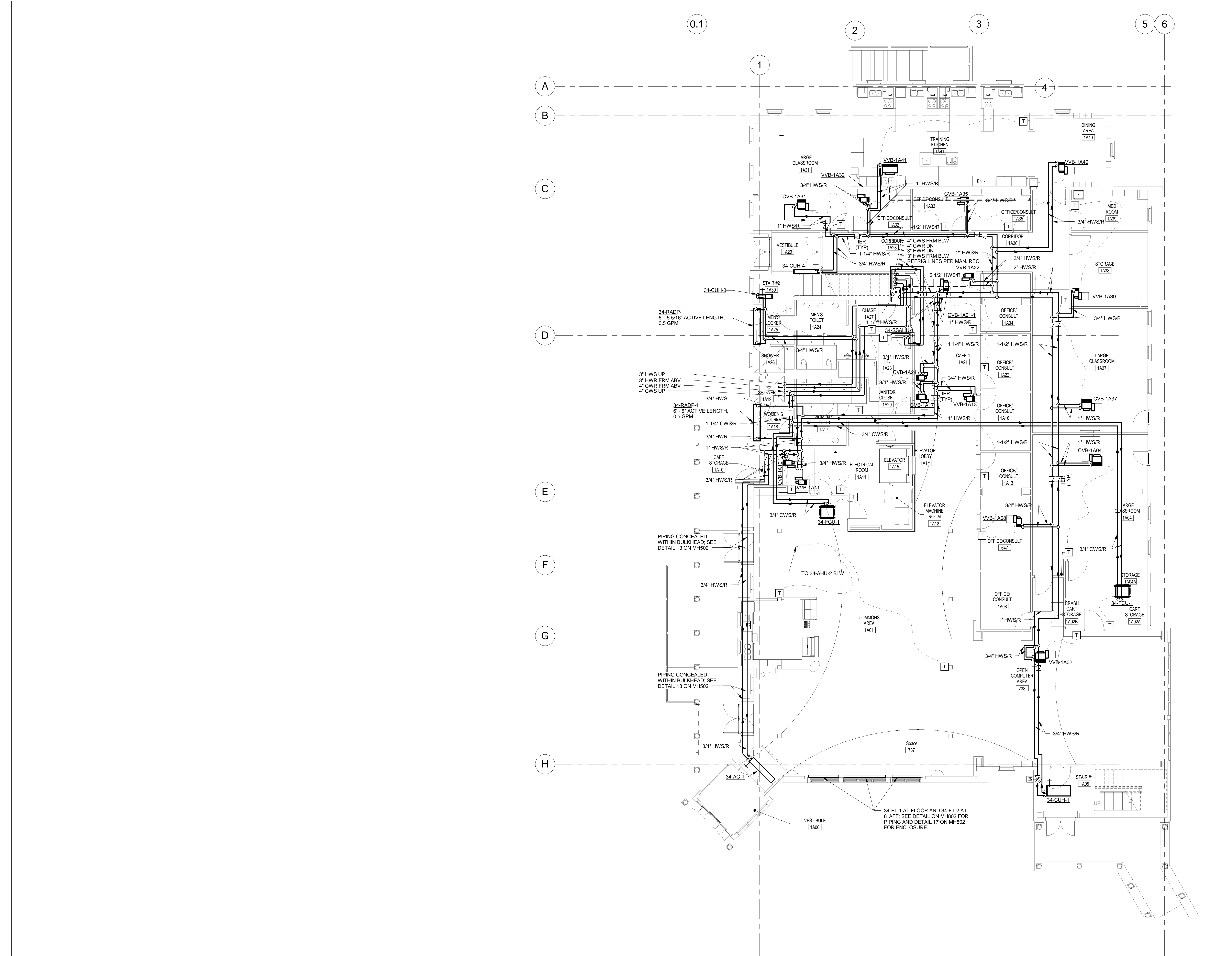
DUCTWORK NOTES

- ALL DUCTWORK SIZES NOTED ARE FREE AREA SIZES.
- RADIUS ELBOWS SHALL BE PROVIDED. TURNING VANES SHALL NOT BE PROVIDED UNLESS APPROVED BY ENGINEER.
- ALL DUCT JUNCTIONS SHALL BE CONSTRUCTED OF STANDARD 45 DEGREES ENTRY BRANCHES WITH BALANCING DAMPERS DOWNSTREAM OF DUCT BRANCH ENTRY.
- MAXIMUM LENGTH OF FLEXIBLE DUCTWORK IN ANY ONE SUPPLY BRANCH SHALL BE THREE (8) FEET.
- NO RUN OF FLEXIBLE DUCTWORK SHALL CONTAIN MORE THAN A TOTAL OF 90 DEGREES OF TURN. INSULATED RIGID SHALL BE USED WHERE MORE THAN 90 DEGREES IS REQUIRED.
- TOTAL STATIC PRESSURE NOTED IN SCHEDULES INCLUDES DUCT SYSTEM, TERMINAL UNITS, FILTERS, COILS, ETC.
- CEILING DIFFUSER SIZES SHOWN ON FLOOR PLANS ARE NECK SIZES.
- REFER TO ARCHITECTURAL REFLECTED CEILING PLAN FOR EXACT LOCATION OF CEILING DIFFUSERS, REGISTERS AND GRILLES.
- PROVIDE FLEXIBLE DUCT CONNECTION BETWEEN AHU/EXH FAN AND DUCTWORK.
- DUE TO THE SMALL SCALE OF THE DRAWINGS, RISERS, AND DROPS ARE NOT ALL SHOWN. PROVIDE RISERS AND DROPS FOR COORDINATION.
- FIRST FIGURE OF DUCT SIZE INDICATES DIMENSION OF FACE SHOWN OR INDICATED.
- THERMOSTAT LOCATIONS ONLY TO BE APPROVED AFTER FINAL FURNITURE LAYOUT IS APPROVED BY CONTRACTOR

FULLY SPRINKLERED
100% CONSTRUCTION DOCUMENTS

CONSULTANTS:						ARCHITECT:	Project Number 3468	Scale 1/8" = 1'-0"	Drawing Title FIRST FLOOR PLAN - DUCTWORK	Project Title Behavioral Health Complex	VA Project Number 595-109	Office of Facilities Management 				
 Civil Engineer 600 Parsippany Road, Suite 301 Parsippany, NJ 07054-3715 Tel (973) 576-9953 Fax (973) 739-9710						 Structural Engineer 180 W. Ridge Pike Limerick, PA 19468 Tel (214) 329-5559	 MEP Engineer 1407 Scalp Avenue Johnstown, PA 15904 Tel (814) 269-9300 Fax (814) 269-9301	 Environmental Consultant 1047 North Park Road, P.O. Box 6307 Reading, PA 19610 Tel (610) 621-2000	 Cost Estimator 221 Chestnut Street, Suite 200 Philadelphia, PA 19106 Tel (215) 923-8888	 healthcare facilities solutions	2520 Renaissance Boulevard, Suite 110 King of Prussia, PA 19406 t: 610.270.0599 f: 610.270.0995 www.arrayhfs.com		Approved: Project Director	Location 1700 South Lincoln Ave. Lebanon, PA 17042	Building Number 34	Drawing Number MH203
Revisions						Date				Date 07/27/2012	Checked TME		Drawn DJA	Dwg. 75 of 123		
Revisions						Date										

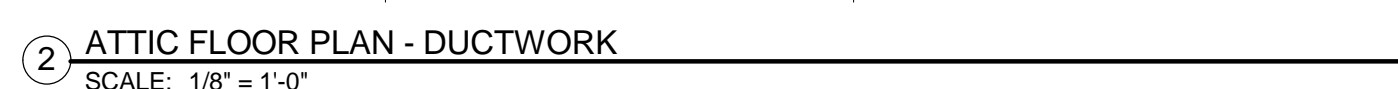
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- MECHANICAL PIPING NOTED**
1. ALL DOWNFEED BRANCHES AND EQUIPMENT SHALL HAVE DRAIN COCKS INSTALLED AT LOWEST POINT.
 2. ALL HORIZONTAL LINES SHALL BE RUN LEVEL WITHOUT POCKETS. WHERE POCKETS OCCUR, AUTO AIR VENTS SHALL BE INSTALLED AT EACH VERTICAL RISE.
 3. ALL UPFEED RISERS SHALL BE MADE WITH TOP CONNECTIONS AT MAIN. ALL DOWNFEED RISERS SHALL BE MADE WITH BOTTOM CONNECTIONS AT MAIN.
 4. CHANGES OF PIPE SIZES ON HORIZONTAL RUNS SHALL BE MADE WITH INVERTED ECCENTRIC REDUCERS WITH TOP OF PIPE LEVEL.
 5. ARROWS ON SUPPLY AND RETURN LINES INDICATE DIRECTION OF FLOW.
 6. PROVIDE VALVE WITH HOSE END ON ALL LOW POINTS OF PIPING SYSTEM AND AUTO AIR VENTS AT ALL HIGH POINTS OF THE PIPING SYSTEM UNLESS NOTED OTHERWISE.
 7. FOR TYPICAL WATER AND REFRIGERANT PIPING CONNECTIONS TO EQUIPMENT, SEE STANDARD DETAILS.
 8. WATER PIPE CONNECTIONS TO AIR HEATING AND COOLING COILS SHALL BE MADE SO THERE WILL BE COUNTER FLOW BETWEEN WATER AND AIR.
 9. DIELECTRIC UNIONS AND FLANGES SHALL BE USED ON ALL CONNECTIONS BETWEEN DISSIMILAR METALS.
 10. ALL LINES NOTED "BELOW FLR." OR "ABV. CLG." SHALL BE CONCEALED IN JOIST SPACE, THROUGH JOISTS, OR BETWEEN JOISTS, UNLESS CEILING IS FURRED OR LINES ARE BELOW SLAB ON GRADE.
 11. THERMOSTAT LOCATIONS ONLY APPROVED AFTER FINAL FURNITURE LAYOUT IS APPROVED BY CONTRACTOR

FULLY SPRINKLERED
100% CONSTRUCTION DOCUMENTS

		CONSULTANTS:		ARCHITECT:		Project Number 3468	Scale 1/8" = 1'-0"	Drawing Title FIRST FLOOR PLAN - PIPING	Project Title Behavioral Health Complex	VA Project Number 595-109	Office of Facilities Management <div>Department of Veterans Affairs</div>		
		Civil Engineer <div>Dewberry</div> 600 Parsippany Road, Suite 301 Parsippany, NJ 07054-3715 Tel (973) 576-9953 Fax (973) 739-9710	Structural Engineer <div>WZIG</div> 180 W. Ridge Pike Limerick, PA 19468 Tel (214) 329-5559	MEP Engineer <div>H.E. LENZ COMPANY</div> 1407 Scalp Avenue Johnstown, PA 15904 Tel (814) 269-9300 Fax (814) 269-9301	Environmental Consultant <div>SSM</div> 1047 North Park Road, P.O. Box 6307 Reading, PA 19610 Tel (610) 621-2000	Cost Estimator <div>INTERNATIONAL CONSULTANTS, INC.</div> 221 Chestnut Street, Suite 200 Philadelphia, PA 19106 Tel (215) 923-8888	2520 Renaissance Boulevard, Suite 110 King of Prussia, PA 19406 t: 610.270.0599 f: 610.270.0995 www.arrayhfs.com		Approved: Project Director			Location 1700 South Lincoln Ave. Lebanon, PA 17042	
Revisions		Date		<div><div>Seal of the Commonwealth of Pennsylvania</div><div>Seal of the Department of Veterans Affairs</div></div>		A R R A Y healthcare facilities solutions		Date 07/27/2012		Checked TME		Drawn DJA	Drawing Number MH204 Dwg. 76 of 123



1. ALL DUCTWORK SIZES NOTED ARE FREE AREA SIZES.
2. RADIUS ELBOWS SHALL BE PROVIDED, TURNING VAINES SHALL NOT BE PROVIDED UNLESS APPROVED BY ENGINEER.
3. ALL DUCT JUNCTIONS SHALL BE CONSTRUCTED OF STANDARD 45 DEGREES ENTRY BRANCHES WITH BALANCING DAMPERS DOWNSTREAM OF DUCT BRANCH ENTRY.
4. MAXIMUM LENGTH OF FLEXIBLE DUCTWORK IN ANY DUCT SYSTEM BRANCH SHALL BE THREE (8) FEET.
5. NO RUN OF FLEXIBLE DUCTWORK SHALL CONTAIN MORE THAN A TOTAL OF 80 DEGREES OF TURN. INSULATED RIGID SHALL BE USED WHERE MORE THAN 90 DEGREES IS REQUIRED.
6. TOTAL STATIC PRESSURE NOTED IN SCHEDULES INCLUDE DUCT SYSTEM, TERMINAL UNITS, FILTERS, COILS, ETC.
7. CEILING DIFFUSER SIZES SHOWN ON FLOOR PLANS ARE NECK SIZES.
8. REFER TO ARCHITECTURAL REFLECTED CEILING PLAN FOR EXACT LOCATION OF CEILING DIFFUSERS, REGISTERS AND GRILLES.
9. PROVIDE FLEXIBLE DUCT CONNECTION BETWEEN AHU/EXH FAN AND DUCTWORK.
10. DUE TO THE SMALL SCALE OF THE DRAWINGS, RISERS AND DROPS ARE NOT ALL SHOWN. PROVIDE RISERS AND DROPS FOR COORDINATION.
11. FIRST FIGURE OF DUCT SIZE INDICATES DIMENSION OF FACE SHOWN OR INDICATED.
12. THERMOSTAT LOCATIONS ONLY TO BE APPROVED AFTER FINAL FURNITURE LAYOUT IS APPROVED BY CONDUCTOR

Revisions	Date
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2520 Renaissance Boulevard, Suite 110
King of Prussia, PA 19406

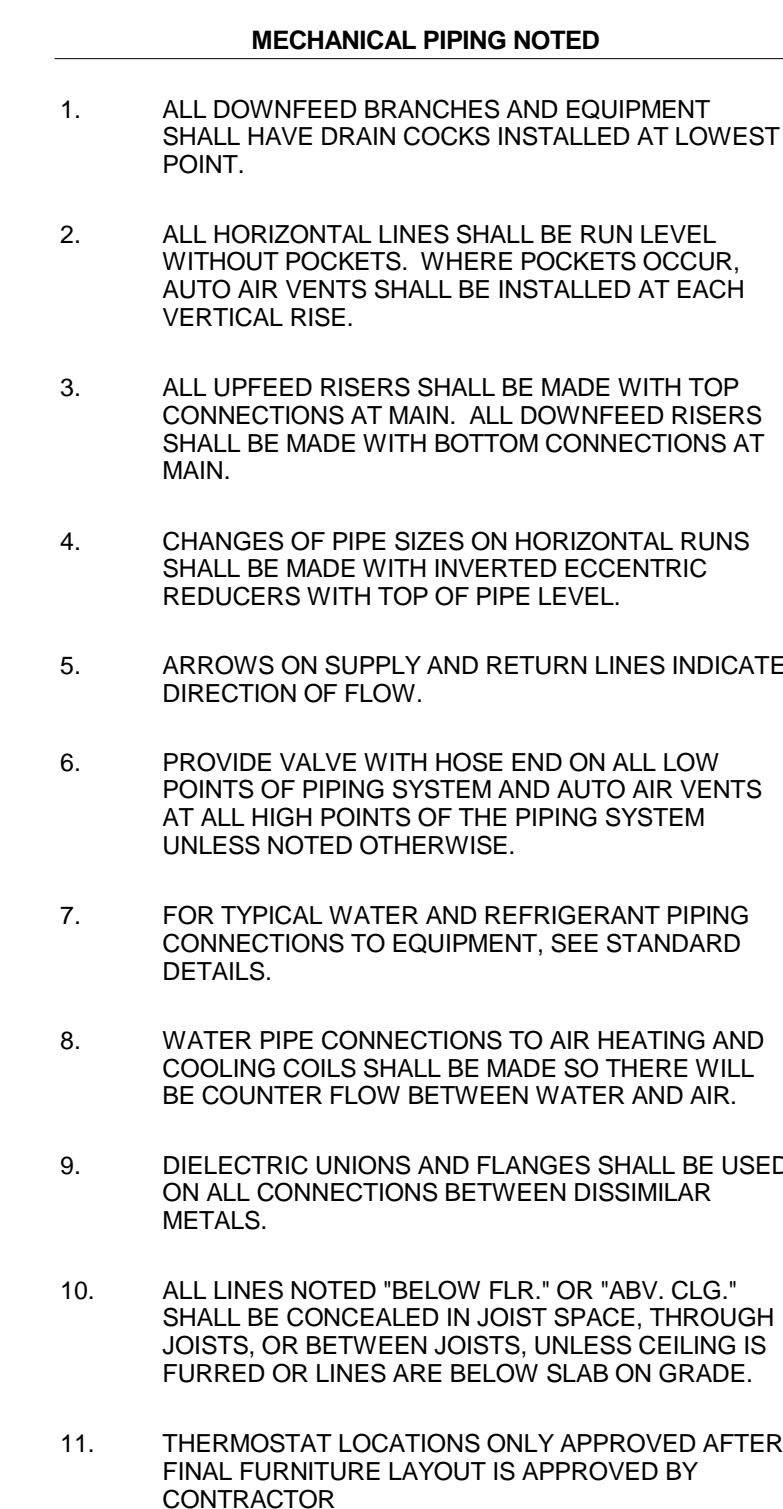
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Approved: Project Director

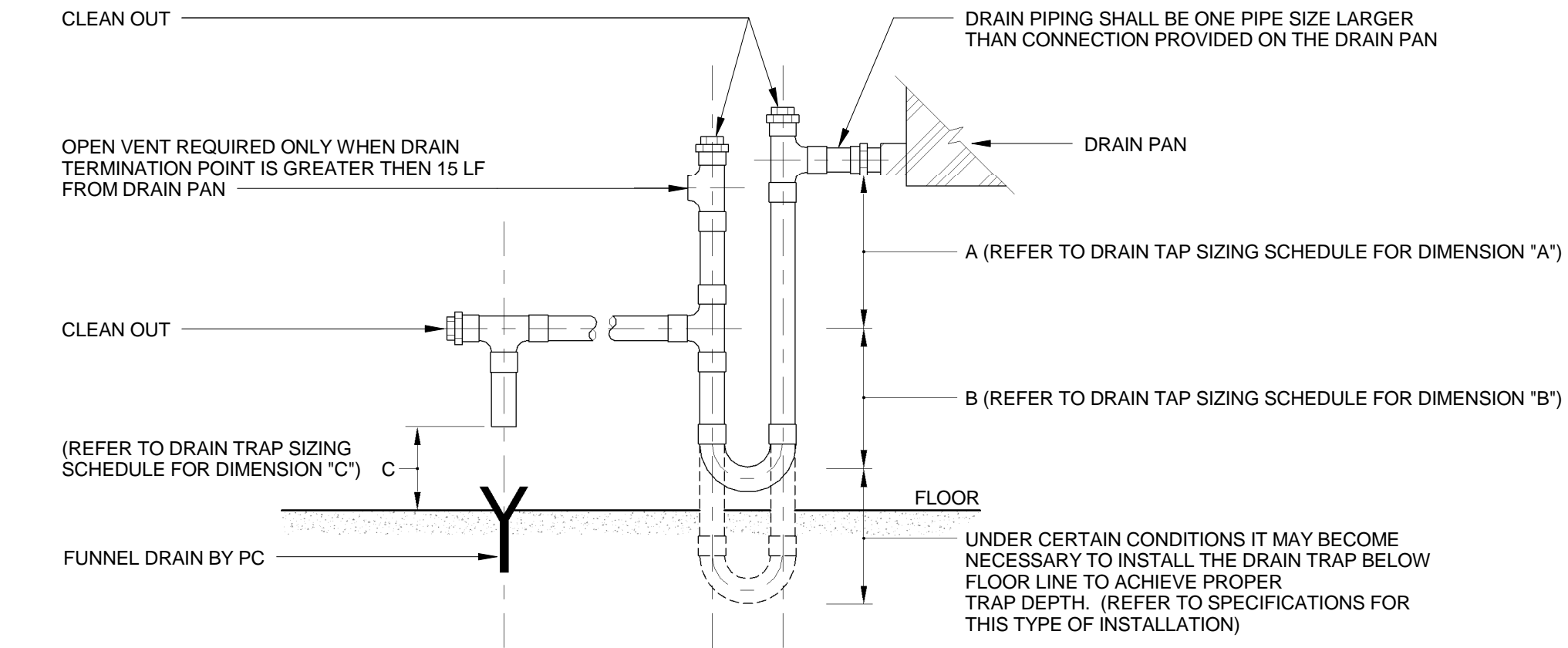
Date	07/27/2012	Checked	TME	Drawn	D.J.A.
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2	Drawing Number	MH205
	Dwg. 77	of 12

 Department of
Veterans Affairs



FULLY SPRINKLERED
100% CONSTRUCTION DOCUMENTS

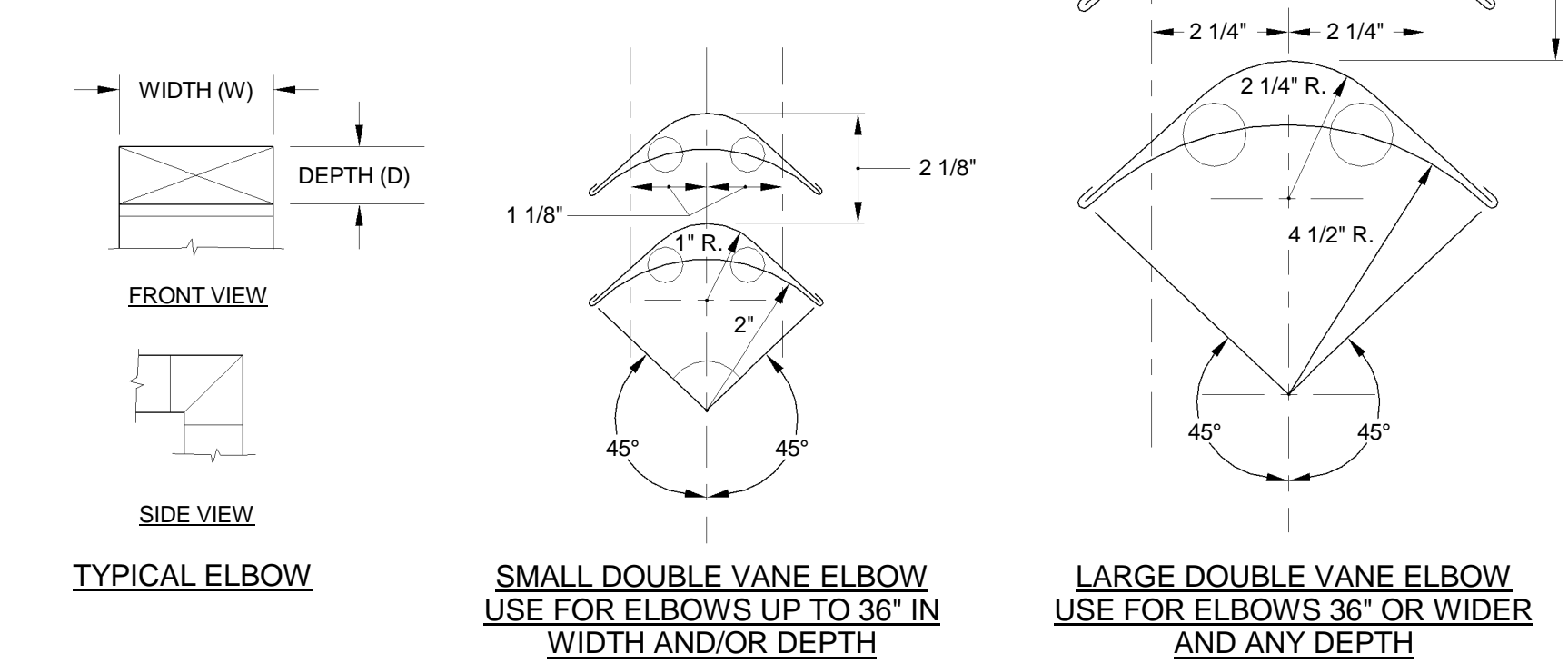


TRAP SIZING SCHEDULE		
DIMENSION	DRAIN TRAP LOCATION FOR NEGATIVE PRESSURE	DRAIN TRAP LOCATION FOR POSITIVE PRESSURE
A	4"	2"
B	4"	TOTAL AHU SP ± 1 (4" MINIMUM)
C	2" ABOVE FUNNEL DRAIN	2" ABOVE FUNNEL DRAIN

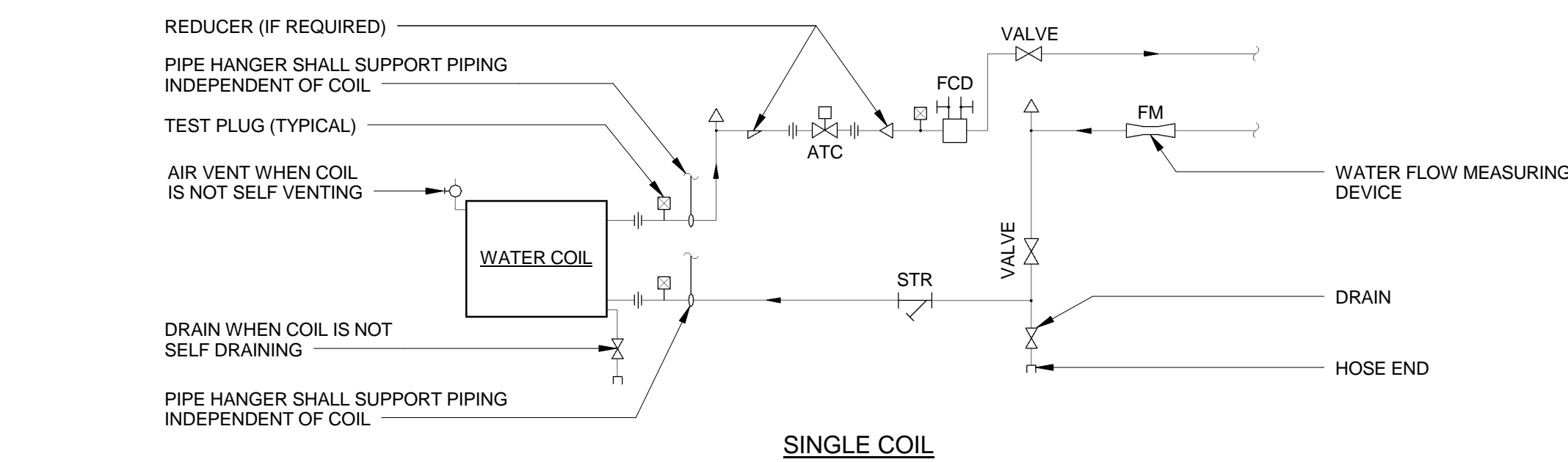
NOTE:
DRAIN PAN MAY BE LOCATED IN THE NEGATIVE OR POSITIVE PRESSURE AREA OF THE AIR STREAM. REFER TO DRAIN TRAP SIZING SCHEDULE FOR DIMENSIONAL DATA REQUIRED FOR SPECIFIC DRAIN LOCATION.

1 AIR HANDLING UNIT CONDENSATE DRAIN TRAP PIPING DETAIL
NOT TO SCALE

- NOTES:**
- ALL SQUARE OR RECTANGULAR ELBOWS SHALL HAVE ONE OF THE TWO TYPES OF TURNING VANES SHOWN. SINGLE VANE ELBOWS WILL NOT BE PERMITTED.
 - VANES SHALL BE CONSTRUCTED, SUPPORTED AND FASTENED AS RECOMMENDED BY SMACNA.
 - ALL SQUARE OR RECTANGULAR ELBOWS SHOWN ON PLANS FOR EXHAUST OR RETURN DUCT MAY BE MADE RADIUS ELBOWS PROVIDED SPACE PERMITS RADIUS INSTALLATION.
 - ALL SQUARE OR RECTANGULAR ELBOWS SHOWN ON PLANS FOR SUPPLY DUCT MAY BE MADE RADIUS ELBOWS PROVIDED SPACE PERMITS RADIUS INSTALLATION AND/OR THERE ISN'T AN OUTLET OR TAKE-OFF WITHIN 5D ON THE DOWNSTREAM SIDE OF THE ELBOW.

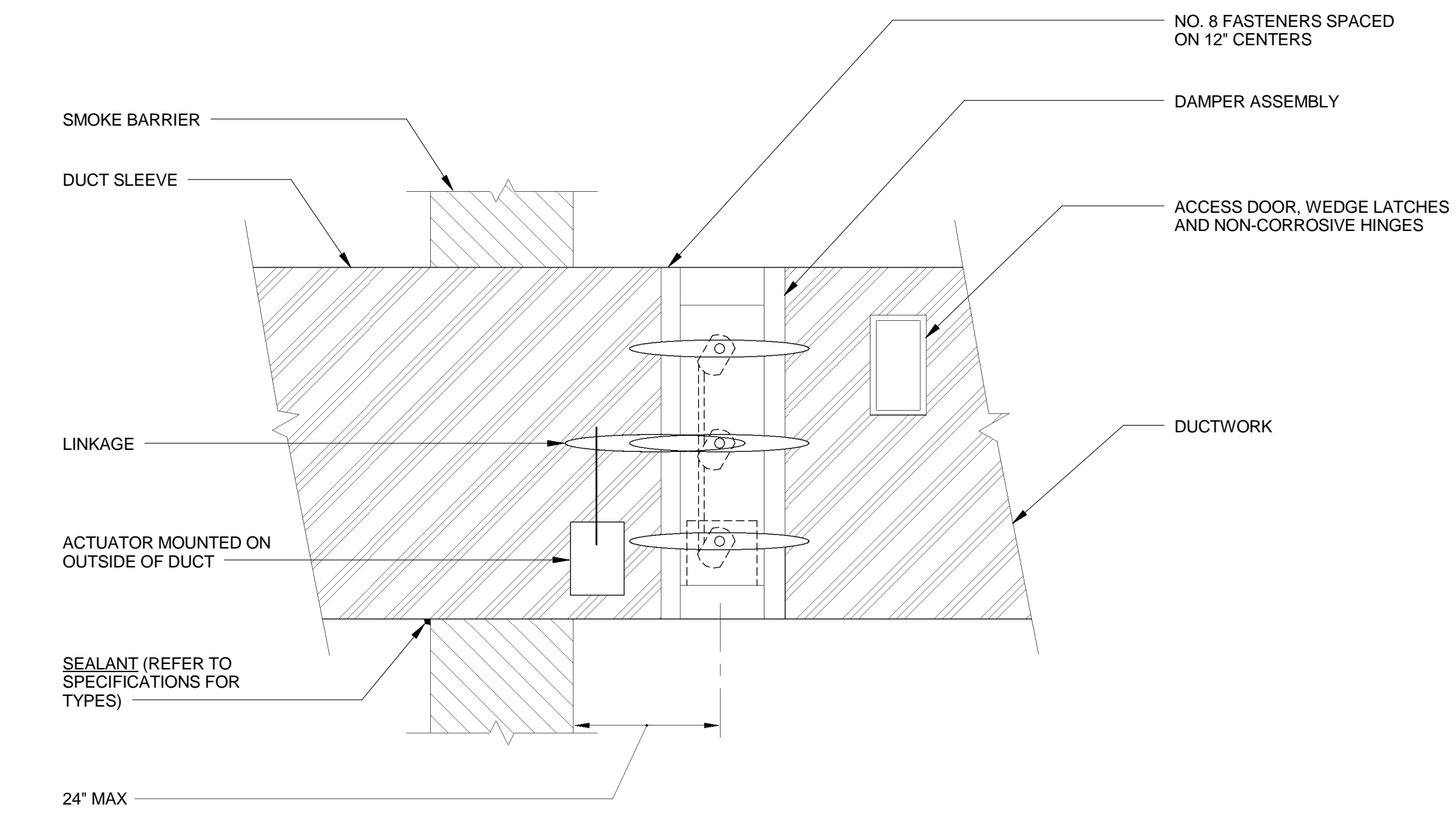


2 SQUARE OR RECTANGULAR ELBOW DETAIL
NOT TO SCALE

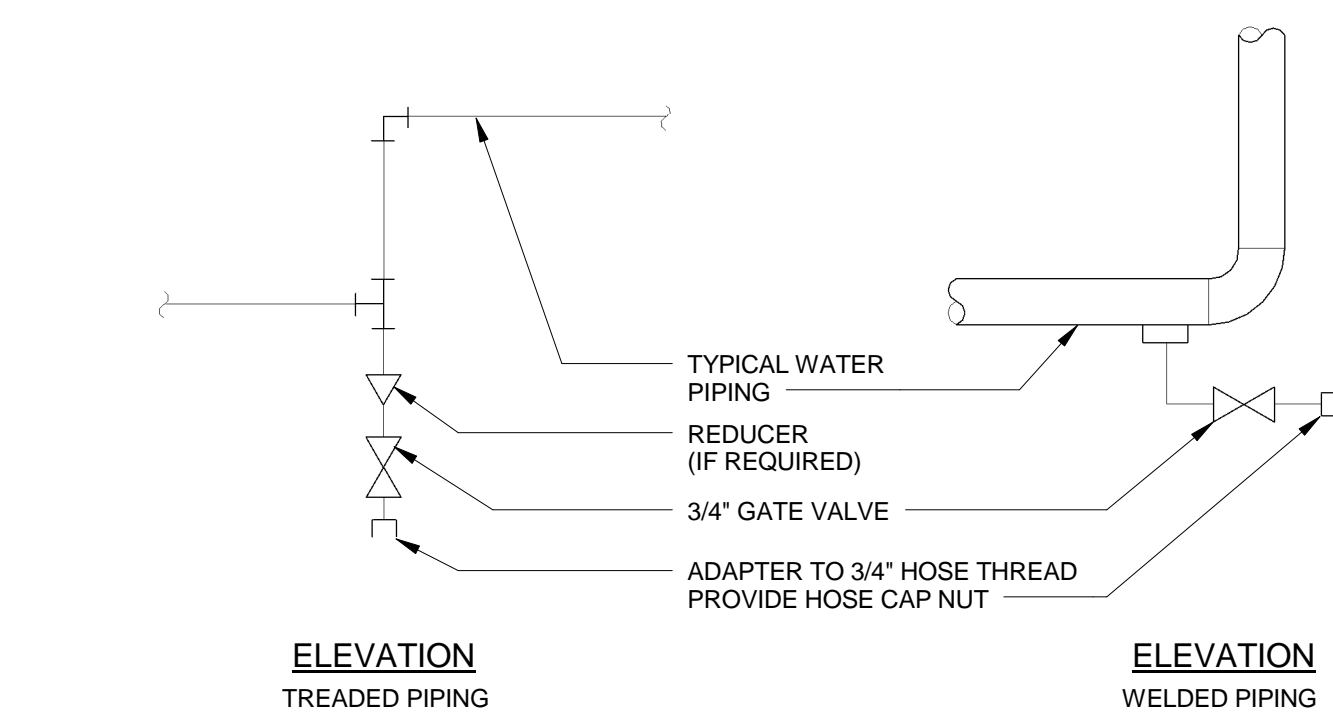


- NOTES:**
- WHEN COIL IS INCLUDED IN CASING MOUNTED VIBRATION ISOLATORS THE FIRST TWO (2) HANGERS FOR EACH PIPE SHALL BE SPRING AND NEOPRENE TYPE. TYPE "H" FOR 4" DIAMETER PIPE AND SMALLER. TYPE "H-P" FOR 5" DIAMETER PIPE AND LARGER.
 - PIPE SHALL BE INSTALLED IN SUCH MANNER THAT IT WILL NOT BLOCK THE SWING OR USE OF ACCESS DOORS OR PANELS. NEITHER SHALL IT BLOCK THE SERVICING OF FILTERS, VALVES, OR EQUIPMENT.

3 TYPICAL CONNECTIONS TO WATER COIL
NOT TO SCALE



4 SMOKE DAMPER DETAIL
NOT TO SCALE

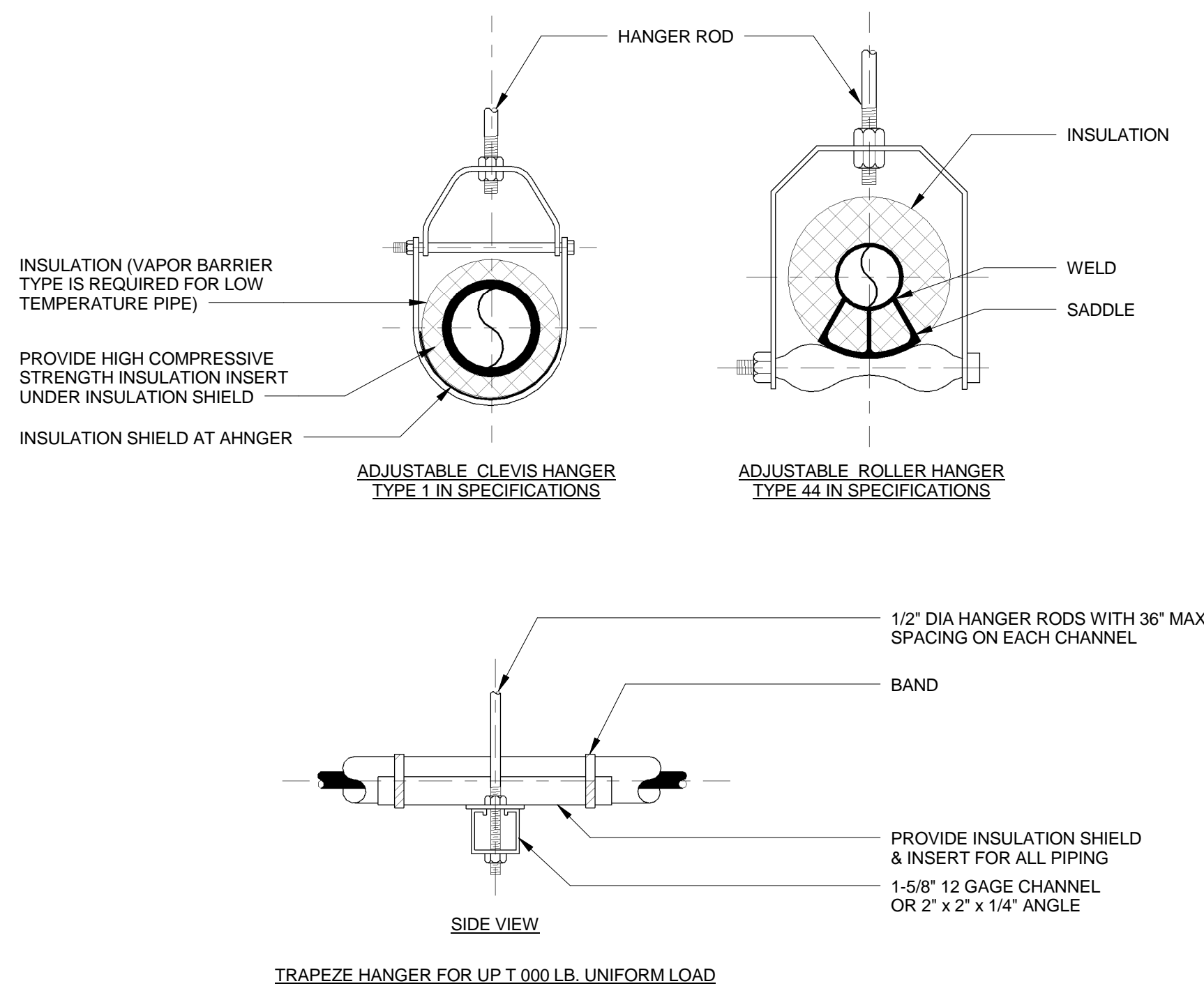


- NOTES:**
- DRAIN ALL LOW POINTS AS SHOWN ABOVE.
 - WHERE SCALE POCKETS ARE SHOWN ON PIPE DIAGRAMS AND/OR PLANS, LOCATE DRAIN AT THE BOTTOM OF SCALE POCKET.

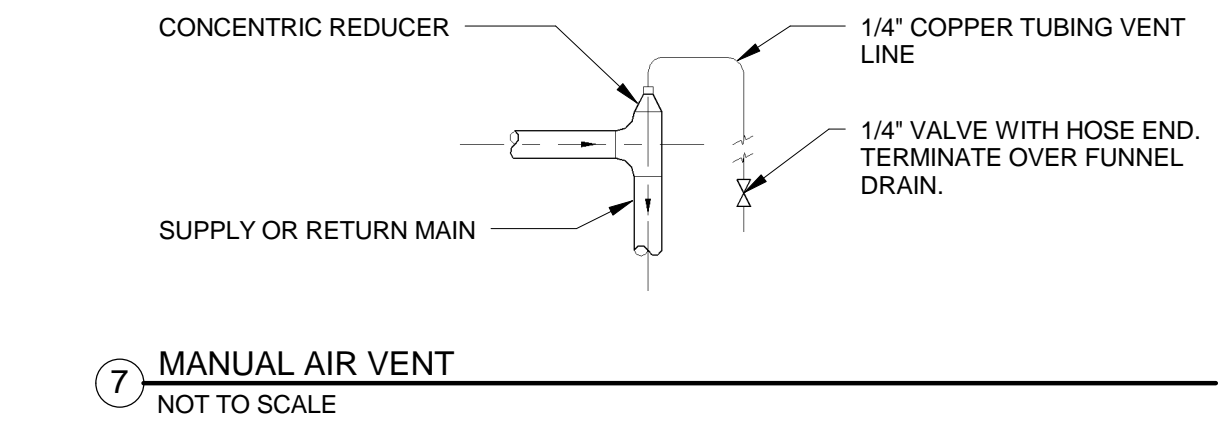
5 TYPICAL DRAIN VALVE CONNECTION
NOT TO SCALE

MAXIMUM PIPE/TUBING SUPPORT SPACING (FEET)																
NOM. SIZE	THRU 3/4"	1	1-1/4"	1-1/2"	2	2-1/2"	3	4	5	6	8	10	12	14	16	18
PIPE	7 FEET	7	7	9	10	11	12	14	16	17	19	22				
TUBING	5 FEET	6	7	8	8	9	10	12	13	14	16					

- NOTE:**
- FOR TRAPEZE HANGER TAKE SPACING OF SMALLEST SIZE ON TRAPEZE.

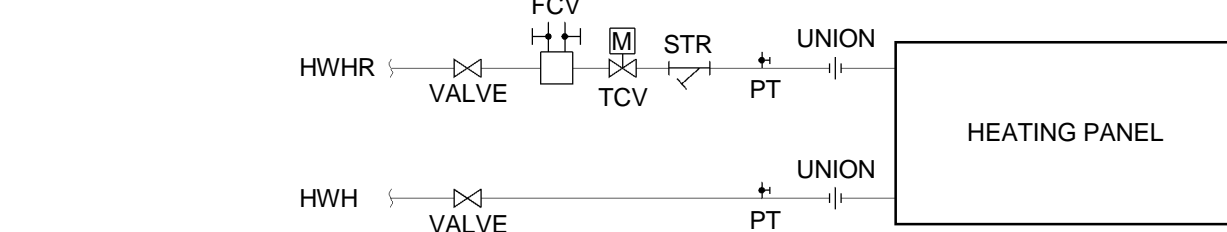


6 TYPICAL PIPE HANGER DETAIL
NOT TO SCALE

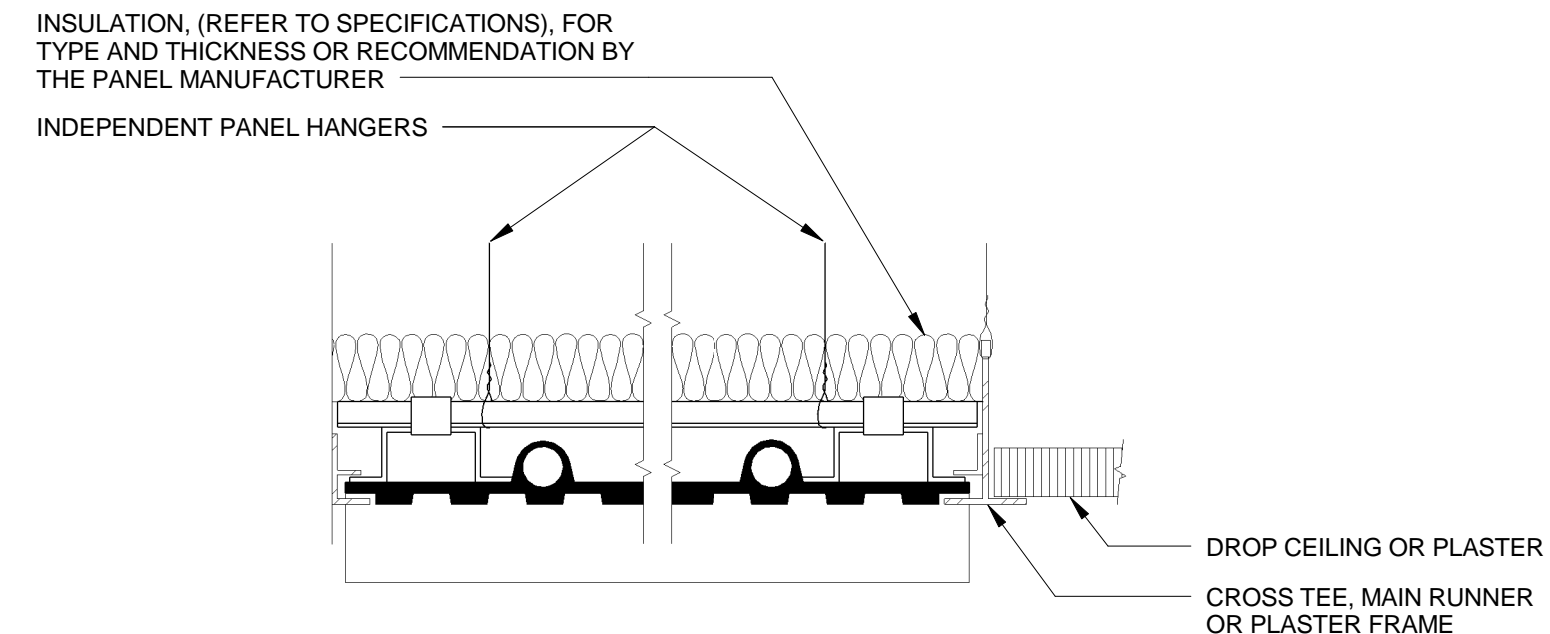


7 MANUAL AIR VENT
NOT TO SCALE

- CONTROL VALVE NOTE:**
- CONTROL VALVE SHALL BE PROVIDED WITH ADJACENT UNIONS TO FACILITATE REMOVAL.

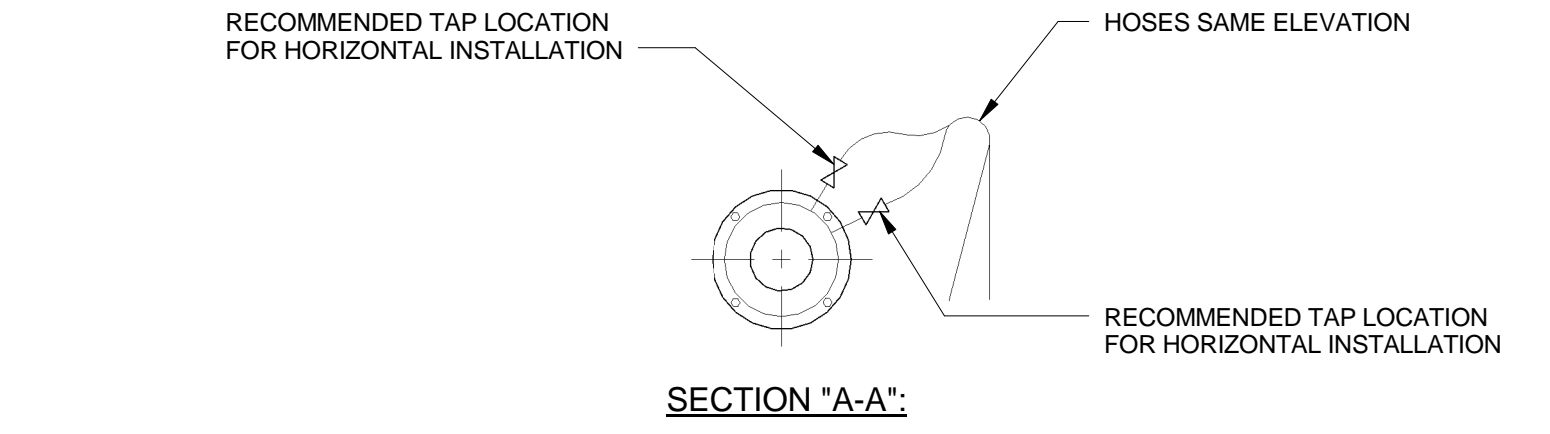


SCHEMATIC - HOT WATER - 2-WAY

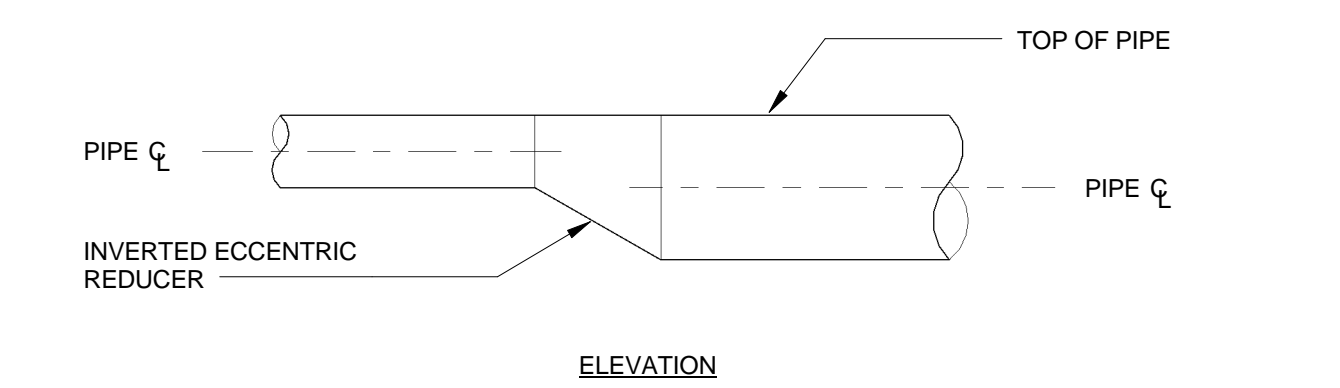


- NOTES:**
- REFER TO FLOOR PLANS FOR PANEL WIDTH AND LOCATION. SEE PANEL MANUFACTURER'S SPECIFICATIONS FOR OPENING SIZE.
 - CROSS CHANNELS, CHANNEL CLIPS, INSULATION AND SADDLE BRACKETS BY PANEL MANUFACTURER.
 - THE PANEL OPENING SIZE, FRAMING REQUIREMENTS AND LOCATION ARE TO BE COORDINATED WITH THE CEILING CONTRACTOR.

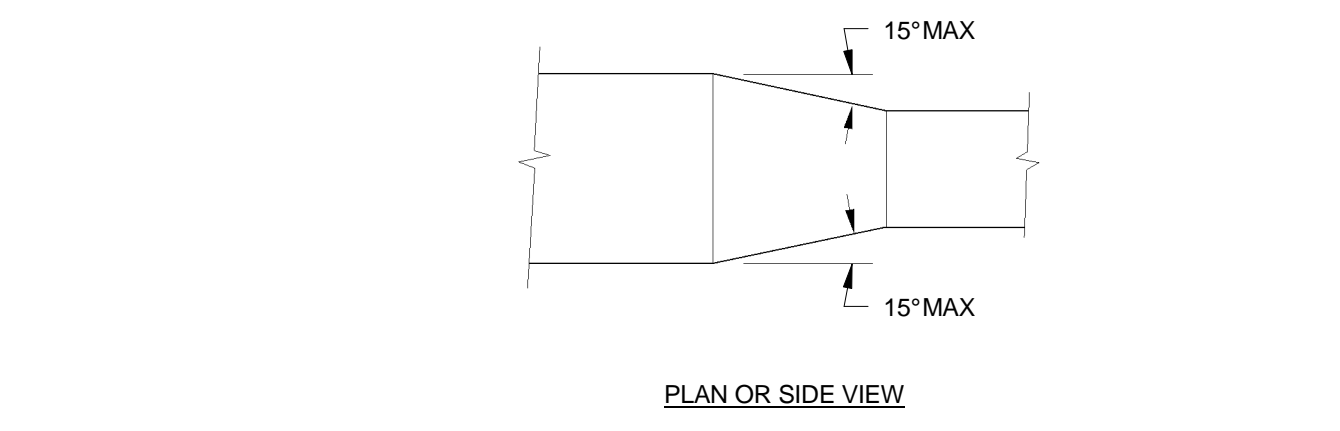
8 HW RAD CEILING PANEL PIPING DETAIL
NOT TO SCALE



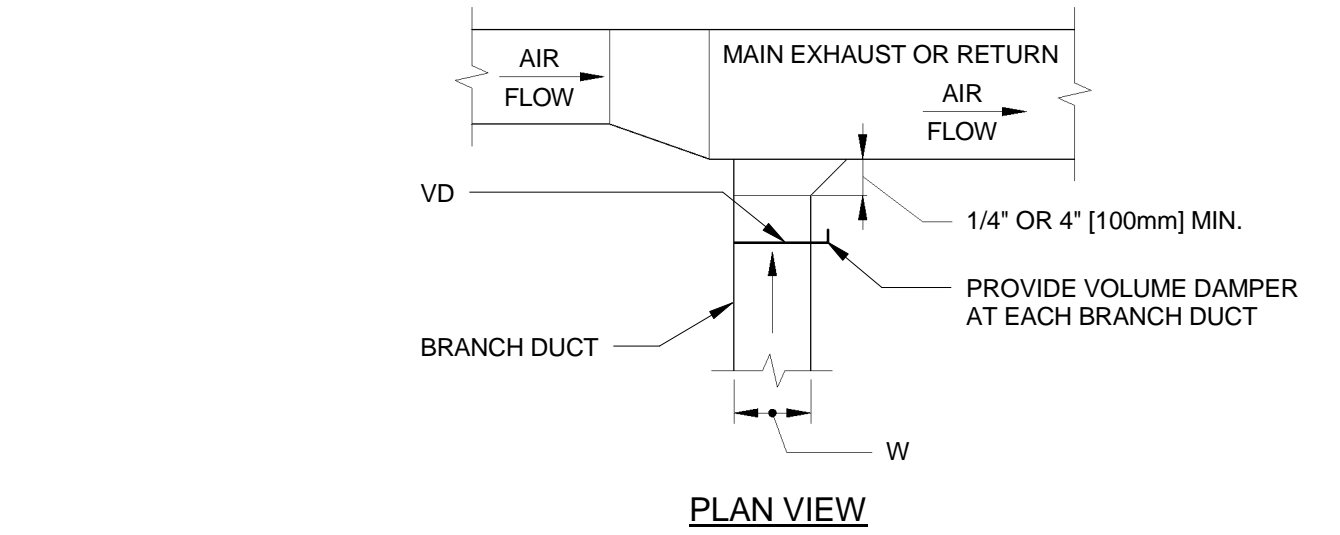
10 RETURN/EXHAUST GRILLE TYPICAL CONNECTION
NOT TO SCALE



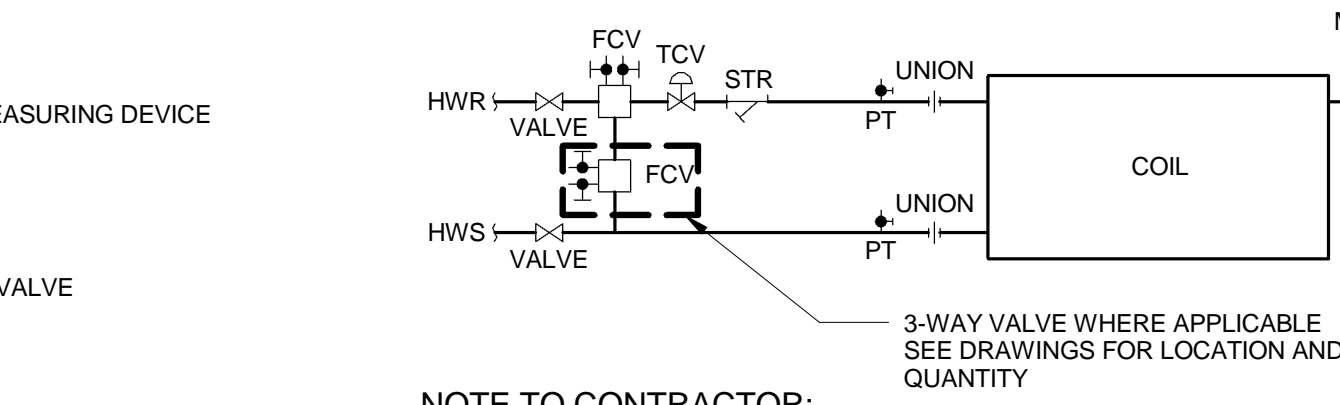
11 TYPICAL PIPE SIZE CHANGE FOR WATER
NOT TO SCALE



12 DUCT TRANSITION
NOT TO SCALE



13 EXHAUST OR RETURN BRANCH DUCTWORK
NOT TO SCALE



- NOTE TO CONTRACTOR:**
- CONTROL VALVE SHALL BE PROVIDED WITH FLANGED ENDS OR SHALL BE PROVIDED WITH ADJACENT UNIONS TO FACILITATE REMOVAL.

14 AUXILIARY HEATING COIL PIPING SCHEMATIC - HOT WATER - 2-WAY
NOT TO SCALE

WATER FLOW MEASURING DEVICE INSTALLATION SCHEDULE			
TYPE	MIN UPSTREAM LENGTH OF PIPE - PIPE DIAMETERS		MIN DOWNSTREAM LENGTH - PIPE IN PIPE DIAMETERS
	FOR SIDE TEE	FOR VALVE or OTHER FITTING	
ORIFICE FLANGE or FLOATING BALL WITH IMPACT TUBE	20	10	5
FLOW CONTROL DEVICE, AUTOMATIC BALANCING CONTROL VALVE, or INSERTION VELOCITY AVERAGING AND MEASURING TUBE	10	5	2

- NOTES:**
- DIMENSIONS SHOWN IN SCHEDULE ARE MINIMUM REQUIRED. IF MANUFACTURER OF FURNISHED WATER FLOW MEASURING DEVICE RECOMMENDS A GREATER DIMENSION, USE THEIR RECOMMENDATION.
 - INSTALL THE WATER FLOW MEASURING DEVICE SO THE FLOW ARROW IS IN THE SAME DIRECTION AS THE FLOW.
 - THE WATER FLOW MEASURING DEVICE MAY BE INSTALLED IN EITHER HORIZONTAL OR VERTICAL PIPE. UNITS REQUIRING REMOTE METERS SHALL HAVE THE METER CONNECTIONS LOCATED ON OR NEAR THE SIDE WHEN INSTALLED IN HORIZONTAL PIPE. SEE SECTION "A-A". THE METER CONNECTIONS CAN BE INSTALLED IN ANY POSITION WHEN INSTALLED IN VERTICAL PIPE.

9 WATER FLOW MEASURING DEVICE INSTALLATION DETAIL
NOT TO SCALE

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Structural Engineer

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MEP Engineer

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Environmental Consultant

SSM

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ARCHITECT:

ARRAY

healthcare facilities solutions

Project Number

3468

Scale

As indicated

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Drawing Title

MECHANICAL DETAILS

Project Title

Behavioral Health Complex

VA Project Number

595-109

Building Number

34

Approved: Project Director

Date

07/27/2012

Checked

TME

Drawn

DJA

Location

1700 South Lincoln Ave. Lebanon, PA 17042

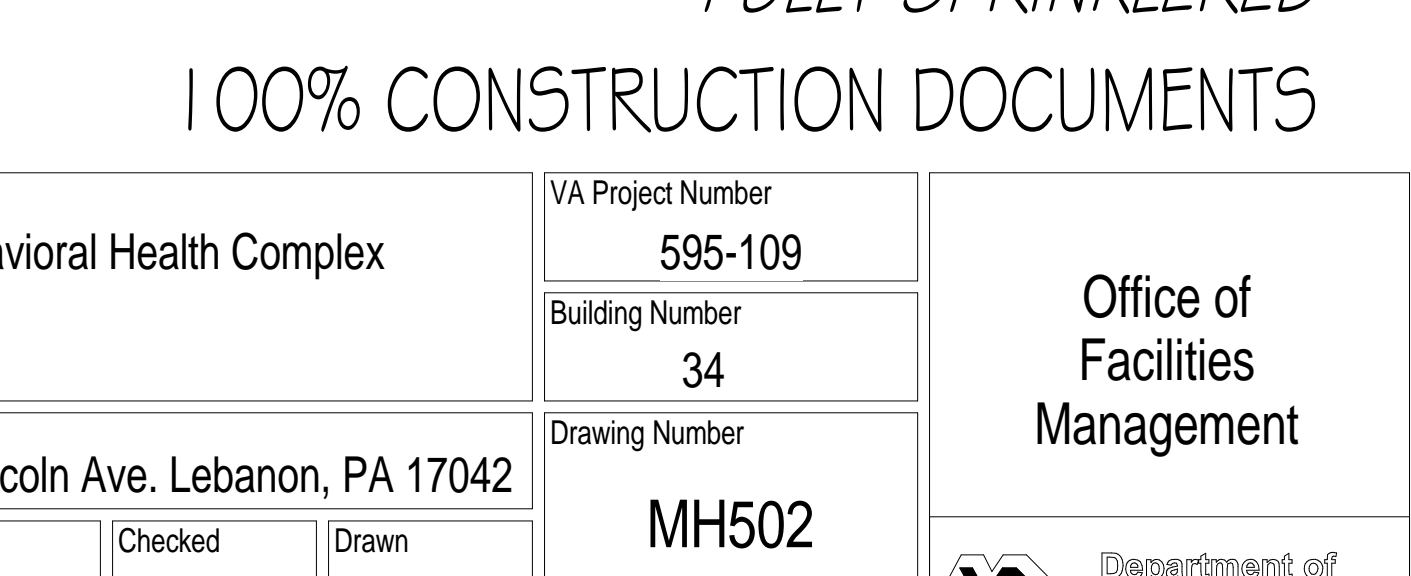
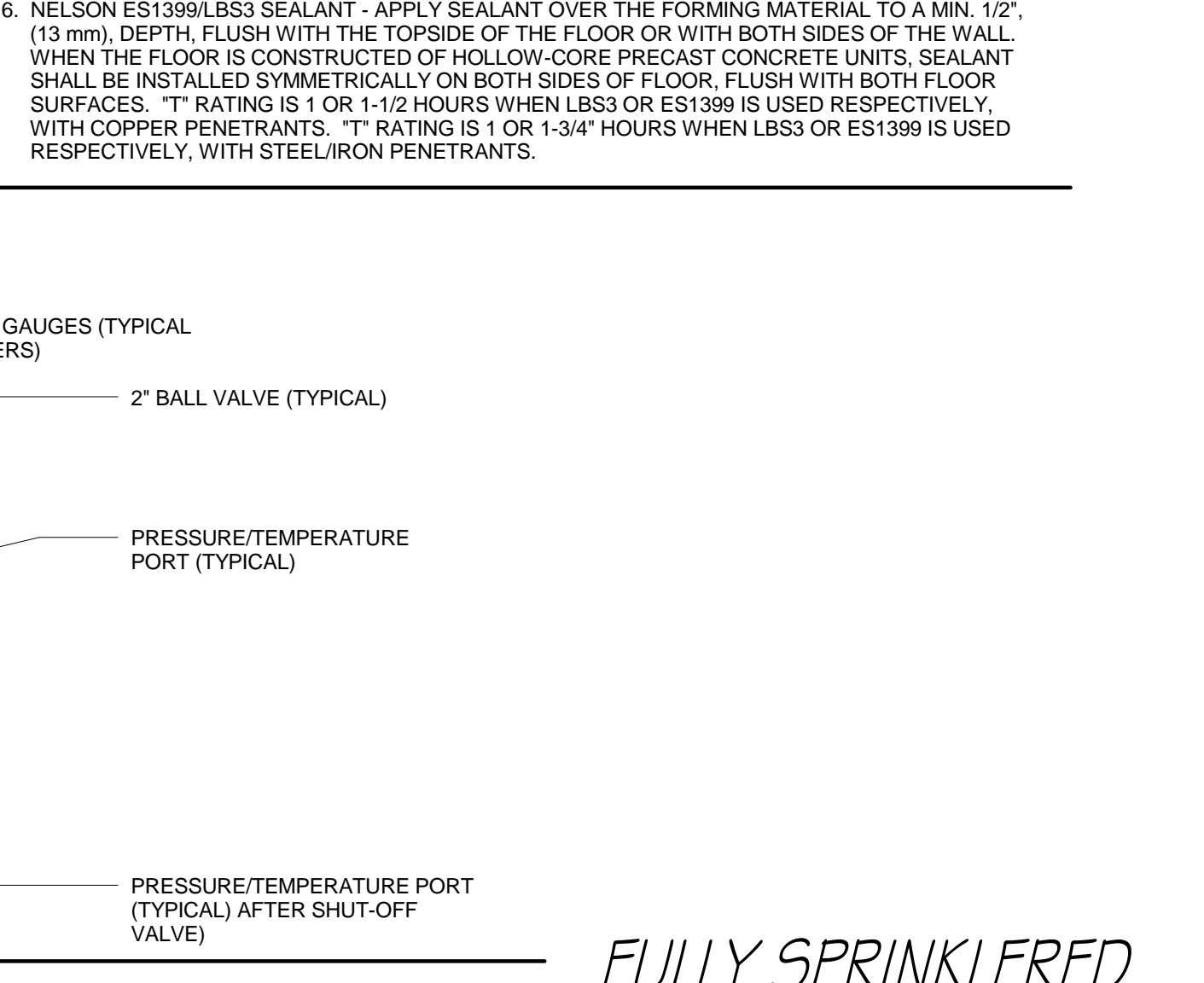
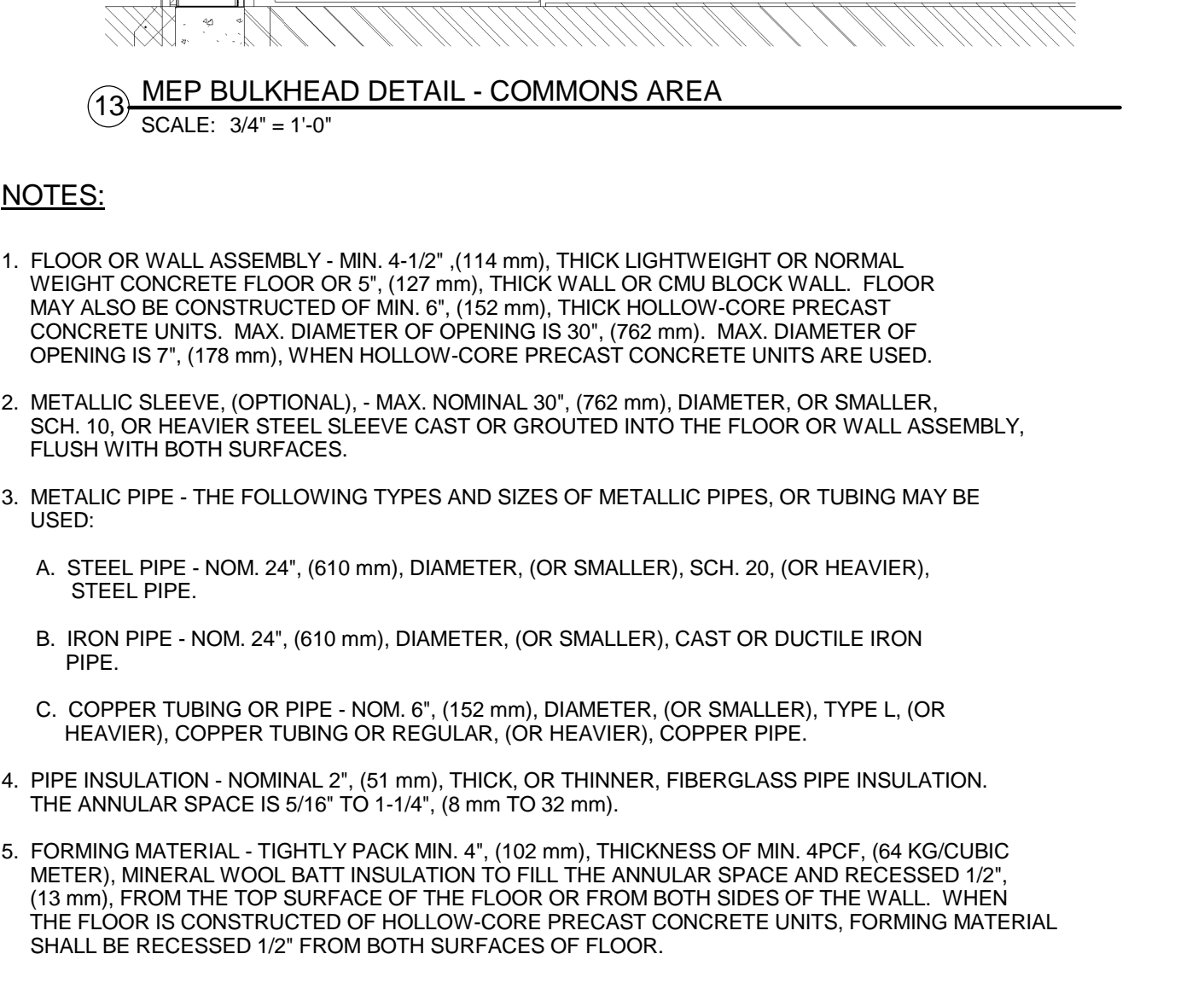
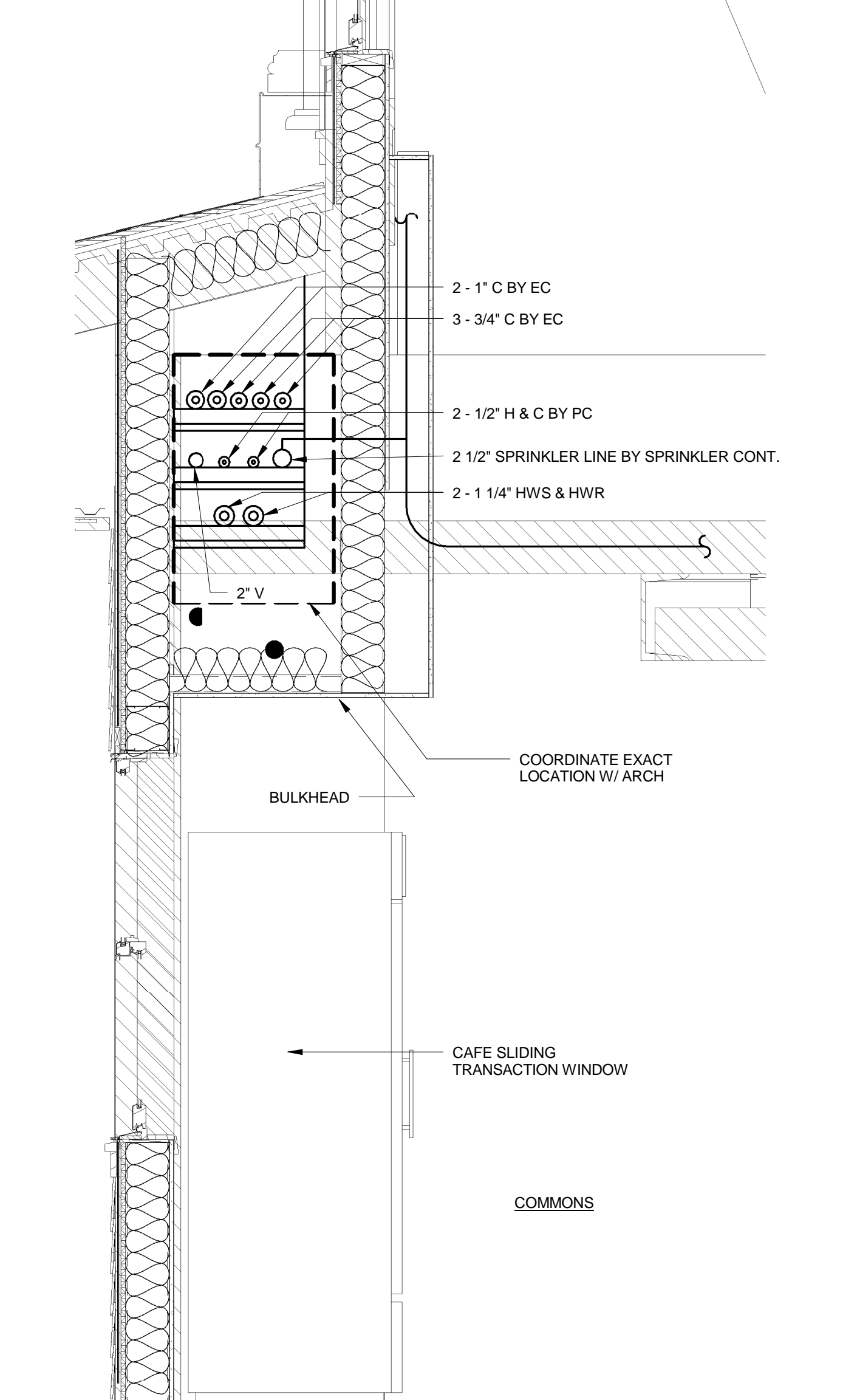
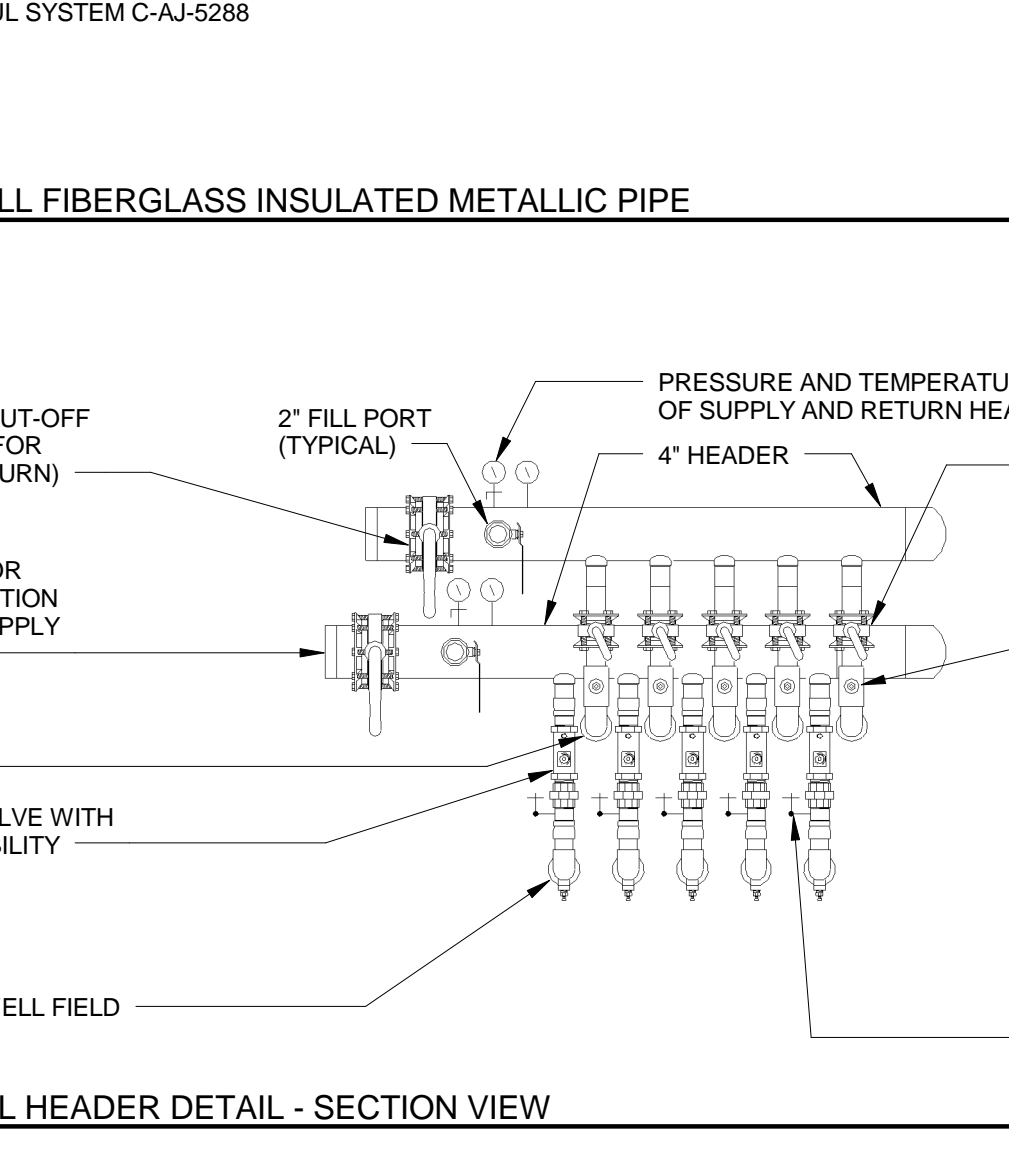
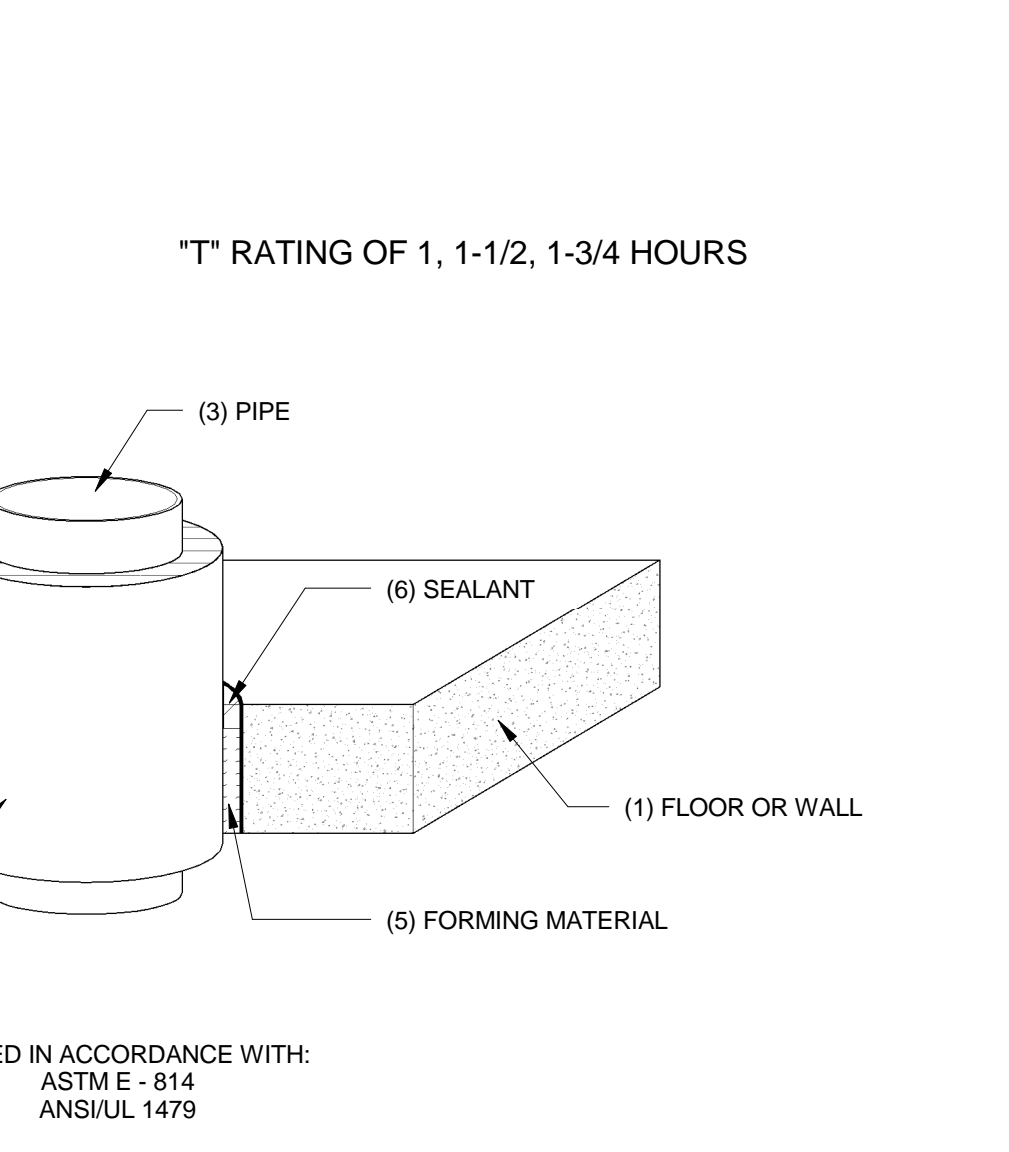
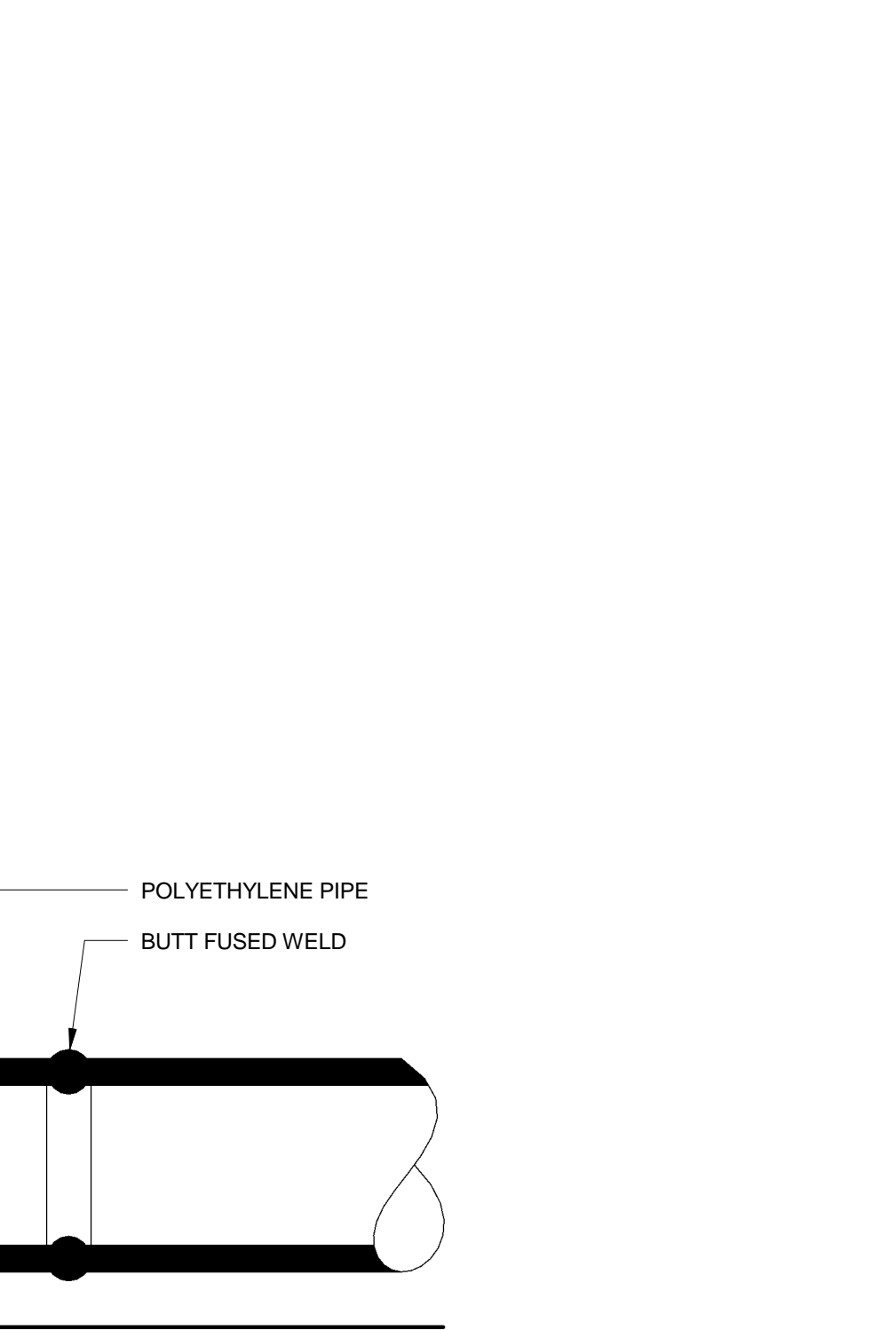
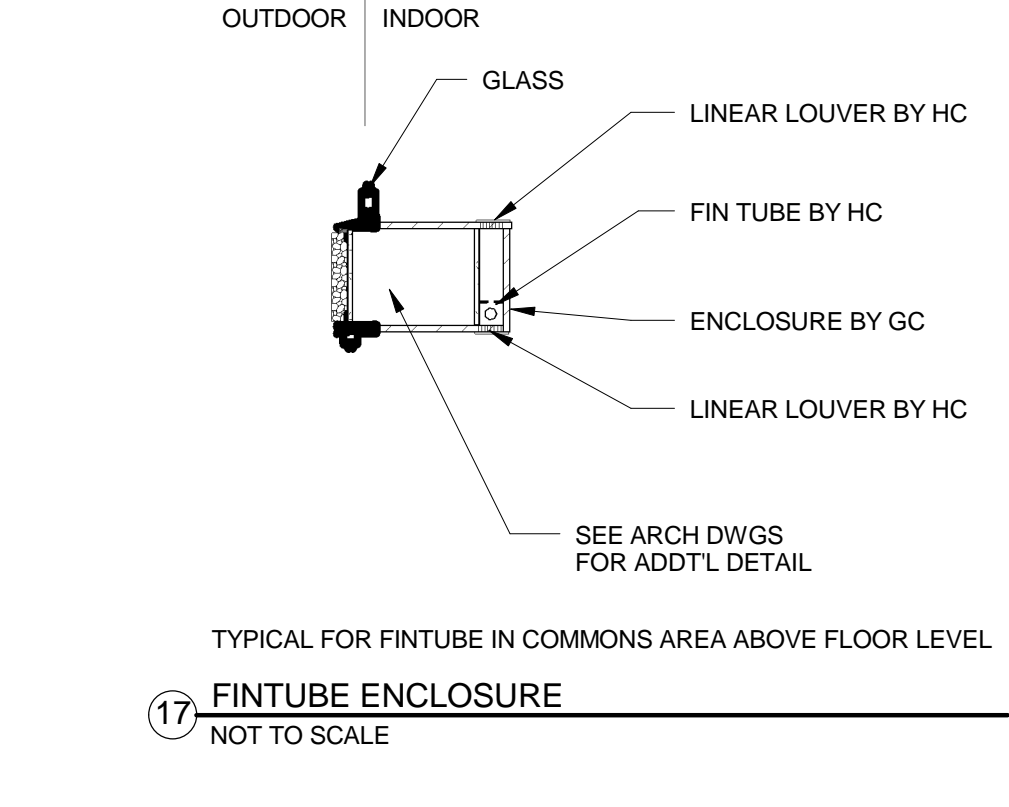
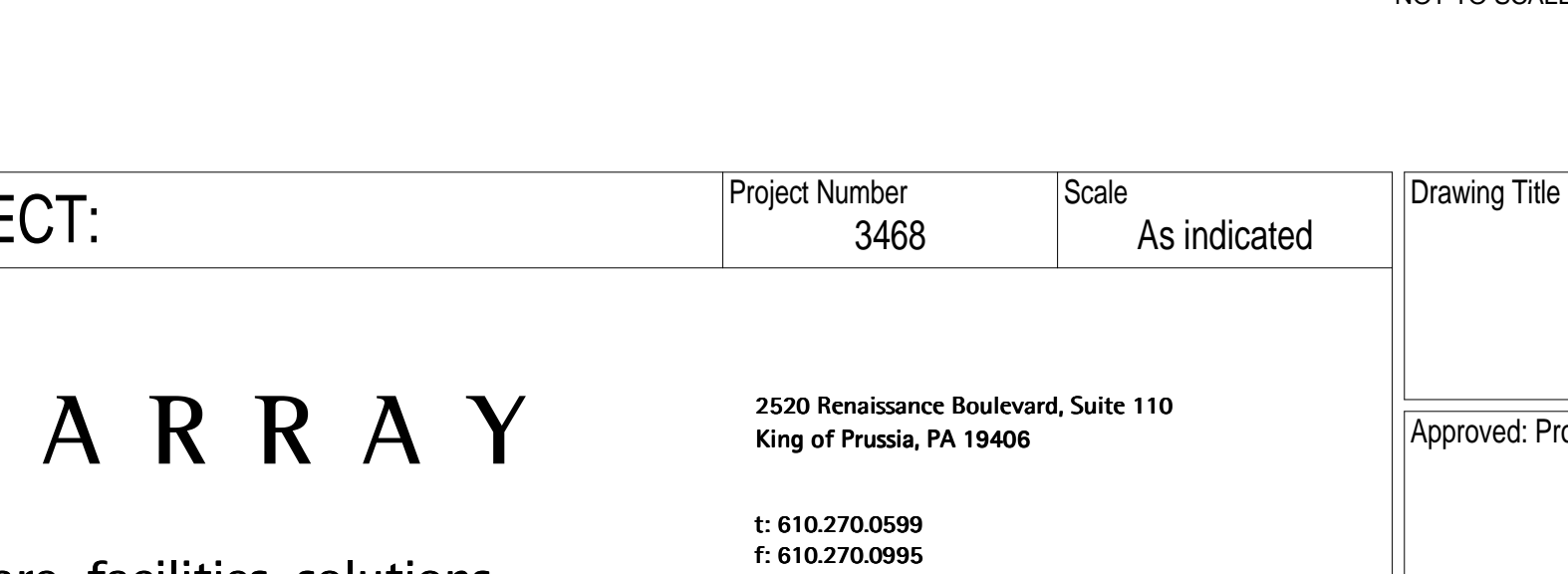
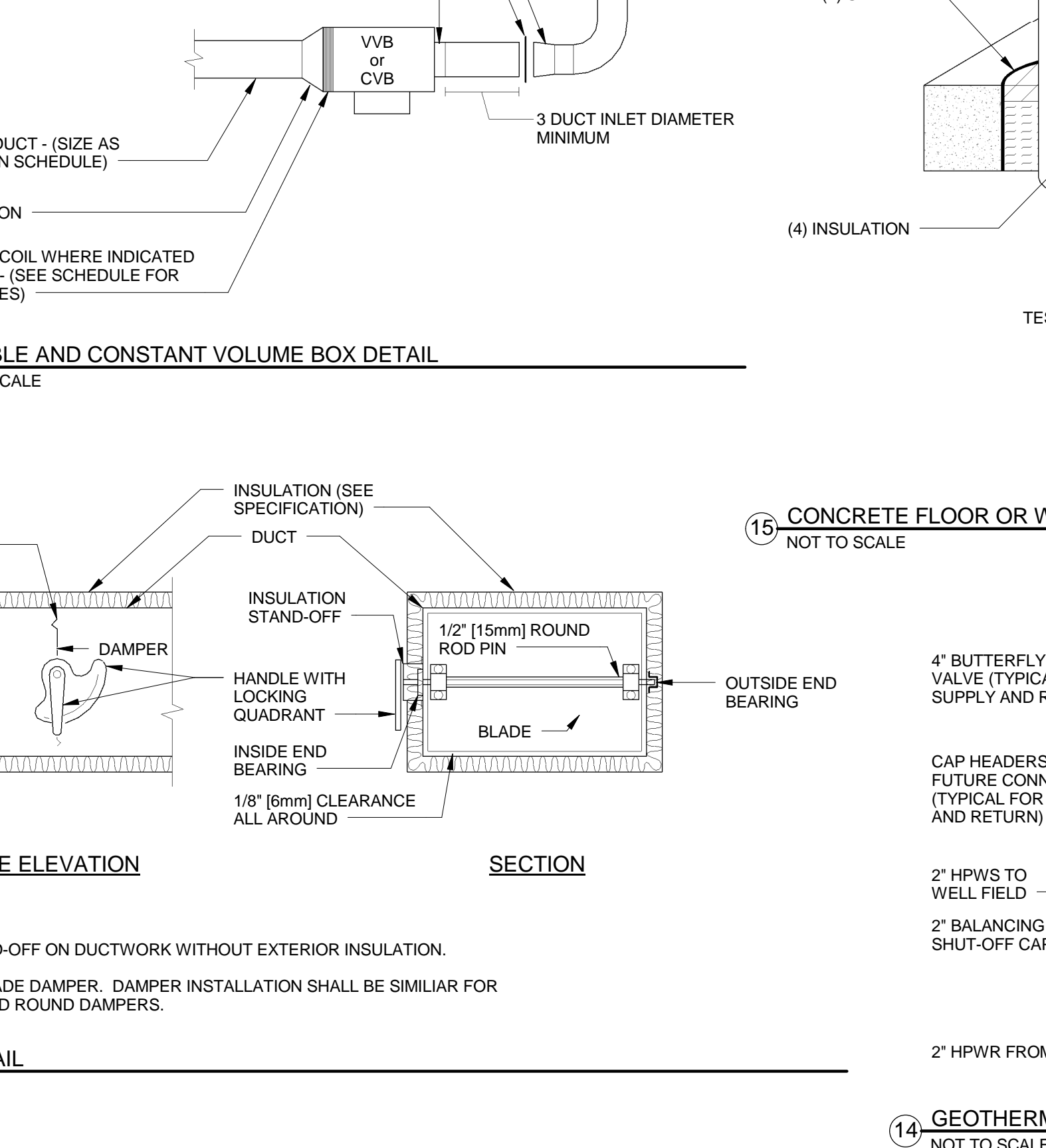
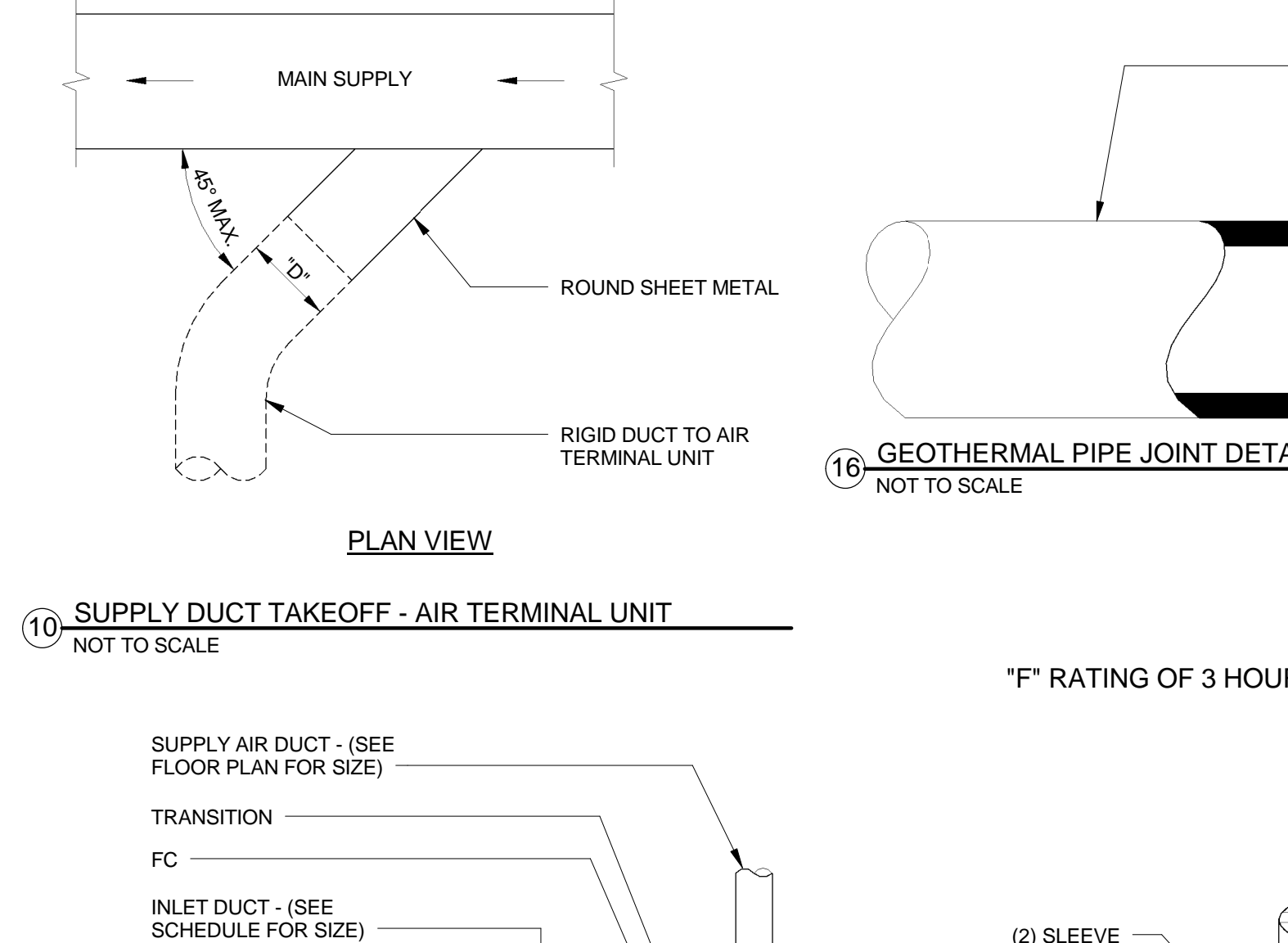
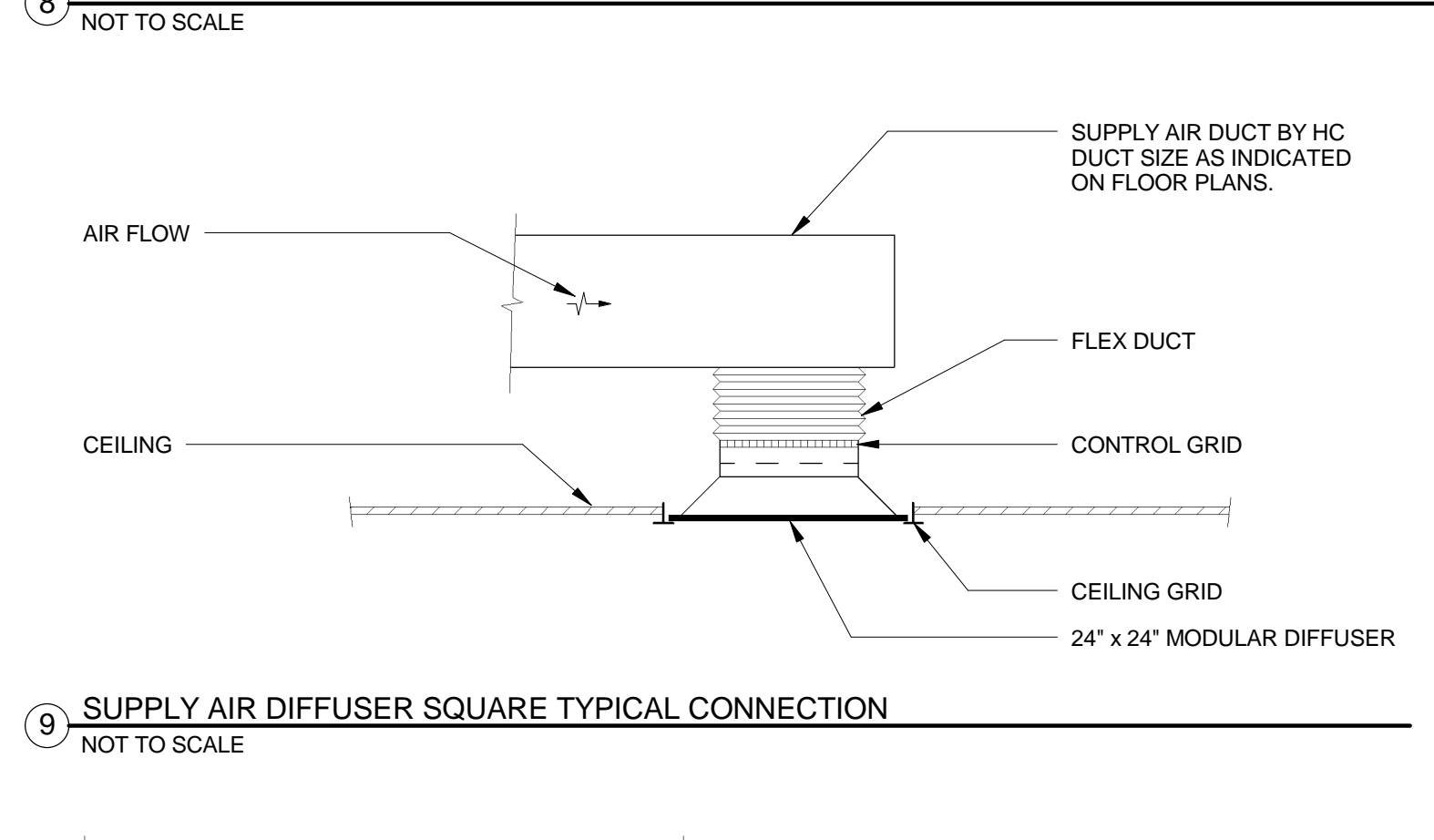
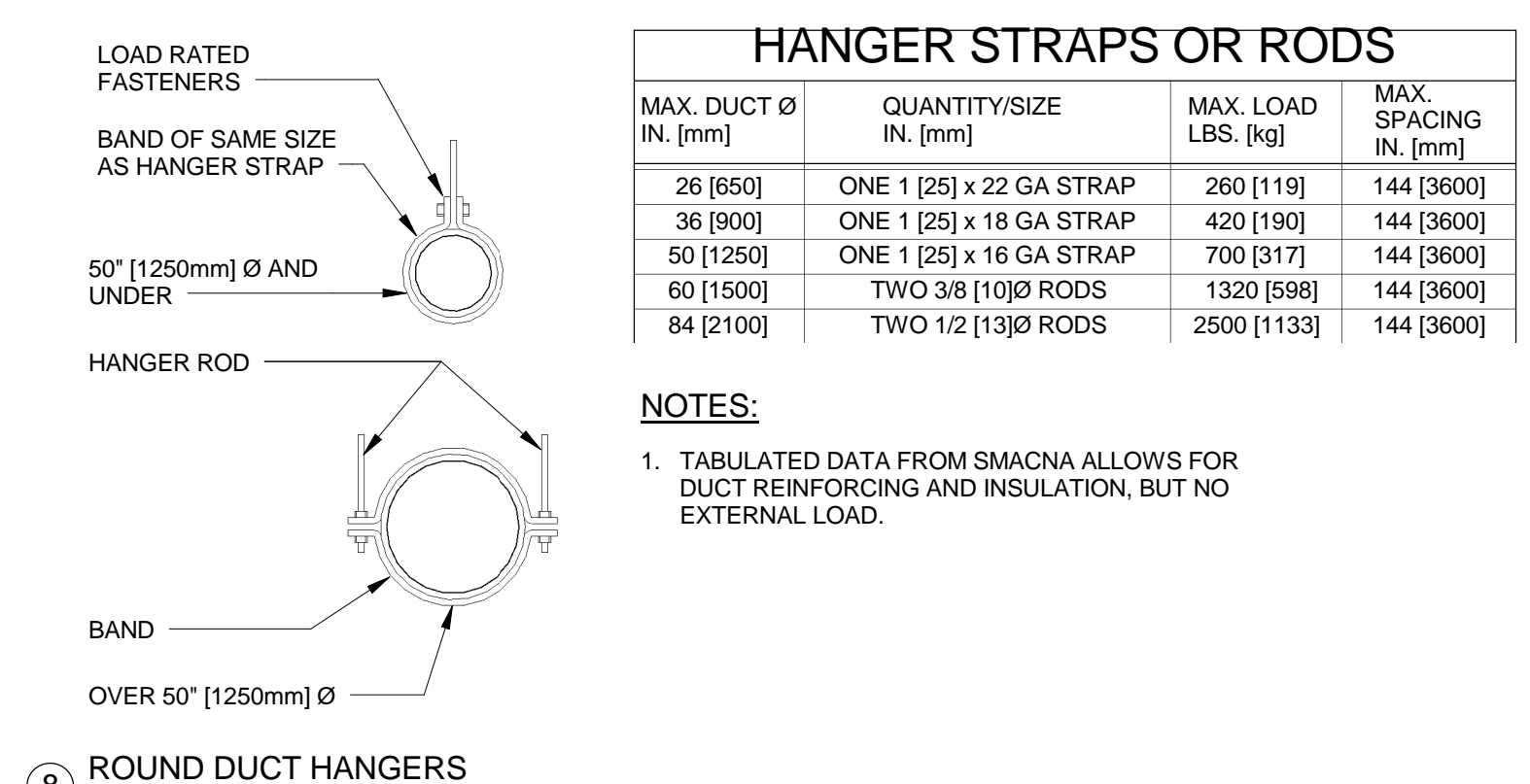
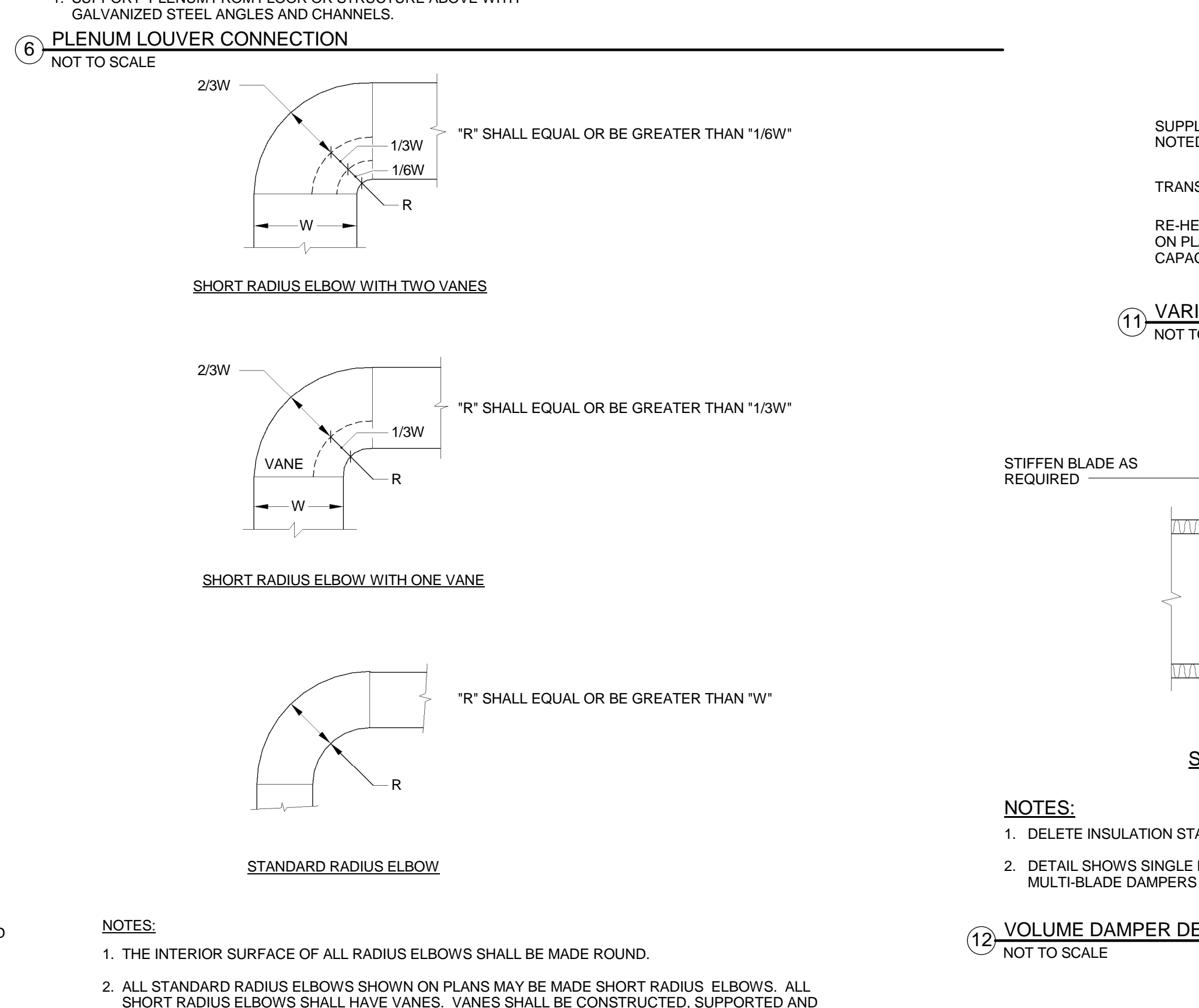
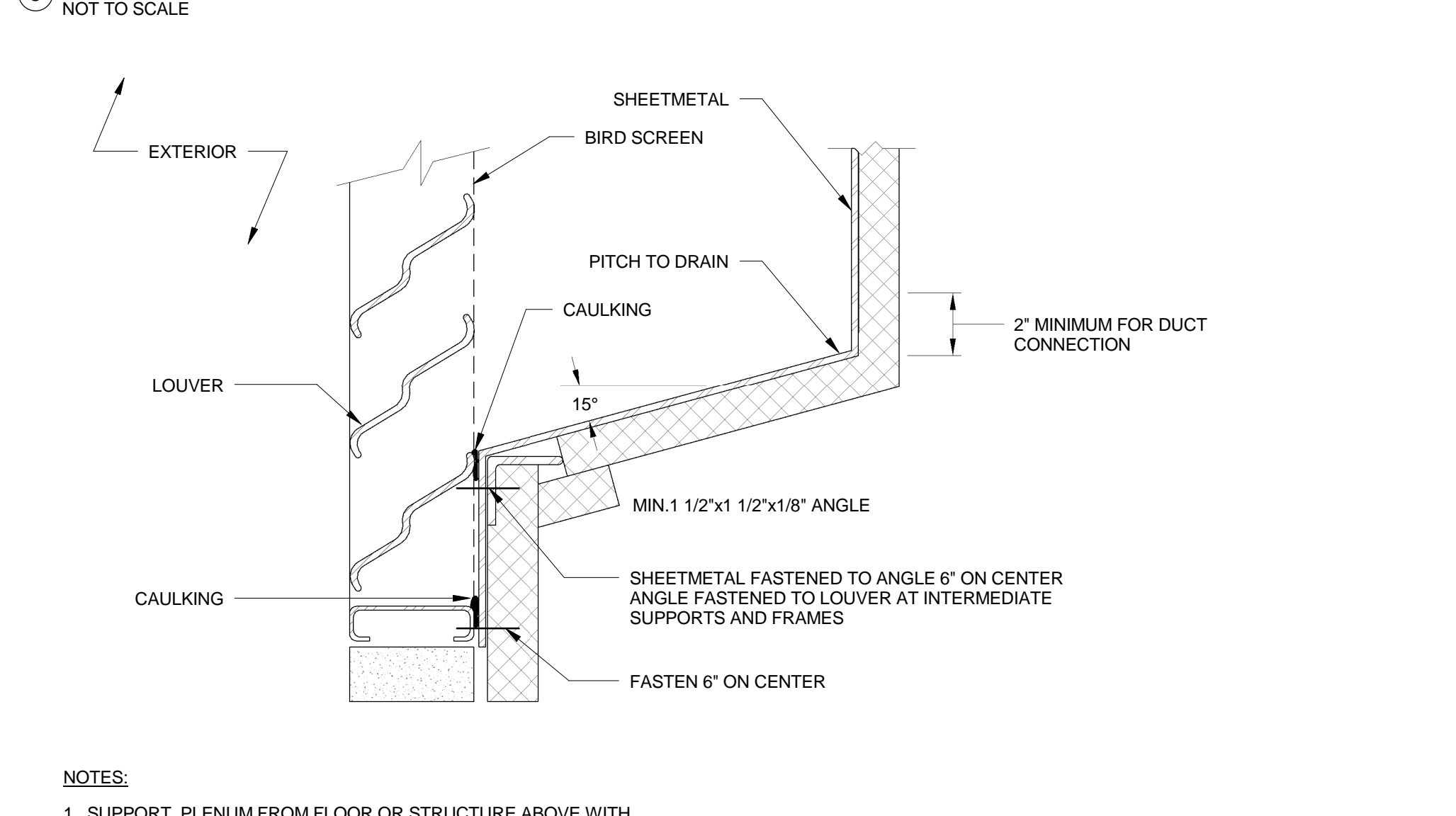
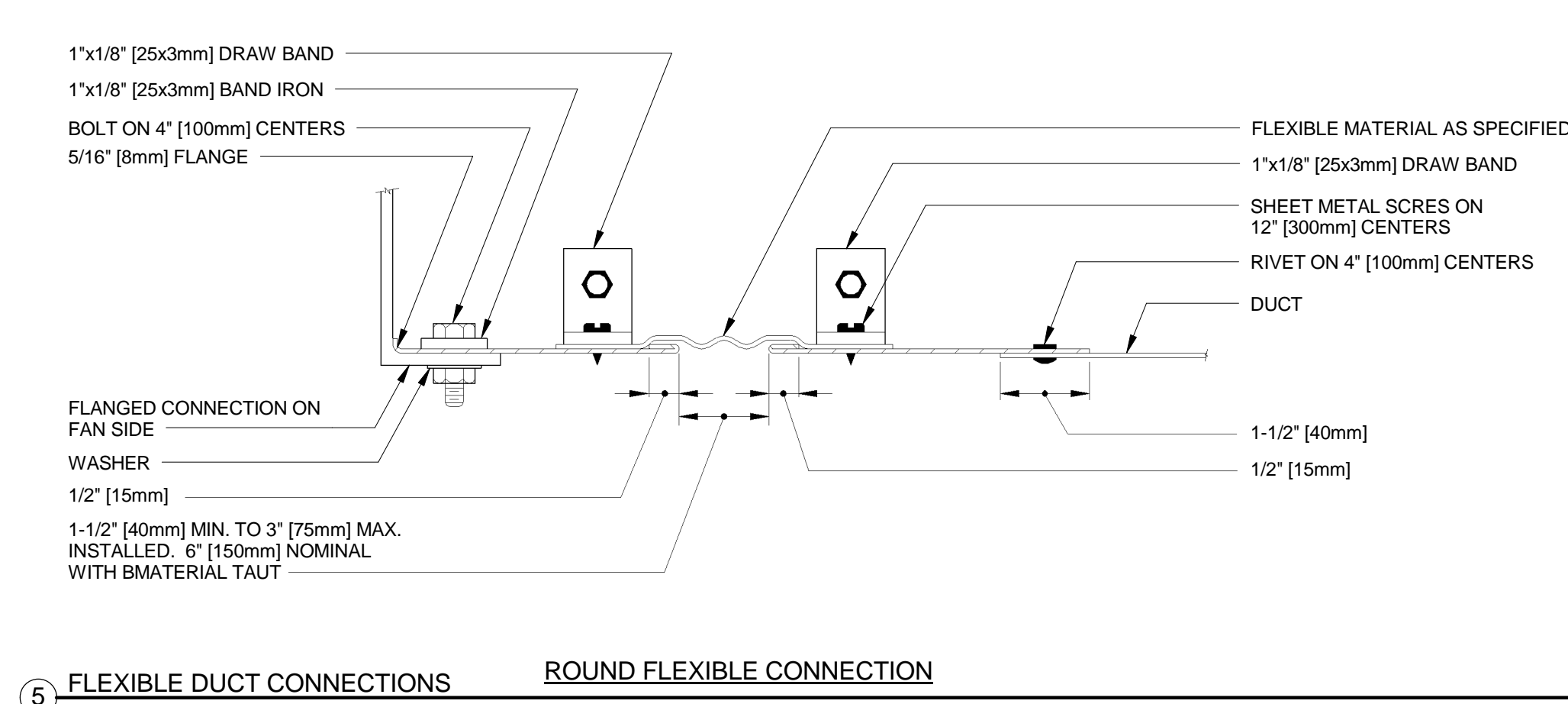
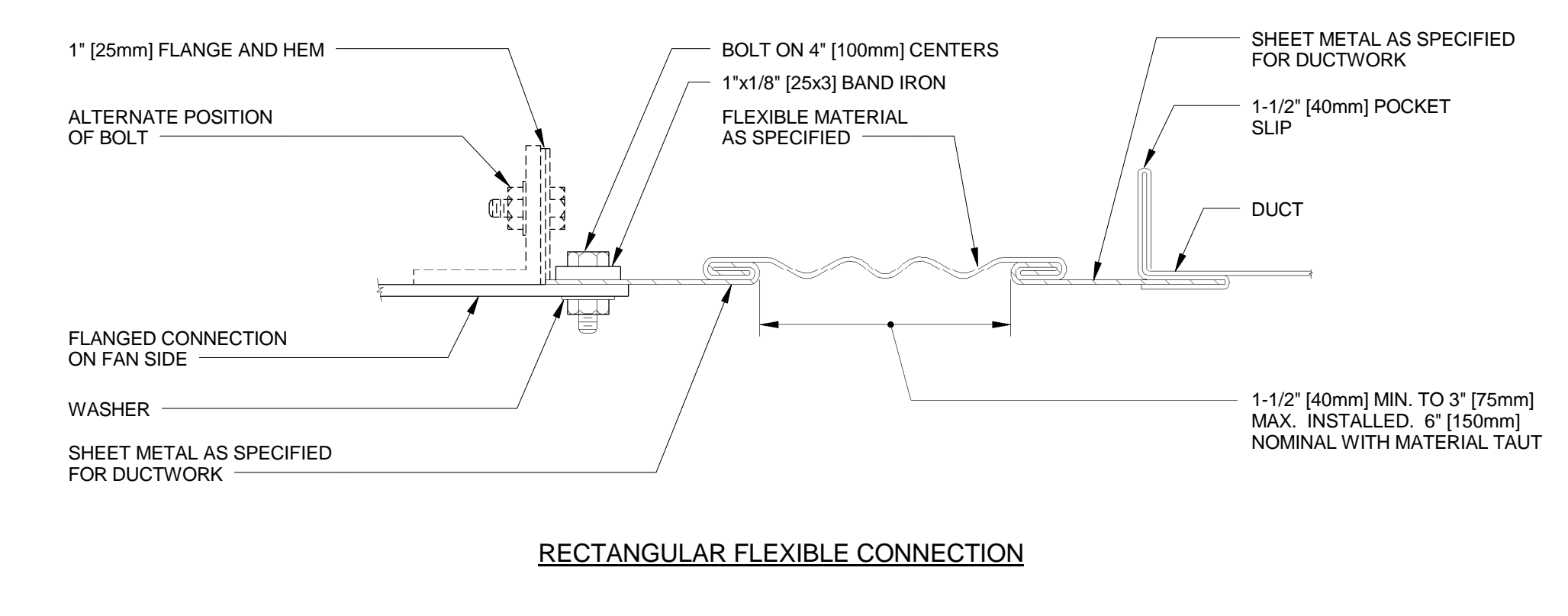
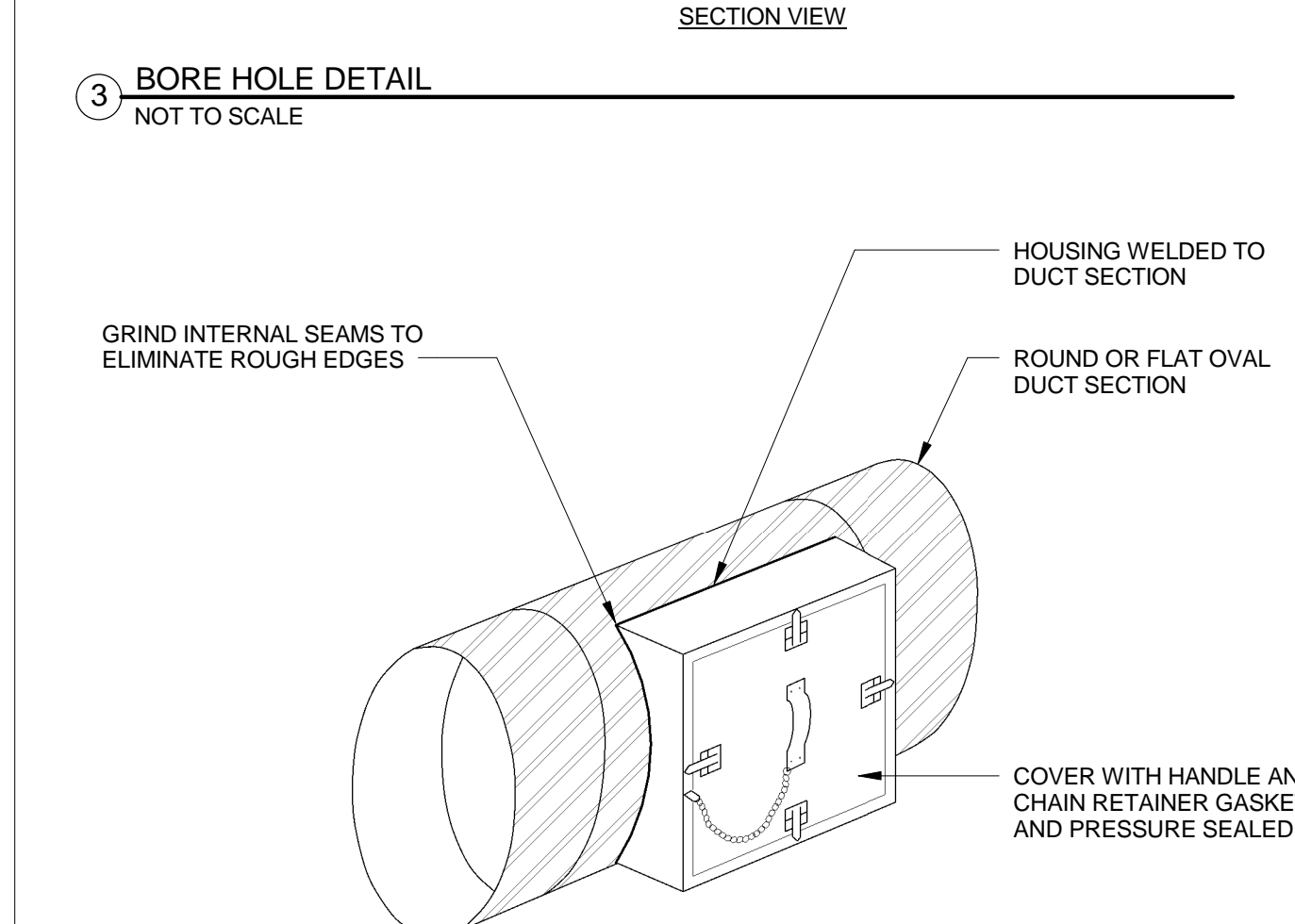
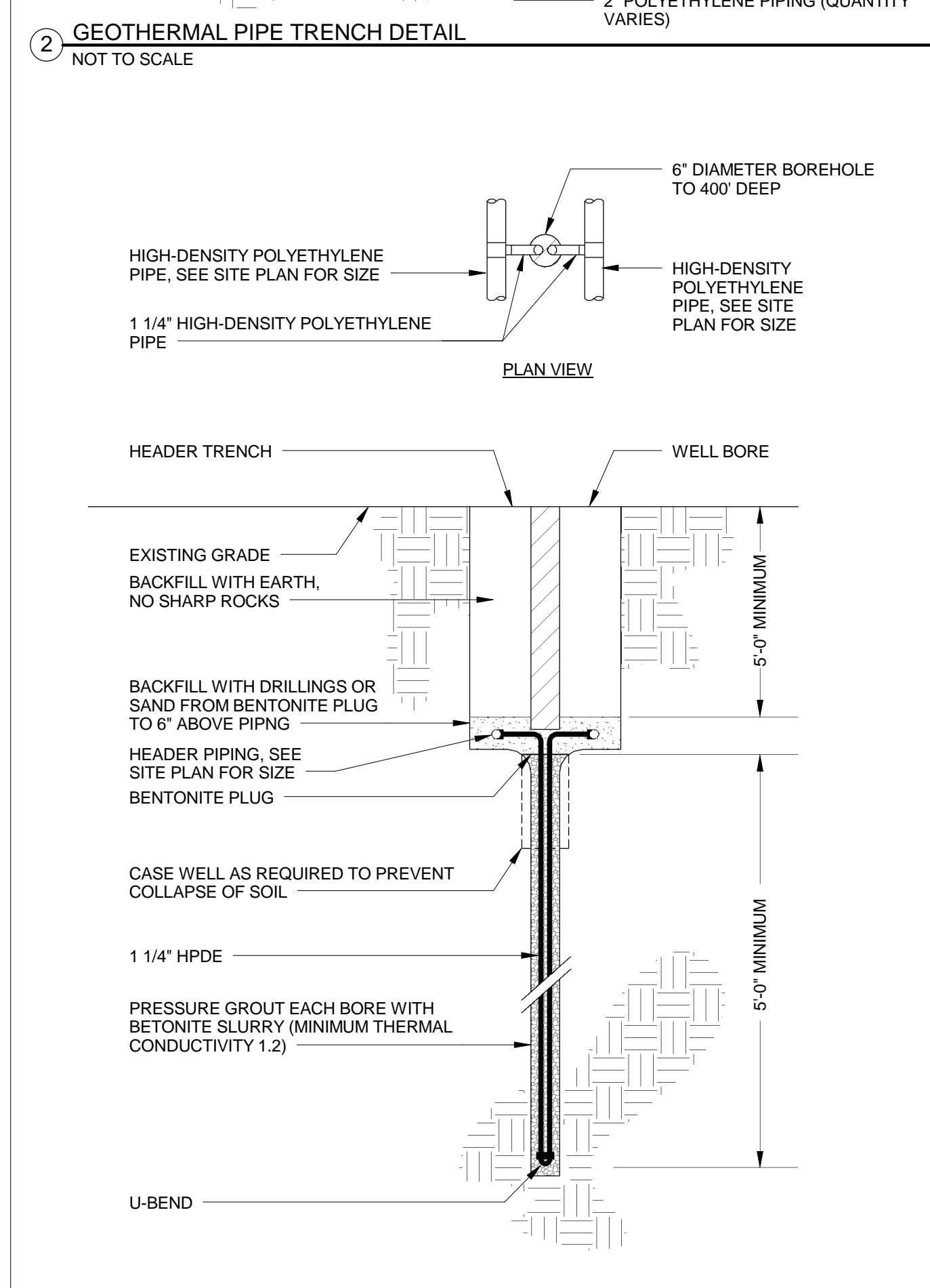
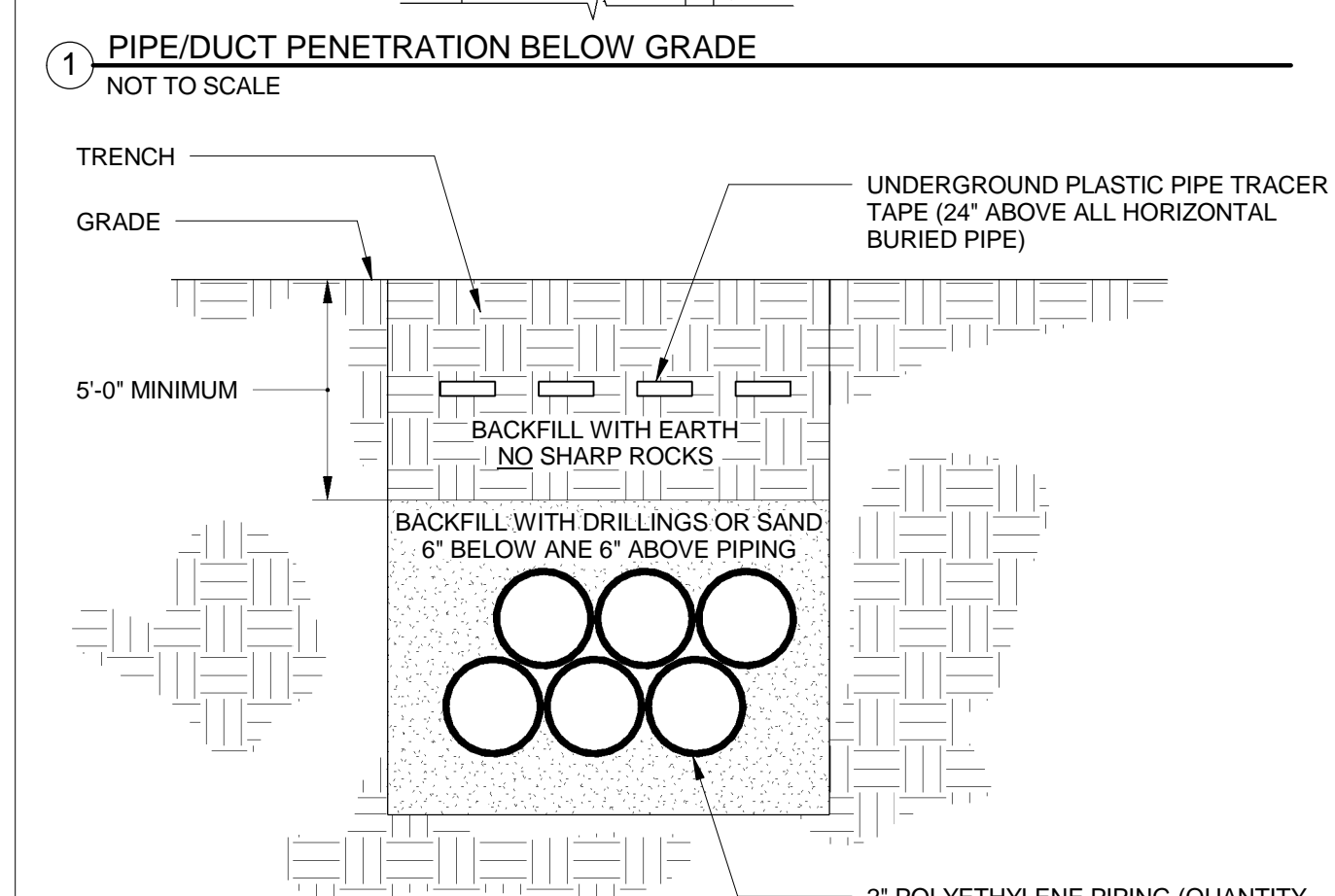
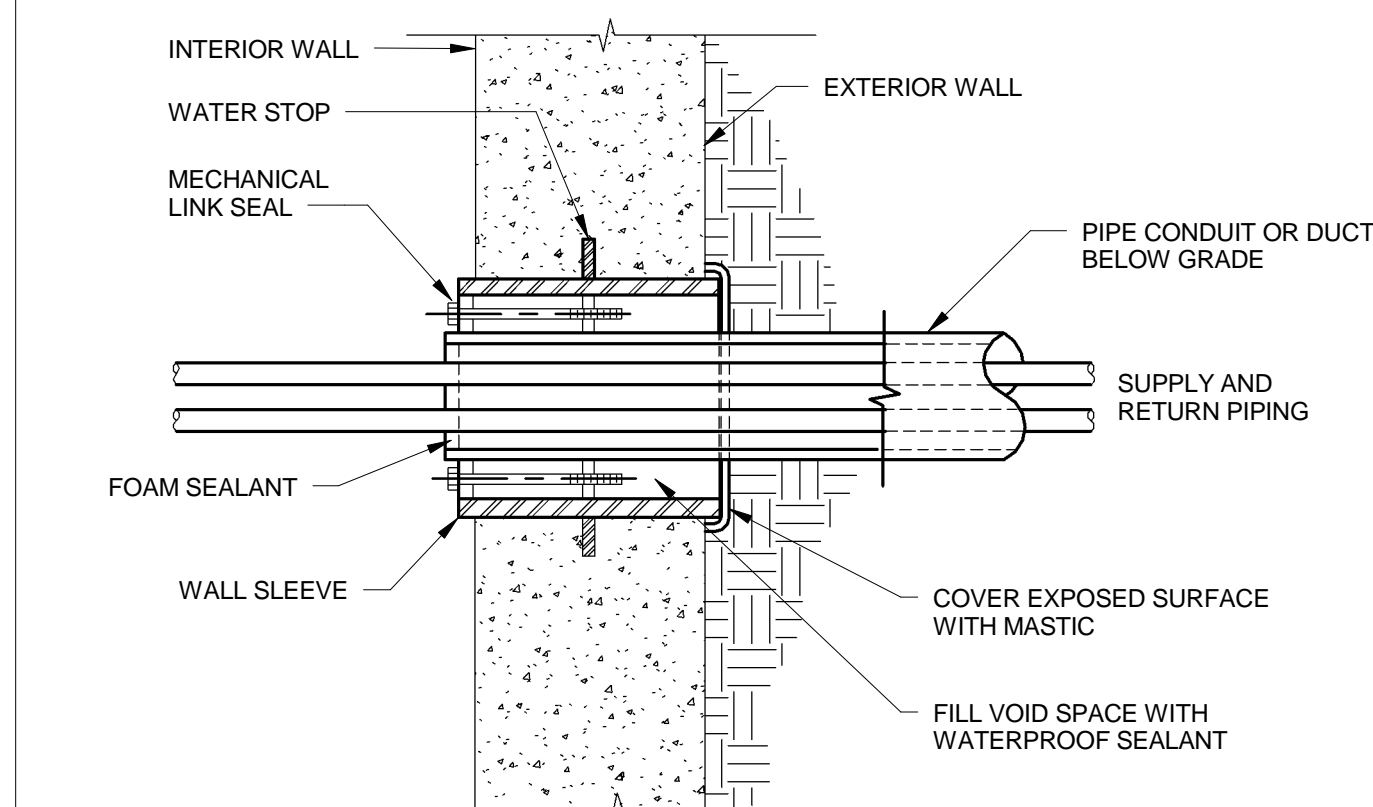
Drawing Number

MH501

Dwg. 79 of 123

Office of Facilities Management

Department of Veterans Affairs



CONSULTANTS:		ARCHITECT:		Project Number 3468	Scale As indicated	Drawing Title MECHANICAL DETAILS	Project Title Behavioral Health Complex	VA Project Number 595-109	Office of Facilities Management
Civil Engineer Dewberry	Structural Engineer WZIG	MEP Engineer H. LENZ COMPANY	Environmental Consultant SSM	2520 Renaissance Boulevard, Suite 110 King of Prussia, PA 19406		Approved: Project Director	Location 1700 South Lincoln Ave. Lebanon, PA 17042	Building Number 34	
600 Parsippany Road, Suite 301 Parsippany, NJ 07054-3715 Tel (973) 576-9953 Fax (973) 739-9710	180 W. Ridge Pike Limerick, PA 19468 Tel (214) 329-5559	1407 Scalp Avenue Johnstown, PA 15904 Tel (814) 269-9300 Fax (814) 269-9301	1047 North Park Road, P.O. Box 6307 Reading, PA 19610 Tel (610) 621-2000	t: 610.270.0599 f: 610.270.0995 www.arrayhs.com		Date 07/27/2012	Checked TME	Drawn DJA	
Revisions		Date						Dwg. 80 of 123	

AIR HANDLING UNIT SCHEDULE (CW/HW)

AIR HANDLING UNIT SCHEDULE (CW/HW)																																																			
SUPPLY FAN DATA																	CHILLED WATER COOLING COIL DATA													HOT WATER HEATING COIL										FILTER DATA				LENGTH	HEIGHT	WIDTH	UNIT WEIGHT	BASIS OF DESIGN			
SYMBOL	SERVES	CFM	OA CFM	EXT SP	CFM	QUANTITY	FAN SIZE	DRIVE	TYPE	RPM	HP (EA)	TOT BHP	TOT SP	VFD	VOLTAGE	PHASE	HZ	EAT °F DB	WBT °F WB	LAT °F DB	WBT °F WB	SP IN	TOT MBH	SENS MBH	GPM	EWTF °F	LWTF °F	WPD (FPT)	FINS PER FT	ROWS	FACE VEL. (FPM)	EAT °F DB	LAT °F DB	SP IN	TOT MBH	GPM	EWTF °F	LWTF °F	WPD (FPT)	FINS PER FT	ROWS	FACE VEL. (FPM)	FILTER						% MERV	TYPE	SP (DIRTY)
34-AHU-1	1ST & 2ND FLOOR	14,700	4,000	3.00	14,700	1	32	BELT	PLENUM	1,800	25	20.59	6.34	YES (BY EC)	460	3	60	88.6	72.5	56.5	55.7	0.70	784.9	496.8	156.8	45.0	55.0	15.5	132	4	538	45.5	83.2	0.25	617.7	62.9	135.0	115.1	3.4	96	2	538	PRE FINAL	30 8	ANGLED	0.15 0.25	251"	85"	93"	7,042 LBS	JCI SOLUTION-XTI-75x75
34-AHU-2	1ST FLOOR PUBLIC SPACE	2820	430	1.50	2820	1	20"	BELT	PLENUM	1,800	3.0	2.54	3.38	YES (BY EC)	460	3	60	83.5	69.1	55.4	54.4	0.66	131.8	88.1	26.3	45.0	55.0	7.3	132	5	542	55.0	69.5	0.09	44.5	4.5	135.0	115.0	0.2	132	1	542	PRE FINAL	30 7 95 14	ANGLED	0.27 0.53	127"	33"	45"	1,859 LBS	JCI SOLUTION-XTI-33x45

NOTES:
1. 34-AHU-1 SHALL HAVE TOP AND BOTTOM RETURN AIR CONNECTION. INSTALL STEEL GRATING IN RETURN AIR FAN SECTION FOR SERVICING.

RETURN FAN DATA

RETURN FAN DATA																
SYMBOL	SERVES	EXT SP	CFM	QUANTITY	FAN SIZE	DRIVE	TYPE	RPM	HP (EA)	TOT BHP	TOT SP	VFD	VOLTAGE	PHASE	HZ	BASIS OF DESIGN
34-RF-1	AHU-2	1.3	2,390	1	-	BELT	INLINE	2,821	3	1.87	1.73	YES BY ECG	460	3	60	GREENHECK TCB-2-12-30
34-RF-2	AHU-1	2.65	14,700	1	20-20	BELT	FC	1,800	20	14.96	1.73	YES BY ECG	460	3	60	-

REHEAT COIL SCHEDULE (HW)

REHEAT COIL SCHEDULE (HW)													
SYMBOL	SERVES	CFM	HOT WATER HEATING COIL								FINS PER FT	ROWS	FACE VEL. (FPM)
			EAT ° DB	LAT ° DB	SP IN	TOT MBH	GPM	EWTF °	LWTF °	WPD (FT)			
34HC-2	AHU-2	7,000	55.0	74.5	0.12	149.0	15.1	135.0	115.0	3.3	96	1	511

WATER-WATER HEAT PUMP SCHEDULE

WATER-WATER HEAT PUMP SCHEDULE																																						
SYMBOL	LOCATION	HEAT PUMP MODULES	VALVE MODULES	SOURCE FLUID	LOAD FLUID	COOLING PERFORMANCE												HEATING PERFORMANCE												PHASE	HZ	VOLTAGE	MCA	MOP	LENGTH	WIDTH	HEIGHT	BASIS OF DESIGN
						EER	TONS	HEAT EXTRACTED (MBH)	SOURCE WATER				LOAD WATER				COP	MBH	HEAT EXTRACTED (MBH)	SOURCE WATER				LOAD WATER														
									GPM	PD (FT)	EWT	LWT	GPM	PD (FT)	EWT	LWT				GPM	PD (FT)	EWT	LWT	GPM	PD (FT)	EWT	LWT											
34/WWHP-1	PUMP ROOMMECH ROOM BA01	4 @ 30 TON EACH	3	15% PROP. GLYCOL	WATER	14.8	63.1	931.3	202	5.9	80.0	99.0	151.3	6.9	55.0	45.0	2.5	1009	602.8	202	5.9	40.3	32	101.6	1.6	115.0	135.0	3	60	460	256	300	172"	78-14"	64"	MULTISTACK VME		

FAN COIL UNIT SCHEDULE (WATER)

FAN COIL UNIT SCHEDULE (WATER)																									
SYMBOL	CFM	ESP	MOTOR DATA				CHILLED WATER COOLING COIL DATA (3 ROW)										CHW PIPE BRANCH SIZE (INCHES)	HOT WATER HEATING COIL DATA (1 ROW)						HW PIPE BRANCH SIZE (INCHES)	BASIS OF DESIGN
			SPEED	WATTS	AMPS	ELEC CHAR	EAT DB	W/B	LAT F DB	TOTAL MBH	SENS MBH	GPM	EWT F	LWT F	WPD FT	EAT DB		LAT F DB	TOTAL MBH	GPM	EWT F	LWT F	WPD FT		
34-FCU-1	600	0.62	LOW	466	2.8 FLA	208-1-60	75	63	53.4	18.83	14.29	3.8	45	54.9	8.51	1"	NO HEATING COIL							ENVIRO-TEC HPP-12	
34-FCU-2	1338	0.50	LOW	914	4.4 FLA	208-1-60	75	63	56.7	33.98	28.08	6.7	45	55	9.65	1-1/4"	70	85.9	23.15	2.4	135	115.1	1.31	3/4"	ENVIRO-TEC HPP-16

NOTES:

1. FCU'S LOCATED ON FIRST FLOOR REQUIRE CONDENSATE PUMPS; SEE PLUMBING DWGS FOR CONDENSATE ROUTING
2. SEE DRAWINGS FOR QUANTITY

EXHAUST FAN SCHEDULE

EXHAUST FAN SCHEDULE																			
SYMBOL	LOCATION	SERVES	TYPE	SYSTEM CFM	FAN CFM	RPM	STATIC PRESSURE	TIP SPEED	O.V. (FPM)	DRIVE	BHP	HP	VFD	PHASE	HZ	VOLTAGE	WEIGHT	CONTROL TYPE	BASIS OF DESIGN
34-EF-1	2ND FLOOR MECH ROOM	RESTROOMS	INLINE	1,325	1,325	1725	1.7"	6,973	-	BELT	0.9	1.0	NO	3	60	460	96 LBS	DDC	GREENHECK BSQ-100-10
34-EF-2	BASEMENT	KITCHEN	INLINE	150	150	2023	1.3"	5,926	-	BELT	0.27	1/3	NO	1	60	115	80 LBS	DDC	GREENHECK BSQ-70-3

NOTES:

1. ADJUST BELT DRIVEN FANS TO PROVIDE SYSTEM CFM.
2. PROVIDE SECOND SET OF SHEAVES AND BELTS AFTER INITIAL BALANCING.

CABINET UNIT HEATER SCHEDULE (WATER)

CABINET UNIT HEATER SCHEDULE (WATER)														
SYMBOL	CFM	MBH	GPM	WTD °F	PD FT	FAT °F	HP	PHASE	HZ	VOLTAGE	RECESS	MOUNTED	DISCHARGE	BASIS OF DESIGN
34-CUH-1	630	19.2	3.0	29.8	0.63	125	1/10	1	60	115	FULL	CEILING	FRONT	STERLING - RC06
34-CUH-2	630	19.2	3.0	29.8	0.63	125	1/10	1	60	115	PARTIAL	WALL	FRONT	STERLING - RW06
34-CUH-3	335	9.4	1.5	26.6	0.16	120	1/10	1	60	115	FULL	WALL	FRONT	STERLING - RW03
34-CUH-4	630	19.2	3.0	29.8	0.63	125	1/10	1	60	115	FULL	WALL	FRONT	STERLING - RW06

NOTES:

1. HEATING CAPACITIES BASED ON 125F EWT AND 60F EAT.
2. INTEGRAL THERMOSTAT ON EACH UNIT.
3. SEE DRAWINGS FOR QUANTITY.

PUMP SCHEDULE

PUMP SCHEDULE																	
Pump No.	TYPE FLR MTD/IN-LINE	SYSTEM	OPERATION DUTY/STAND-BY	FLUID TYPE	GPM	FEET HD	EFF %	BHP	MOTOR HP	RPM	ELEC. CHAR	EMERGENCY POWER	VARIABLE FREQ DRIVE	OPERATING CONDITIONS	IMPELLER SIZE	BASIS OF DESIGN	
34-HWP-1	FLR MTD END SUCTION	HOT WATER	DUTY	WATER	0	48	0	0	3	1750	3-60-480V	NO	YES (BY EC)	GPM	102	6.875	BELL & GOSSETT 1510 2 BC
					75	48	61	1.5						FT HD	43		
					150	36	66.5	2.1						EFF	67.09		
34-HWP-2	FLR MTD END SUCTION	HOT WATER	STAND-BY	WATER	0	48	0	0	3	1750	3-60-480V	NO	YES (BY EC)	GPM	102	6.875	BELL & GOSSETT 1510 2 BC
					75	48	61	1.5						FT HD	43		
					150	36	66.5	2.1						EFF	67.09		
34-CWP-1	FLR MTD END SUCTION	CHILLED WATER	DUTY	WATER	0	48	0	0	3	1150	3-60-480V	NO	YES (BY EC)	GPM	151	10.25	BELL & GOSSETT 1510 2E
					100	46	63	1.8						FT HD	40		
					200	33	62.5	2.7						EFF	68.29		
34-CWP-2	FLR MTD END SUCTION	CHILLED WATER	STAND-BY	WATER	0	48	0	0	3	1150	3-60-480V	NO	YES (BY EC)	GPM	151	10.25	BELL & GOSSETT 1510 2E
					100	46	63	1.8						FT HD	40		
					200	33	62.5	2.7						EFF	68.29		
34-GWP-1	FLR MTD END SUCTION	GEOTHERMAL WATER	DUTY	15% PROP. GLYCOL	0	75	0	0	7.5	1750	3-60-480V	NO	YES (BY EC)	GPM	202	8.5	BELL & GOSSETT 1510 2-1/2 BB
					150	74	68	4.1						FT HD	68		
					250	65	76	5.4						EFF	74.41		
34-GWP-2	FLR MTD END SUCTION	GEOTHERMAL WATER	STAND-BY	15% PROP. GLYCOL	0	75	0	0	7.5	1750	3-60-480V	NO	YES (BY EC)	GPM	202	8.5	BELL & GOSSETT 1510 2-1/2 BB
					150	74	68	4.1						FT HD	68		
					250	65	76	5.4						EFF	74.41		

AIR CURTAIN SCHEDULE (WATER)

AIR CURTAIN SCHEDULE (WATER)														
SYMBOL	CFM	ESP	MAX VELOCITY FPM	NOZZLE WIDTH (IN)	MOTOR DATA		HOT WATER HEATING COIL					AIR TEMP RISE °F	UNIT WEIGHT	BASIS OF DESIGN
					No AT HP	ELEC CHAR	GPM	TOTAL MBH	EW/°F	LWT °F	WPD FT			
34-AC-1	2193	0.08	3844	84	2 @ 1/2	208-1-60	3.0	54.7	135	98.4	0.2	22.9	203LBS	BERNER VSA2084W

NOTE:

1. PROVIDE AIR CURTAIN WITH 2 ROW COIL, 10 F.P.I.
2. UNIT SELECTED AT LOW FAN SPEED: UNIT SHALL BE SET AT LOW FAN SPEED IN FIELD FOR BOTH TEMPERATURE CONTROL AND DOOR INTERLOCK.
3. PROVIDE COMFORT PLUS PACKAGE FOR MULTI-SPEED AND TEMPERATURE CONTROL.

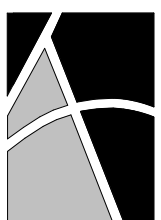
PADDLE FAN SCHEDULE

PADDLE FAN SCHEDULE													
SYMBOL	LOCATION	SERVES	TYPE	SYSTEM CFM	FAN CFM	WATTS	VFD	PHASE	HZ	VOLTAGE	WEIGHT	CONTROL TYPE	BASIS OF DESIGN
34-PF-1	COMMONS CEILING	COMMONS	PADDLE	6,550 @ HIGH SPEED	6,550 @ HIGH SPEED	87	NO	1	60	208	119 LBS	DDC	MODERNFANCO - CIRRUS- 52"

NOTES:

1. FAN SHALL BE SUPPLIED WITH 12' DOWN ROD.
2. FAN SHALL ONLY HAVE THE ABILITY TO OPERATE WHEN 34-AHU-2 IS COMMANDED TO OFF.
3. FINISH, COLOR, AND ADDITIONAL OPTIONS PROVIDED BY ARCHITECT.

ARCHITECT:



healthcare facilities solutions

Project Number	Scale
3468	N

2520 Renaissance Boulevard, Suite 110
King of Prussia, PA 19406

t: 610.270.0599
f: 610.270.0995
www.arrayhfs.com

Drawing Title

MECHANICAL SCHEDULES

Approved: Project Director

Project Title	Behavioral Health Complex
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Location
17500 2nd St. N. #100, Burnsville, MN 55337-1000

Date	07/27/2012
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Health Complex

References

Checked	Drawn
TME	DJA

FULLY SPRINKLERED

100% CONSTRUCTION DOCUMENTS

Office of
Facilities
Management

Department of
Veterans Affairs

VA FORM 08-6231, OCT 1978

34-AHU-1 SEQUENCE OF OPERATION

RUN CONDITIONS - SCHEDULED:

34-AHU-1 SHALL BE CAPABLE OF UTILIZING A TIME SCHEDULE, WARM-UP, COOL-DOWN, UNOCCUPIED, AND OPTIMAL START MODES, BUT WILL BE PROGRAMMED TO OPERATE CONTINUOUSLY IN THE OCCUPIED MODE. THE FOLLOWING MODES OF OPERATION SHALL APPLY TO ALL UNITS.

WARM-UP MODE:

WHEN INDEXED TO THE WARM-UP MODE BY THE BAS SYSTEM, THE UNIT SUPPLY AND RETURN AIR FANS SHALL RUN CONTINUOUSLY. THE OUTDOOR AIR DAMPER AND RELIEF AIR DAMPER SHALL BE CLOSED. THE RETURN AIR DAMPER SHALL BE OPENED, AND THE RETURN AIR SENSOR SHALL MODULATE THE HOT WATER COIL CONTROL VALVE OPEN TO THE COIL TO ACHIEVE ZONE SENSORS SETPOINT (ADJ.). MECHANICAL COOLING SHALL BE DISABLED.

COOL-DOWN MODE:

WHEN INDEXED TO THE COOL-DOWN MODE BY THE BAS SYSTEM, THE UNIT SUPPLY AND RETURN AIR FANS SHALL RUN CONTINUOUSLY. MECHANICAL COOL-DOWN: WHEN THE O.A.T. IS ABOVE 55 DEGF (ADJ.), THE OUTDOOR AIR DAMPER AND RELIEF AIR DAMPER SHALL BE CLOSED AND THE RETURN AIR DAMPER SHALL BE OPENED AND THE SUPPLY AIR TEMPERATURE SENSOR SHALL CONTROL CHILLED WATER VALVE TO ACHIEVE ZONE SENSOR SETPOINT. COOLING SHALL NOT BE ENABLED UNTIL THE OUTDOOR AIR TEMPERATURE RISES ABOVE 55 DEGREES F. (ADJ.). ECONOMIZER COOL-DOWN: WHEN THE O.A.T. IS BELOW 55 DEGF (ADJ.), THE OUTSIDE, RETURN AND RELIEF AIR DAMPERS SHALL BE MODULATED TO MAINTAIN A SUPPLY AIR TEMPERATURE OF 55 DEGF (ADJ.) UNTIL ZONE SENSOR SETPOINT IS REACHED. HEATING SHALL BE DISABLED.

OCCUPIED CYCLE:

WHEN INDEXED TO THE OCCUPIED MODE BY THE BAS SYSTEM, THE UNIT SUPPLY AND RETURN AIR FANS SHALL RUN CONTINUOUSLY AND THE MODULATING OUTDOOR AIR DAMPER AND RELIEF AIR DAMPER SHALL OPEN TO THEIR SCHEDULED MINIMUM POSITION, WHEN THE OUTDOOR AIR TEMPERATURE IS BELOW 50 DEGF (ADJ.), AND THERE IS A CALL FOR HEAT, THE BAS SHALL OPEN THE HOT WATER HEATING COIL CONTROL VALVE TO THE HEATING COIL AND MODULATE THE VALVE TO MAINTAIN SUPPLY AIR TEMPERATURE. ONCE THE TEMPERATURE HAS BEEN SATISFIED AND THERE IS NO LONGER A CALL FOR HEAT, THE HEATING COIL VALVE SHALL CLOSE ON A RISE IN SUPPLY AIR TEMPERATURE ABOVE SETPOINT (ADJ.). THE OUTDOOR AIR DAMPER SHALL MODULATE OPEN FROM ITS MINIMUM SETPOINT TO 100% OPEN. THE RETURN AIR DAMPERS SHALL MODULATE CLOSED AND RELIEF AIR DAMPERS SHALL MODULATE OPEN ACCORDINGLY. WHENEVER THE OUTDOOR AIR TEMPERATURE RISES ABOVE 50 DEGF (ADJ.), THE CONTROL VALVE SHALL BE CLOSED TO THE HEATING COIL.

OAT	SAT (RANGE)	ZONE THERMOSTAT SETPOINT
20 DEGF & LOWER	65 DEGF - 85 DEGF	68 DEGF (ADJ.)
65 DEGF & ABOVE	55 DEGF - 55 DEGF	75 DEGF (ADJ.)

ON A RISE IN OUTDOOR AIR TEMPERATURE ABOVE ECONOMIZER ENABLE SETPOINT (ADJ.), THE O.A. DAMPER SHALL BE POSITIONED TO SCHEDULED MINIMUM O.A. POSITION, THE RETURN AIR DAMPERS AND RELIEF AIR DAMPERS SHALL POSITION ACCORDINGLY, AND THE CHILLED WATER VALVE SHALL MODULATE AS REQUIRED TO MAINTAIN SUPPLY AIR TEMPERATURE SETPOINT

THE SUPPLY AIR TEMPERATURE SHALL BE RESET TO MAINTAIN THE ZONE TEMPERATURE SENSOR SETPOINT. THE ZONE TEMPERATURE SETPOINT SHALL BE SET BY THE BAS.

UNOCCUPIED CYCLE:

WHEN INDEXED TO THE UNOCCUPIED COOLING MODE BY THE BAS SYSTEM, THE OUTDOOR AIR DAMPER AND RELIEF AIR DAMPER SHALL BE CLOSED, THE RETURN AIR DAMPER SHALL BE OPEN AND THE UNIT FANS SHALL BE STOPPED. ON A NEED FOR UNOCCUPIED COOLING TO MAINTAIN ELEVATED TEMPERATURE SETPOINT OF 70 DEGREES F. (ADJ.), THE UNIT WILL BE PLACED INTO A "COOL DOWN" MODE OF OPERATION. THE HEATING COIL CONTROL VALVE SHALL BE FULLY CLOSED TO THE HEATING COIL. WHEN ALL AREAS ARE SATISFIED, THE UNIT SHALL BE DE-ENERGIZED. ON A NEED FOR UNOCCUPIED HEATING TO MAINTAIN REDUCED TEMPERATURE SETPOINT OF 65 DEGREES F. (ADJ.), THE UNIT WILL BE PLACED INTO A "WARM UP" MODE OF OPERATION. MECHANICAL COOLING SHALL BE DISABLED. WHEN ALL AREAS ARE SATISFIED, THE UNIT SHALL BE DE-ENERGIZED.

THE BAS SYSTEM SHALL PROVIDE OVERRIDE TO THE ZONE BY OPERATOR INITIATION OR INDIVIDUAL ZONE THERMOSTAT OVERRIDES.

ALARMS SHALL BE PROVIDED AS FOLLOWS:

HIGH ZONE TEMP: IF THE ZONE TEMPERATURE IS GREATER THAN THE COOLING SETPOINT BY A USER DEFINABLE AMOUNT (ADJ.).

LOW ZONE TEMP: IF THE ZONE TEMPERATURE IS LESS THAN THE HEATING SETPOINT BY A USER DEFINABLE AMOUNT (ADJ.).

ZONE OPTIMAL START:

THE UNIT SHALL USE AN OPTIMAL START ALGORITHM FOR MORNING START-UP. THIS ALGORITHM SHALL MINIMIZE THE UNOCCUPIED WARM-UP OR COOL-DOWN PERIOD WHILE STILL ACHIEVING COMFORT CONDITIONS BY THE START OF SCHEDULED OCCUPIED PERIOD.

FREEZE PROTECTION:

THE UNIT SHALL SHUT DOWN AND GENERATE AN ALARM UPON ACTIVATION OF A FREEZESTAT.

SUPPLY AIR SMOKE DETECTION:

THE UNIT SHALL SHUT DOWN AND GENERATE AN ALARM UPON ACTIVATION OF A SUPPLY AIR SMOKE DETECTOR.

RETURN AIR SMOKE DETECTION:

THE UNIT SHALL SHUT DOWN AND GENERATE AN ALARM UPON ACTIVATION OF ANY RETURN AIR SMOKE DETECTOR.

SUPPLY FAN:

THE SUPPLY FAN SHALL RUN ANYTIME THE UNIT IS COMMANDED TO RUN, UNLESS SHUTDOWN ON SAFETIES. TO PREVENT SHORT CYCLING, THE SUPPLY FAN SHALL HAVE A USER DEFINABLE (ADJ.) MINIMUM RUNTIME. THE SUPPLY FAN VFD SHALL RECEIVE A CONTROL SIGNAL FROM THE AHU DDC CONTROL PANEL TO START AFTER THE RETURN AIR DAMPER IS PROVEN OPEN BY THE END SWITCHES. UPON UNIT START UP, THE SUPPLY FAN WILL SOFT START TO MAINTAIN STATIC PRESSURE 2/3 OF THE WAY DOWN THE MEDIUM PRESSURE DUCTWORK (ACTUAL STATIC PRESSURE TO BE DETERMINED AT TIME OF BALANCING, BUT NO GREATER THAN 1.5"). THE DUCT STATIC PRESSURE WILL RESET THE VFD TO MAINTAIN SETPOINT.

ALARMS SHALL BE PROVIDED AS FOLLOWS:

SUPPLY FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.

SUPPLY FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.

SUPPLY FAN RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT (ADJ.).

RETURN FAN:

THE RETURN FAN SHALL RUN WHENEVER THE SUPPLY FAN RUNS AND SHALL TRACK THE SUPPLY FAN, TO MAINTAIN POSITIVE PRESSURE (5% TO 10% ADJ.) IN THE SPACE.

ALARMS SHALL BE PROVIDED AS FOLLOWS:

RETURN FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.

RETURN FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.

RETURN FAN RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT (ADJ.).

HEATING COIL VALVE:

THE HEATING SHALL BE ENABLED WHENEVER:

OUTSIDE AIR TEMPERATURE IS LESS THAN 50°F (ADJ.),

AND THE ECONOMIZER IS DISABLED.

AND THE HEATING IS ACTIVE,

AND COOLING IS NOT ACTIVE,

AND THE SUPPLY FAN STATUS IS ON.

THE HEATING COIL VALVE SHALL OPEN FOR FREEZE PROTECTION WHENEVER:

MIXED AIR TEMPERATURE DROPS FROM 45°F TO 40°F (ADJ.)

OR THE FREEZESTAT IS ON.

CHILLED WATER COOLING SYSTEM:

THE COOLING SHALL BE ENABLED WHENEVER:

OUTSIDE AIR TEMPERATURE IS GREATER THAN 55°F (ADJ.).

AND THE ECONOMIZER IS DISABLED

AND THE ZONE TEMPERATURE IS ABOVE COOLING SETPOINT.

AND THE SUPPLY FAN STATUS IS ON.

AND THE HEATING IS NOT ACTIVE.

ECONOMIZER:

THE CONTROLLER SHALL MODULATE THE ECONOMIZER DAMPERS IN SEQUENCE TO MAINTAIN THE SUPPLY AIR TEMPERATURE SETPOINT. THE OUTSIDE AIR DAMPERS SHALL MAINTAIN THE MINIMUM OUTSIDE AIR POSITION WHENEVER OCCUPIED.

THE ECONOMIZER SHALL BE ENABLED WHENEVER:

• OUTSIDE AIR TEMPERATURE IS LESS THAN 55°F (ADJ.),

• AND THE OUTSIDE AIR ENTHALPY IS LESS THAN 25 BTU/LB (ADJ.),

• AND THE OUTSIDE AIR TEMPERATURE IS LESS THAN THE RETURN AIR TEMPERATURE.

• AND THE OUTSIDE AIR ENTHALPY IS LESS THAN THE RETURN AIR ENTHALPY,

• AND THE SUPPLY FAN STATUS IS ON.

THE ECONOMIZER SHALL CLOSE WHENEVER:

• MIXED AIR TEMPERATURE DROPS FROM 55°F TO 45°F (ADJ.)

• OR LOSS OF SUPPLY FAN STATUS.

• OR FREEZESTAT IS ON.

THE OUTSIDE AND RELIEF AIR DAMPERS SHALL CLOSE AND THE RETURN AIR DAMPER SHALL OPEN WHEN THE UNIT IS OFF. IF OPTIMAL START UP IS AVAILABLE, THE MIXED AIR DAMPER SHALL OPERATE AS DESCRIBED IN THE OCCUPIED MODE EXCEPT THAT THE OUTSIDE AIR DAMPER SHALL MODULATE TO FULLY CLOSED.

DEHUMIDIFICATION:

THE CONTROLLER SHALL MEASURE THE RETURN AIR HUMIDITY AND OVERRIDE THE COOLING SEQUENCE WHEN RETURN AIR HUMIDITY IS ABOVE 65% RH (ADJ.). UPON ACTIVATION OF THE DEHUMIDIFICATION CYCLE, THE OUTSIDE AIR DAMPER SHALL BE REPOSITIONED TO ITS MINIMUM SCHEDULE POSITION AND THE CHILLED WATER VALVE AND COIL SHALL BE COMMANDED TO ITS FULL OPERATING POSITION. INDIVIDUAL SPACE TEMPERATURES SHALL BE MAINTAINED BY INDEPENDENT OPERATION OF THE ASSOCIATED VAV BOX AND COIL. THE DEHUMIDIFICATION MODE SHALL REMAIN IN OPERATION UNTIL THE RETURN AIR HUMIDITY IS AT OR BELOW 55% RH (ADJ.) AT WHICH TIME THE DEHUMIDIFICATION MODE SHALL BE DEACTIVATED AND NORMAL OPERATION BE USED. DEHUMIDIFICATION SHALL BE ENABLED WHENEVER THE SUPPLY FAN STATUS IS ON. THE DDC CONTROLLER SHALL ENABLE THE HEATING HOT WATER PUMPS TO ALLOW THE INDIVIDUAL ROOM VAV BOX REHEAT COILS TO OPERATE AND MAINTAIN SPACE TEMPERATURE AND PREVENT OVER COOLING.

PRE/AFTER FILTER DIFFERENTIAL PRESSURE MONITOR:

ALARMS SHALL BE PROVIDED AS FOLLOWS:

• PRE/AFTER FILTER CHANGE REQUIRED: PREFILTER DIFFERENTIAL PRESSURE EXCEEDS A USER DEFINABLE LIMIT (ADJ.).

MIXED AIR TEMPERATURE:

ALARMS SHALL BE PROVIDED AS FOLLOWS:

• HIGH MIXED AIR TEMP: IF THE MIXED AIR TEMPERATURE IS GREATER THAN 90°F (ADJ.).

• LOW MIXED AIR TEMP: IF THE MIXED AIR TEMPERATURE IS LESS THAN 45°F (ADJ.).

RETURN AIR HUMIDITY:

THE CONTROLLER SHALL MONITOR THE RETURN AIR HUMIDITY AND USE AS REQUIRED FOR ECONOMIZER CONTROL OR HUMIDITY CONTROL.

ALARMS SHALL BE PROVIDED AS FOLLOWS:

• HIGH RETURN AIR HUMIDITY: IF THE RETURN AIR HUMIDITY IS GREATER THAN 65% (ADJ.).

RETURN AIR TEMPERATURE:

ALARMS SHALL BE PROVIDED AS FOLLOWS:

• HIGH RETURN AIR TEMP: IF THE RETURN AIR TEMPERATURE IS GREATER THAN 90°F (ADJ.).

• LOW RETURN AIR TEMP: IF THE RETURN AIR TEMPERATURE IS LESS THAN 45°F (ADJ.).

SUPPLY AIR TEMPERATURE:

THE CONTROLLER SHALL MONITOR THE SUPPLY AIR TEMPERATURE.

ALARMS SHALL BE PROVIDED AS FOLLOWS:

• HIGH SUPPLY AIR TEMP: IF THE SUPPLY AIR TEMPERATURE IS GREATER THAN 120°F (ADJ.).

• LOW SUPPLY AIR TEMP: IF THE SUPPLY AIR TEMPERATURE IS LESS THAN 45°F (ADJ.).

34-AHU-2 SEQUENCE OF OPERATION

RUN CONDITIONS - SCHEDULED:

34-AHU-2 SHALL BE CAPABLE OF UTILIZING A TIME SCHEDULE, WARM-UP, COOL-DOWN, UNOCCUPIED, AND OPTIMAL START MODES, BUT WILL BE PROGRAMMED TO OPERATE CONTINUOUSLY IN THE OCCUPIED MODE. THE FOLLOWING MODES OF OPERATION SHALL APPLY TO ALL UNITS.

WARM-UP MODE:

WHEN INDEXED TO THE WARM-UP MODE BY THE BAS SYSTEM, THE UNIT SUPPLY AIR FAN SHALL RUN CONTINUOUSLY. THE OUTDOOR AIR DAMPER SHALL BE CLOSED, THE RETURN AIR DAMPER SHALL BE OPENED, AND THE RETURN AIR SENSOR SHALL MODULATE THE HOT WATER COIL CONTROL VALVE OPEN TO THE COIL TO ACHIEVE ZONE SENSORS SETPOINT (ADJ.). MECHANICAL COOLING SHALL BE DISABLED.

COOL-DOWN MODE:

WHEN INDEXED TO THE COOL-DOWN MODE BY THE BAS SYSTEM, THE UNIT SUPPLY AIR FAN SHALL RUN CONTINUOUSLY. MECHANICAL COOL-DOWN: WHEN THE O.A.T. IS ABOVE 55 DEGF (ADJ.), THE OUTDOOR AIR DAMPER SHALL BE CLOSED AND THE RETURN AIR DAMPER SHALL BE OPENED AND THE SUPPLY AIR TEMPERATURE SENSOR SHALL CONTROL CHILLED WATER VALVE TO ACHIEVE ZONE SENSOR SETPOINT. COOLING SHALL NOT BE ENABLED UNTIL THE OUTDOOR AIR TEMPERATURE RISES ABOVE 55 DEGREES F. (ADJ.).

OCCUPIED CYCLE:

WHEN INDEXED TO THE OCCUPIED MODE BY THE BAS SYSTEM, THE UNIT SUPPLY AIR FAN SHALL RUN CONTINUOUSLY AND THE MODULATING OUTDOOR AIR DAMPER SHALL OPEN TO THEIR SCHEDULED MINIMUM POSITION, WHEN THE OUTDOOR AIR TEMPERATURE IS BELOW 50 DEGF (ADJ.), AND THERE IS A CALL FOR HEAT, THE BAS SHALL OPEN THE HOT WATER HEATING COIL CONTROL VALVE TO THE HEATING COIL AND TO MAINTAIN SUPPLY AIR TEMPERATURE. ONCE THE TEMPERATURE HAS BEEN SATISFIED AND THERE IS NO LONGER A CALL FOR HEAT, THE HEATING COIL VALVE SHALL CLOSE ON A RISE IN SUPPLY AIR TEMPERATURE ABOVE SETPOINT (ADJ.).

OAT	SAT (RANGE)	ZONE THERMOSTAT SETPOINT
20 DEGF & LOWER	67 DEGF (65 DEGF - 70 DEGF)	68 DEGF (ADJ.)
65 DEGF & ABOVE	67 DEGF (65 DEGF - 70 DEGF)	75 DEGF (ADJ.)

ON A RISE IN OUTDOOR AIR TEMPERATURE, THE O.A. DAMPER SHALL BE POSITIONED TO SCHEDULED MINIMUM O.A. POSITION, THE RETURN AIR DAMPERS SHALL POSITION ACCORDINGLY, AND THE CHILLED WATER VALVE SHALL MODULATE AS REQUIRED TO MAINTAIN SUPPLY AIR TEMPERATURE SETPOINT

THE SUPPLY AIR TEMPERATURE SHALL BE RESET TO MAINTAIN THE ZONE TEMPERATURE SENSOR SETPOINT. THE ZONE TEMPERATURE SETPOINT SHALL BE SET BY THE BAS.

UNOCCUPIED CYCLE:

WHEN INDEXED TO THE UNOCCUPIED COOLING MODE BY THE BAS SYSTEM, THE OUTDOOR AIR DAMPER SHALL BE CLOSED, THE RETURN AIR DAMPER SHALL BE OPEN AND THE UNIT FANS SHALL BE STOPPED. ON A NEED FOR UNOCCUPIED COOLING TO MAINTAIN ELEVATED TEMPERATURE SETPOINT OF 70 DEGREES F. (ADJ.), THE UNIT WILL BE PLACED INTO A "COOL DOWN" MODE OF OPERATION. THE HEATING COIL CONTROL VALVE SHALL BE FULLY CLOSED TO THE HEATING COIL. WHEN ALL AREAS ARE SATISFIED, THE UNIT SHALL BE DE-ENERGIZED. ON A NEED FOR UNOCCUPIED HEATING TO MAINTAIN REDUCED TEMPERATURE SETPOINT OF 68 DEGREES F. (ADJ.), THE UNIT WILL BE PLACED INTO A "WARM UP" MODE OF OPERATION. MECHANICAL COOLING SHALL BE DISABLED. WHEN ALL AREAS ARE SATISFIED, THE UNIT SHALL BE DE-ENERGIZED.

THE BAS SYSTEM SHALL PROVIDE OVERRIDE TO THE ZONE BY OPERATOR INITIATION OR INDIVIDUAL ZONE THERMOSTAT OVERRIDES.

ALARMS SHALL BE PROVIDED AS FOLLOWS:

HIGH ZONE TEMP: IF THE ZONE TEMPERATURE IS GREATER THAN THE COOLING SETPOINT BY A USER DEFINABLE AMOUNT (ADJ.).

LOW ZONE TEMP: IF THE ZONE TEMPERATURE IS LESS THAN THE HEATING SETPOINT BY A USER DEFINABLE AMOUNT (ADJ.).

ZONE OPTIMAL START:

THE UNIT SHALL USE AN OPTIMAL START ALGORITHM FOR MORNING START-UP. THIS ALGORITHM SHALL MINIMIZE THE UNOCCUPIED WARM-UP OR COOL-DOWN PERIOD WHILE STILL ACHIEVING COMFORT CONDITIONS BY THE START OF SCHEDULED OCCUPIED PERIOD.

FREEZE PROTECTION:

THE UNIT SHALL SHUT DOWN AND GENERATE AN ALARM UPON ACTIVATION OF A FREEZESTAT.

SUPPLY AIR SMOKE DETECTION:

THE UNIT SHALL SHUT DOWN AND GENERATE AN ALARM UPON ACTIVATION OF A SUPPLY AIR SMOKE DETECTOR.

SUPPLY FAN:

THE SUPPLY FAN SHALL RUN ANYTIME THE UNIT IS COMMANDED TO RUN, UNLESS SHUTDOWN ON SAFETIES. TO PREVENT SHORT CYCLING, THE SUPPLY FAN SHALL HAVE A USER DEFINABLE (ADJ.) MINIMUM RUNTIME. THE SUPPLY FAN VFD SHALL RECEIVE A CONTROL SIGNAL FROM THE AHU DDC CONTROL PANEL TO START AFTER THE RETURN AIR DAMPER IS PROVEN OPEN BY THE END SWITCHES. UPON UNIT START UP, THE SUPPLY FAN WILL SOFT START TO MAINTAIN STATIC PRESSURE 2/3 OF THE WAY DOWN THE MEDIUM PRESSURE DUCTWORK (ACTUAL STATIC PRESSURE TO BE DETERMINED AT TIME OF BALANCING, BUT NO GREATER THAN 1.5"). THE DUCT STATIC PRESSURE WILL RESET THE VFD TO MAINTAIN SETPOINT.

ALARMS SHALL BE PROVIDED AS FOLLOWS:

SUPPLY FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.

SUPPLY FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.

SUPPLY FAN RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT (ADJ.).

RETURN FAN:

THE RETURN FAN SHALL RUN WHENEVER THE SUPPLY FAN RUNS AND SHALL TRACK THE SUPPLY FAN, TO MAINTAIN POSITIVE PRESSURE (5% TO 10% ADJ.) IN THE SPACE.

ALARMS SHALL BE PROVIDED AS FOLLOWS:

RETURN FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.

RETURN FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.

RETURN FAN RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT (ADJ.).

PREHEATING COIL VALVE:

THE PREHEATING SHALL BE ENABLED WHENEVER:

OUTSIDE AIR TEMPERATURE IS LESS THAN 50°F (ADJ.),

AND THE HEATING IS ACTIVE,

AND COOLING IS NOT ACTIVE,

AND THE SUPPLY FAN STATUS IS ON.

THE HEATING COIL VALVE SHALL OPEN FOR FREEZE PROTECTION WHENEVER:

MIXED AIR TEMPERATURE DROPS FROM 45°F TO 40°F (ADJ.)

OR THE FREEZESTAT IS ON.

CHILLED WATER COOLING SYSTEM:

THE COOLING SHALL BE ENABLED WHENEVER:

OUTSIDE AIR TEMPERATURE IS GREATER THAN 55°F (ADJ.),

AND THE ZONE TEMPERATURE IS ABOVE COOLING SETPOINT.

AND THE SUPPLY FAN STATUS IS ON.

AND THE HEATING IS NOT ACTIVE.

DEHUMIDIFICATION:

THE CONTROLLER SHALL MEASURE THE RETURN AIR HUMIDITY AND OVERRIDE THE COOLING SEQUENCE WHEN RETURN AIR HUMIDITY IS ABOVE 65% RH (ADJ.). UPON ACTIVATION OF THE DEHUMIDIFICATION CYCLE, THE OUTSIDE AIR DAMPER SHALL BE REPOSITIONED TO ITS MINIMUM SCHEDULE POSITION AND THE CHILLED WATER VALVE AND COIL SHALL BE COMMANDED TO MAINTAIN LEAVING AIR TEMPERATURE. THE DEHUMIDIFICATION MODE SHALL REMAIN IN OPERATION UNTIL THE RETURN AIR HUMIDITY IS AT OR BELOW 55% RH (ADJ.) AT WHICH TIME THE DEHUMIDIFICATION MODE SHALL BE DEACTIVATED AND NORMAL OPERATION RESUED. DEHUMIDIFICATION SHALL BE ENABLED WHENEVER THE SUPPLY FAN STATUS IS ON. THE REHEAT COIL SHALL BE ENABLED TO MAINTAIN LEAVING AIR TEMPERATURE.

HEATING COIL VALVE:

THE CONTROLLER SHALL MEASURE THE ZONE TEMPERATURE AND MODULATE THE HEATING COIL VALVE TO MAINTAIN ITS HEAT/LAT SETPOINT.

THE HEATING SHALL BE ENABLED WHENEVER:

• OUTSIDE AIR TEMPERATURE IS LESS THAN 65 DEGF (ADJ.)

• AND THE ZONE TEMPERATURE IS BELOW SETPOINT

• AND THE SUPPLY FAN STATUS IS ON

PRE/AFTER FILTER DIFFERENTIAL PRESSURE MONITOR:

ALARMS SHALL BE PROVIDED AS FOLLOWS:

• PRE/AFTER FILTER CHANGE REQUIRED: PREFILTER DIFFERENTIAL PRESSURE EXCEEDS A USER DEFINABLE LIMIT (ADJ.).

MIXED AIR TEMPERATURE:

ALARMS SHALL BE PROVIDED AS FOLLOWS:

• HIGH MIXED AIR TEMP: IF THE MIXED AIR TEMPERATURE IS GREATER THAN 90°F (ADJ.).

• LOW MIXED AIR TEMP: IF THE MIXED AIR TEMPERATURE IS LESS THAN 45°F (ADJ.).

RETURN AIR HUMIDITY:

THE CONTROLLER SHALL MONITOR THE RETURN AIR HUMIDITY AND USE AS REQUIRED FOR HUMIDITY CONTROL.

ALARMS SHALL BE PROVIDED AS FOLLOWS:

• HIGH RETURN AIR HUMIDITY: IF THE RETURN AIR HUMIDITY IS GREATER THAN 65% (ADJ.).

RETURN AIR TEMPERATURE:

ALARMS SHALL BE PROVIDED AS FOLLOWS:

• HIGH RETURN AIR TEMP: IF THE RETURN AIR TEMPERATURE IS GREATER THAN 90°F (ADJ.).

• LOW RETURN AIR TEMP: IF THE RETURN AIR TEMPERATURE IS LESS THAN 45°F (ADJ.).

SUPPLY AIR TEMPERATURE:

THE CONTROLLER SHALL MONITOR THE SUPPLY AIR TEMPERATURE.

ALARMS SHALL BE PROVIDED AS FOLLOWS:

• HIGH SUPPLY AIR TEMP: IF THE SUPPLY AIR TEMPERATURE IS GREATER THAN 120°F (ADJ.).

• LOW SUPPLY AIR TEMP: IF THE SUPPLY AIR TEMPERATURE IS LESS THAN 45°F (ADJ.).

PADBLE FANS IN COMMONS AREA:

PADBLE FANS SHALL BE DISABLED WHEN AHU-2 IS IN OPERATION.

RELIEF AIR IN COMMONS AREA (ABOVE FIREPLACE):

THE MODULATING MOTOR OPERATED DAMPER SHALL BE CLOSED WHEN THE OUTDOOR AIR TEMPERATURE IS BELOW 70 DEG F (ADJ.).

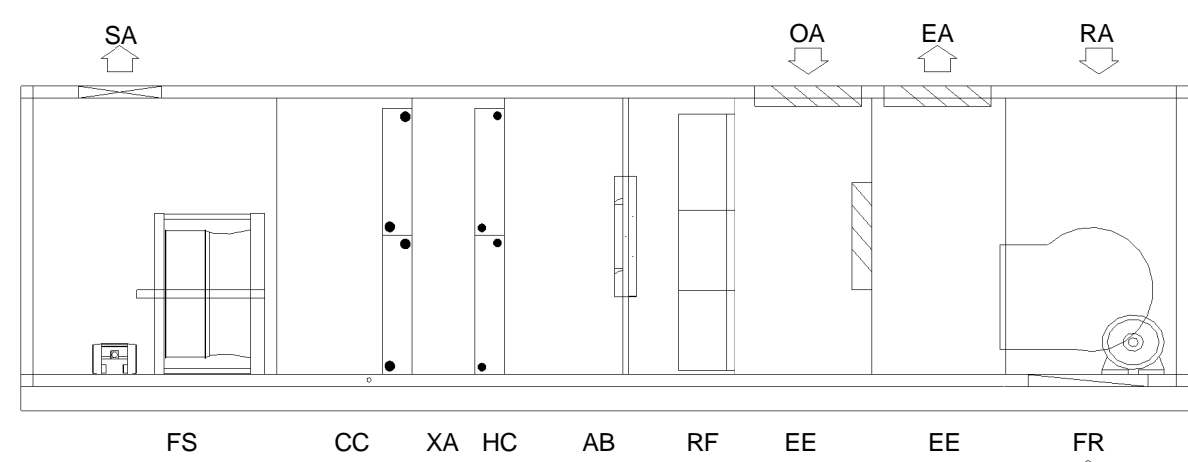
THE MODULATING MOTOR OPERATED DAMPER SHALL MODULATE OPEN WHEN THE OUTDOOR AIR TEMPERATURE IS ABOVE 70 DEG F (ADJ.).

FULLY SPRINKLERED
100% CONSTRUCTION DOCUMENTS

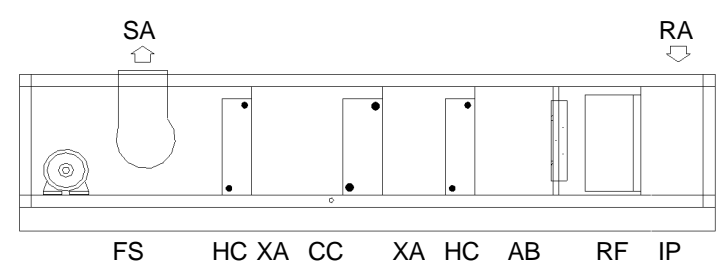
CONSULTANTS:		ARCHITECT:		Project Number 3468		Scale 1/8" = 1'-0"		Drawing Title MECHANICAL ATC DIAGRAMS		Project Title Behavioral Health Complex		VA Project Number 595-109		Office of Facilities Management	
Civil Engineer Dewberry		Structural Engineer WZIG		MEP Engineer H.E. LENZ COMPANY		Environmental Consultant SSM		Cost Estimator INTERNATIONAL CONSULTANTS, INC.		Building Number 34		Drawing Number MH701			
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Revisions		Date		2520 Renaissance Boulevard, Suite 110 King of Prussia, PA 19406		t: 610.270.0599 f: 610.270.0695 www.arrayffs.com		Approved: Project Director		Date 07/27/2012		Checked TME		Drawn DJA	

34-AHU-1&2	HARDWARE POINTS					SOFTWARE POINTS					
POINT NAME	AI	AO	DI	DO	SLK	AV	DV	SCHED	TREND	ALARM	SHOW ON GRAPHIC
SUPPLY AIR STATIC PRESSURE	●								●		●
SUPPLY AIRFLOW	●										●
RETURN AIRFLOW	●								●		●
MIXED AIR TEMP	●									●	●
RETURN AIR HUMIDITY	●								●		●
RETURN AIR TEMP	●								●		●
SUPPLY AIR TEMP	●								●		●
SUPPLY FAN VFD SPEED		●								●	●
RETURN FAN VFD SPEED		●							●		●
SUPPLY VFD ALARM			●							●	●
SUPPLY FAN STATUS			●						●		●
RETURN VFD ALARM			●							●	●
RETURN FAN STATUS			●						●		●
SUPPLY FAN START/STOP				●					●		●
RETURN FAN START/STOP				●						●	●
SUPPLY FAN VFD RUN STATUS			●						●		●
RETURN FAN VFD RUN STATUS			●							●	●
SUPPLY FAN VFD CURRENT	●								●		●
RETURN FAN VFD CURRENT	●								●		●
SUPPLY FAN VFD POWER	●								●		●
RETURN FAN VFD POWER	●								●		●
PREHEATING VALVE COMMAND		●								●	●
HEATING VALVE COMMAND		●							●		●
COOLING VALVE COMMAND		●								●	●
OUTSIDE AIR DAMPER COMMAND		●							●		●
RELIEF AIR DAMPER COMMAND		●								●	●
FREEZE/STAT			●						●	●	●
SUPPLY FAN HIGH STATIC SHUTDOWN			●						●		●
RETURN FAN HIGH STATIC SHUTDOWN			●						●		●
SUPPLY AIR SMOKE DETECTOR			●						●		●
PREFILTER STATUS			●						●		●
SUPPLY FAN STATIC PRESSURE SETPOINT						●			●		●
RETURN AIRFLOW SETPOINT						●			●		●
MIXED AIR TEMP SETPOINT						●			●		●
OUTSIDE AIR TEMP SETPOINT						●			●		●
SUPPLY AIR TEMP SETPOINT						●			●		●
SCHEDULE								●			
SUPPLY AIR STATIC PRESSURE	●								●		●
HIGH SUPPLY AIR STATIC PRESSURE										●	
LOW SUPPLY AIR STATIC PRESSURE										●	
SUPPLY AIR DIFFERENTIAL PRESSURE										●	
SUPPLY FAN FAILURE										●	
SUPPLY FAN IN HAND										●	
RETURN FAN FAILURE										●	
RETURN FAN IN HAND										●	
HIGH RETURN AIRFLOW										●	
LOW RETURN AIRFLOW										●	
PRE/AFTER FILTER CHANGE REQUIRED										●	
LOW RETURN AIR TEMP										●	
HIGH SUPPLY AIR TEMP										●	
LOW SUPPLY AIR TEMP										●	
HIGH RETURN AIR HUMIDITY										●	
LOW RETURN AIR TEMP										●	
LOW MIXED AIR TEMP										●	
HIGH RETURN FAN STATIC PRESSURE										●	
LOW RETURN FAN STATIC PRESSURE										●	
RETURN AIR DIFFERENTIAL PRESSURE										●	
SUPPLY AIR HIGH HUMIDITY										●	

PROVIDE ADDITIONAL POINTS AS SHOWN IN DIAGRAM ABOVE OR AS NEEDED TO COMPLETE THE SEQUENCES OF OPERATION
NOT ALL POINTS LISTED ARE NECESSARY FOR AHU-2.

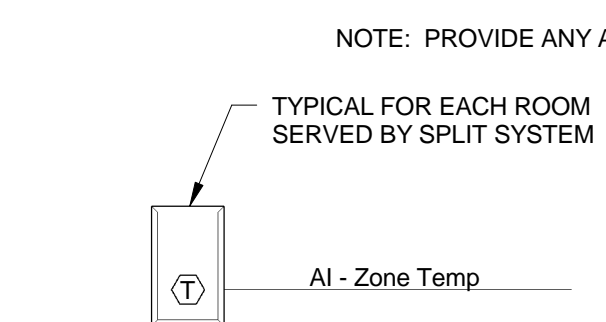


19 34-AHU-1 Diagram
NOT TO SCALE

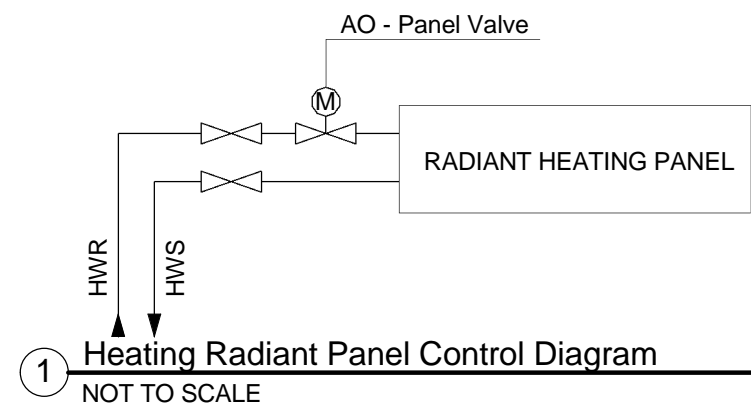


20 34-AHU-2 Diagram
NOT TO SCALE

- LEGEND:
- FS: SUPPLY FAN
 - HC: HEATING COIL
 - XA: VARIABLE LENGTH ACCESS
 - CC: COOLING COIL
 - XA: VARIABLE ACCESS LENGTH
 - AB: AIR BLENDER
 - RF: HIGH EFFICIENCY FILTER
 - IP: INLET PLENUM
 - EE: ECONOMIZER
 - RA: RETURN AIR
 - SA: SUPPLY AIR
 - EA: OUTDOOR AIR
 - EA: EXHAUST AIR



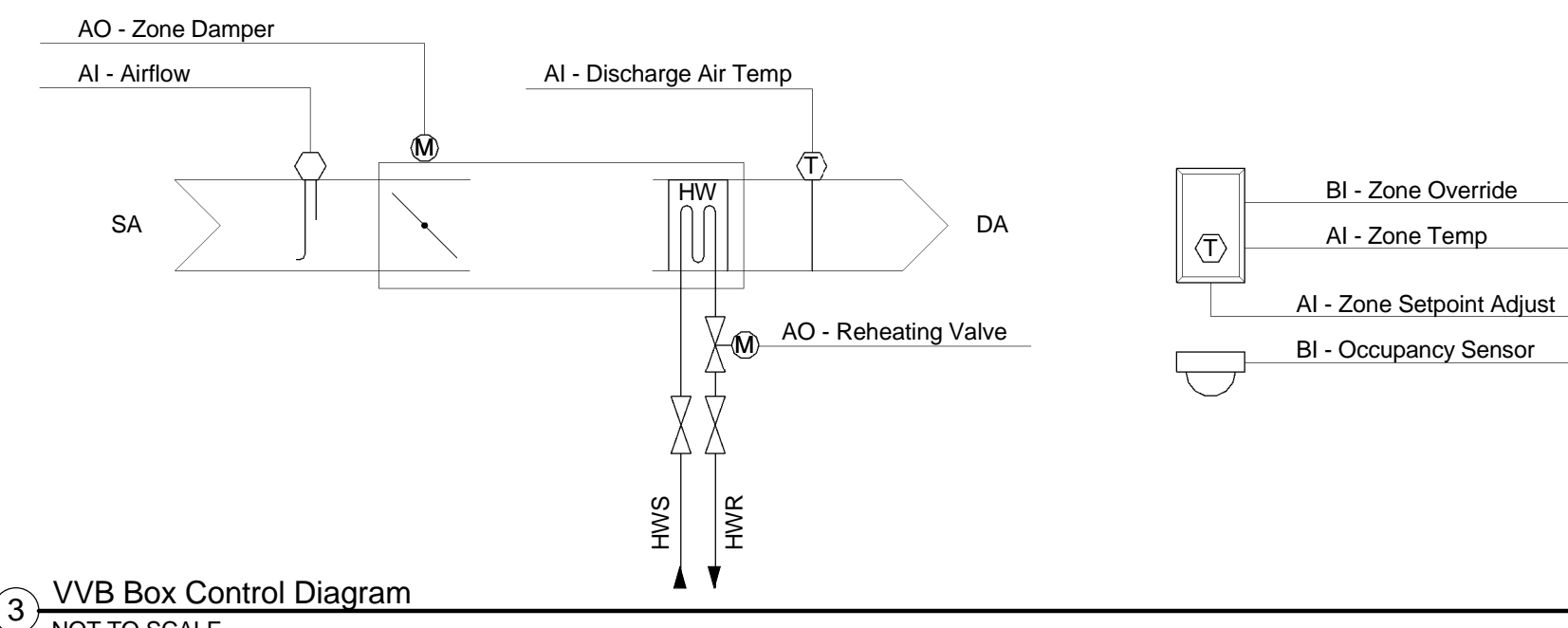
9 SPLIT SYSTEM ROOM TEMPERATURE MONITORING DIAGRAM
NOT TO SCALE



HEATING RADIANT PANELS:
SEQUENCE OF CONTROL

OCCUPIED CYCLE:
THE ROOM THERMOSTAT SHALL MODULATE THE HEATING CONTROL VALVE V-1 TO MAINTAIN ROOM TEMPERATURE.

UNOCCUPIED CYCLE/NIGHT SETBACK:
THE ROOM THERMOSTAT SHALL MODULATE THE HEATING CONTROL VALVE V-1 TO MAINTAIN A REDUCED UNOCCUPIED ROOM TEMPERATURE.



VARIABLE AIR VOLUME BOX W/ AND W/O RADIANT PANEL SEQUENCE OF OPERATION

NOTE: CONSTANT VOLUME BOXES SHALL BE CONTROLLED SIMILAR TO VVB'S EXCEPT THAT THE SUPPLY AIR VOLUME REMAINS CONSTANT AND NO ADJUSTMENT OF THE DAMPER IS PERFORMED. MAXIMUM AND MINIMUM AIR VOLUMES ARE THE SAME.

RUN CONDITIONS - OCCUPANCY SENSOR:
THE UNIT SHALL OPERATE IN AN UNOCCUPIED MODE WHEN ASSOCIATED OCCUPANCY SENSOR SENSES THE ROOM IS UNOCCUPIED, EXCEPT DURING SCHEDULED OCCUPIED PERIODS SUCH AS LUNCH. OTHERWISE THE UNIT SHALL OPERATE IN THE OCCUPIED MODE:
OCCUPIED MODE: THE UNIT SHALL MAINTAIN
A 75° (ADJ.) COOLING SETPOINT
A 68° (ADJ.) HEATING SETPOINT.
UNOCCUPIED MODE (NIGHT SETBACK): THE UNIT SHALL MAINTAIN
A 65° (ADJ.) COOLING SETPOINT.
A 55° (ADJ.) HEATING SETPOINT.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
HIGH ZONE TEMP: IF THE ZONE TEMPERATURE IS GREATER THAN THE COOLING SETPOINT BY A USER DEFINABLE AMOUNT (ADJ.).
LOW ZONE TEMP: IF THE ZONE TEMPERATURE IS LESS THAN THE HEATING SETPOINT BY A USER DEFINABLE AMOUNT (ADJ.).

ZONE SETPOINT ADJUST:
THE OCCUPANT SHALL BE ABLE TO ADJUST THE ZONE TEMPERATURE HEATING AND COOLING SETPOINTS AT THE ZONE SENSOR WITHIN A USER DEFINABLE TEMPERATURE RANGE TO BE ADJ. THROUGH THE BAS.

TIMEZED LOCAL OVERRIDE CONTROL:
A TIMEZED LOCAL OVERRIDE CONTROL SHALL ALLOW AN OCCUPANT TO OVERRIDE THE SCHEDULE AND PLACE THE UNIT INTO AN OCCUPIED MODE FOR AN ADJUSTABLE PERIOD OF TIME. AT THE EXPIRATION OF THIS TIME, CONTROL OF THE UNIT SHALL AUTOMATICALLY RETURN TO THE SCHEDULE.

REVERSING VARIABLE VOLUME TERMINAL UNIT - FLOW CONTROL:
THE UNIT SHALL MAINTAIN ZONE SETPOINTS BY CONTROLLING THE AIRFLOW THROUGH ONE OF THE FOLLOWING. A 30 SECOND TIME DELAY SHALL BE PROVIDED TO PREVENT EXCESSIVE MODULATION CAUSED BY OPENING AND CLOSING THE DOOR TO THE ISOLATION ROOM.

- OCCUPIED:
- WHEN ZONE TEMPERATURE IS GREATER THAN ITS COOLING SETPOINT, THE ZONE DAMPER SHALL MODULATE BETWEEN THE MINIMUM OCCUPIED AIRFLOW (ADJ.) AND THE MAXIMUM COOLING AIRFLOW (ADJ.) UNTIL THE ZONE IS SATISFIED.
 - WHEN THE ZONE TEMPERATURE IS BETWEEN THE COOLING SETPOINT AND THE HEATING SETPOINT, THE ZONE DAMPER SHALL MAINTAIN THE MINIMUM REQUIRED ZONE VENTILATION (ADJ.).
 - WHEN ZONE TEMPERATURE IS LESS THAN ITS HEATING SETPOINT, THE CONTROLLER SHALL ENABLE HEATING TO MAINTAIN THE ZONE TEMPERATURE AT ITS HEATING SETPOINT. ADDITIONALLY, IF WARM AIR IS AVAILABLE FROM THE AHU, THE ZONE DAMPER SHALL MODULATE BETWEEN THE MINIMUM OCCUPIED AIRFLOW (ADJ.) AND THE MAXIMUM HEATING AIRFLOW (ADJ.) UNTIL THE ZONE IS SATISFIED.
- UNOCCUPIED:
- WHEN THE ZONE IS UNOCCUPIED THE ZONE DAMPER SHALL CONTROL TO ITS MINIMUM UNOCCUPIED AIRFLOW (ADJ.).
 - WHEN THE ZONE TEMPERATURE IS GREATER THAN ITS COOLING SETPOINT, THE ZONE DAMPER SHALL MODULATE BETWEEN THE MINIMUM UNOCCUPIED AIRFLOW (ADJ.) AND THE MAXIMUM COOLING AIRFLOW (ADJ.) UNTIL THE ZONE IS SATISFIED.
 - WHEN ZONE TEMPERATURE IS LESS THAN ITS UNOCCUPIED HEATING SETPOINT, THE CONTROLLER SHALL ENABLE HEATING TO MAINTAIN THE ZONE TEMPERATURE AT THE SETPOINT. ADDITIONALLY, IF WARM AIR IS AVAILABLE FROM THE AHU, THE ZONE DAMPER SHALL MODULATE BETWEEN THE MINIMUM UNOCCUPIED AIRFLOW (ADJ.) AND THE AUXILIARY HEATING AIRFLOW (ADJ.) UNTIL THE ZONE IS SATISFIED.

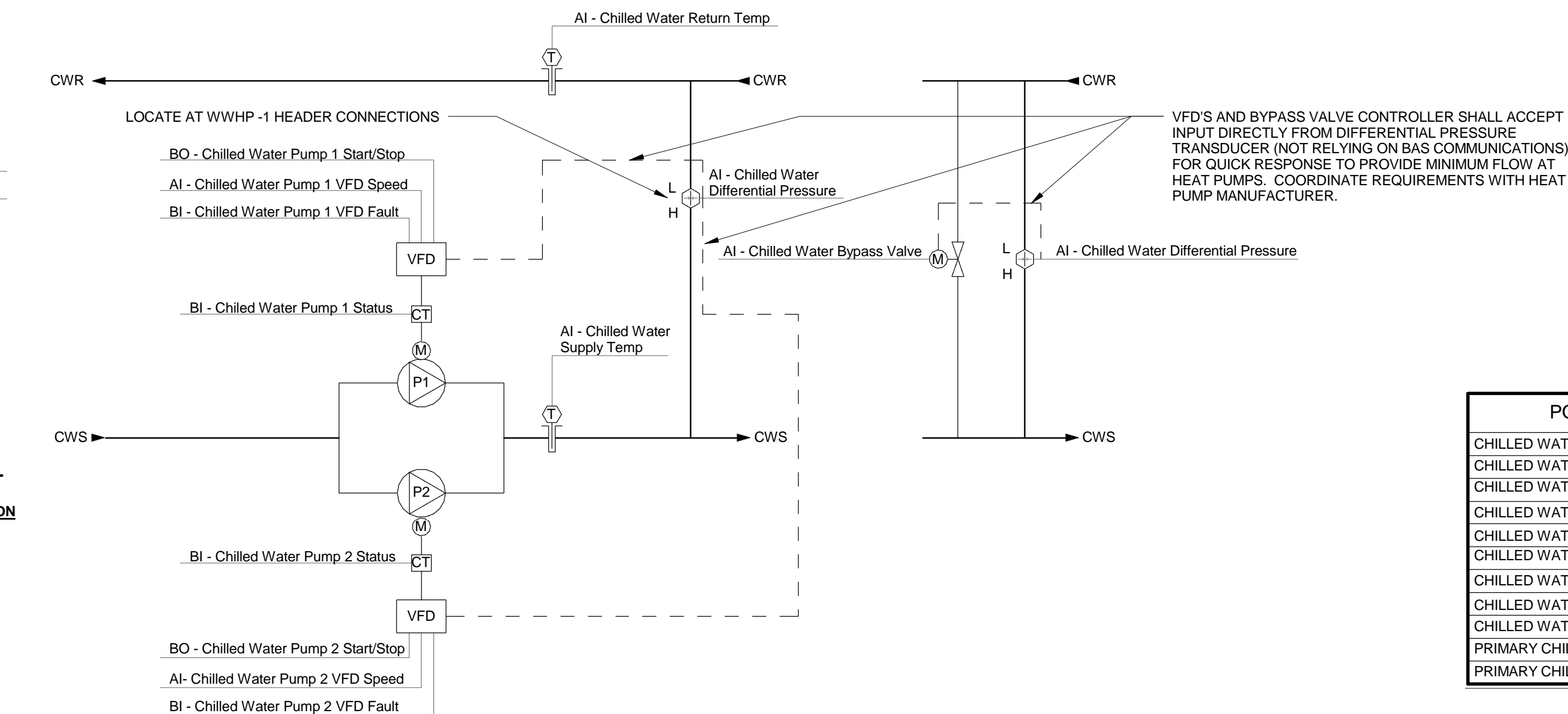
REHEATING COIL VALVE:
THE CONTROLLER SHALL MEASURE THE ZONE TEMPERATURE AND MODULATE THE REHEATING COIL VALVE OPEN ON DROPPING TEMPERATURE TO MAINTAIN ITS HEATING SETPOINT.

DISCHARGE AIR TEMPERATURE:
THE CONTROLLER SHALL MONITOR THE DISCHARGE AIR TEMPERATURE.
ALARMS SHALL BE PROVIDED AS FOLLOWS:
HIGH DISCHARGE AIR TEMP: IF THE DISCHARGE AIR TEMPERATURE IS GREATER THAN 120° (ADJ.).
LOW DISCHARGE AIR TEMP: IF THE DISCHARGE AIR TEMPERATURE IS LESS THAN 40° (ADJ.).

POINT NAME	HARDWARE POINTS				SOFTWARE POINTS				ALARM	GRAPHIC
	AI	AO	DI	DO	AV	DV	SCHED	TREND		
Zone Temp	●							●		●
Zone Setpoint Adjust								●		●
Airflow	●							●		●
Discharge Air Temp								●		●
Outdoor Air Temp	●							●		●
Zone Damper		●						●		●
Reheating Valve		●						●		●
Zone Override			●					●		●
Heating Setpoint								●		●
Cooling Setpoint								●		●
Airflow Setpoint						●		●		●
Heating Mode						●		●		●
Schedule							●	●		●
High Zone Temp									●	●
Low Zone Temp									●	●
High Discharge Air Temp									●	●
Low Discharge Air Temp									●	●
Occupancy Sensor Status		●								●

NOTE: PROVIDE ANY ADDITIONAL POINTS REQUIRED FOR SEQUENCES OF OPERATION

15 HWP - 1 & HWP - 2 CONTROL DIAGRAM
NOT TO SCALE



GLYCOL WATER PUMP DUTY/STAND-BY OPERATION:
THE TWO GLYCOL WATER PUMPS SHALL OPERATE IN A DUTY/STAND-BY FASHION.

- THE DUTY PUMP SHALL RUN FIRST.
- ON FAILURE OF THE DUTY PUMP, THE STAND-BY PUMP SHALL RUN AND THE DUTY PUMP SHALL TURN OFF.

THE DESIGNATED DUTY PUMP SHALL ROTATE UPON ONE OF THE FOLLOWING CONDITIONS (USER SELECTABLE):

- MANUALLY THROUGH A SOFTWARE SWITCH
- IF PUMP RUNTIME (ADJ.) IS EXCEEDED
- DAILY
- WEEKLY
- MONTHLY

ALARMS SHALL BE PROVIDED AS FOLLOWS:
GLYCOL WATER PUMP
FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
RUNNING IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.

POINT NAME		HARDWARE VALUES				SOFTWARE VALUES		SHOW ON GRAPHIC
		AI	AO	BI	BO	TREND	ALARM	
GLYCOL WATER DIFFERENTIAL PRESSURE		●						●
GLYCOL WATER PUMP 1 VFD SPEED			●					●
GLYCOL WATER PUMP 2 VFD SPEED			●					●
GLYCOL WATER PUMP 1 VFD FAULT				●				●
GLYCOL WATER PUMP 2 VFD FAULT				●				●
GLYCOL WATER PUMP 1 STATUS				●				●
GLYCOL WATER PUMP 2 STATUS				●				●
GLYCOL WATER PUMP 1 START/STOP					●			●
GLYCOL WATER PUMP 2 START/STOP					●			●
PRIMARY GLYCOL WATER SUPPLY TEMP		●						●
PRIMARY GLYCOL WATER RETURN TEMP		●						●

HOT WATER PUMP DUTY/STAND-BY OPERATION:
THE TWO HOT WATER PUMPS SHALL OPERATE IN A DUTY/STAND-BY FASHION.

- THE DUTY PUMP SHALL RUN FIRST.
- ON FAILURE OF THE DUTY PUMP, THE STAND-BY PUMP SHALL RUN AND THE DUTY PUMP SHALL TURN OFF.

THE DESIGNATED DUTY PUMP SHALL ROTATE UPON ONE OF THE FOLLOWING CONDITIONS (USER SELECTABLE):

- MANUALLY THROUGH A SOFTWARE SWITCH
- IF PUMP RUNTIME (ADJ.) IS EXCEEDED
- DAILY
- WEEKLY
- MONTHLY

ALARMS SHALL BE PROVIDED AS FOLLOWS:
HOT WATER PUMP
FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
RUNNING IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.

		HARDWARE VALUES				SOFTWARE VALUES		
POINT NAME		AI	AO	BI	BO	TREND	ALARM	SHOW GRAPH
HOT WATER DIFFERENTIAL PRESSURE		●						●
HOT WATER PUMP 1 VFD SPEED			●					●
HOT WATER PUMP 2 VFD SPEED			●					●
HOT WATER PUMP 1 VFD FAULT				●				●
HOT WATER PUMP 2 VFD FAULT				●				●
HOT WATER PUMP 1 STATUS				●				●
HOT WATER PUMP 2 STATUS				●				●
HOT WATER PUMP 1 START/STOP					●			●
HOT WATER PUMP 2 START/STOP					●			●
PRIMARY HOT WATER SUPPLY TEMP		●						●
PRIMARY HOT WATER RETURN TEMP		●						●

CHILLED WATER PUMP DUTY/STAND-BY OPERATION:
THE TWO CHILLED WATER PUMPS SHALL OPERATE IN A DUTY/STAND-BY FASHION.

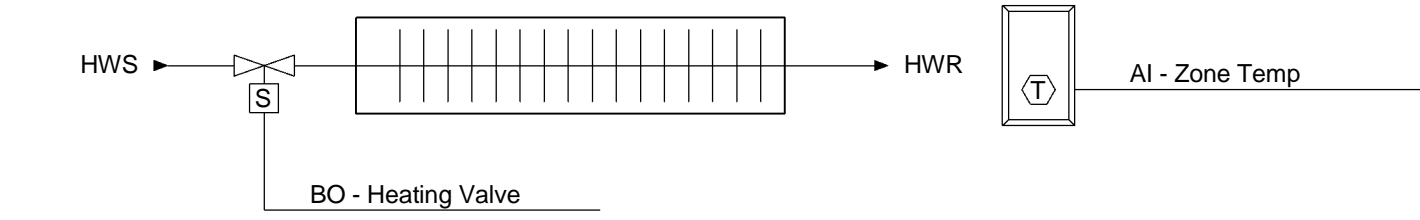
- THE DUTY PUMP SHALL RUN FIRST.
- ON FAILURE OF THE DUTY PUMP, THE STAND-BY PUMP SHALL RUN AND THE DUTY PUMP SHALL TURN OFF.

THE DESIGNATED DUTY PUMP SHALL ROTATE UPON ONE OF THE FOLLOWING CONDITIONS (USER SELECTABLE):

- MANUALLY THROUGH A SOFTWARE SWITCH
- IF PUMP RUNTIME (ADJ.) IS EXCEEDED
- DAILY
- WEEKLY
- MONTHLY

ALARMS SHALL BE PROVIDED AS FOLLOWS:
CHILLED WATER PUMP
FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
RUNNING IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.

		HARDWARE VALUES				SOFTWARE VALUES		SHOW GRAPH
POINT NAME		AI	AO	BI	BO	TREND	ALARM	
CHILLED WATER DIFFERENTIAL PRESSURE		●						●
CHILLED WATER PUMP 1 VFD SPEED			●					●
CHILLED WATER PUMP 2 VFD SPEED			●					●
CHILLED WATER PUMP 1 VFD FAULT				●				●
CHILLED WATER PUMP 2 VFD FAULT				●				●
CHILLED WATER PUMP 1 STATUS				●				●
CHILLED WATER PUMP 2 STATUS				●				●
CHILLED WATER PUMP 1 START/STOP					●			●
CHILLED WATER PUMP 2 START/STOP					●			●
PRIMARY CHILLED WATER SUPPLY TEMP		●						●
PRIMARY CHILLED WATER RETURN TEMP		●						●



10 CONVECTIVE/FIN TUBE HEATER CONTROL DIAGRAM
NOT TO SCALE

CONVECTIVE / FIN TUBE HEATER

1. RUN CONDITIONS - CONTINUOUS:
THE UNIT SHALL RUN CONTINUOUSLY AND SHALL MAINTAIN A HEATING SET POINT OF 70°F (ADJ.).
WHEN THE OA IS BELOW 55 DEGF (ADJ.)

ALARMS SHALL BE PROVIDED AS FOLLOWS:

- LOW ZONE TEMP: IF THE ZONE TEMPERATURE IS LESS THAN THE HEATING SETPOINT BY A USER DEFINABLE AMOUNT (ADJ.)

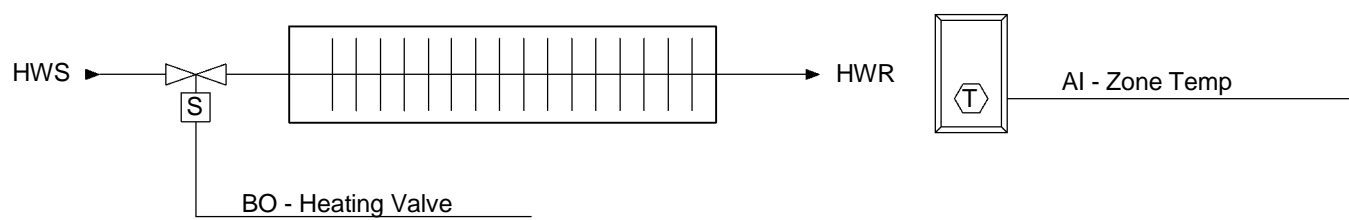
2. HEATING COIL VALVE:
THE CONTROLLER SHALL MEASURE THE ZONE TEMPERATURE AND OPEN THE HEATING COIL VALVE TO MAINTAIN ITS HEATING SETPOINT.

THE HEATING SHALL BE ENABLED WHENEVER:

- AND SUPPLY WATER TEMPERATURE IS GREATER THAN 100°F
- AND THE ZONE TEMPERATURE IS BELOW HEATING SETPOINT.
- OUTSIDE AIR TEMPERATURE IS LESS THAN 55°F (ADJ.).

POINT NAME	HARDWARE POINTS				SOFTWARE POINTS				GRAPHIC
	AI	AO	BI	BO	AV	BV	SCHED	TREND	ALARM
ZONE TEMP	●							●	●
VALVE		●						●	●
HEATING SETPOINT								●	●
LOW ZONE TEMP									●

NOTE: PROVIDE ANY ADDITIONAL POINTS REQUIRED FOR SEQUENCES OF OPERATION



13 AIR CURTAIN CONTROL DIAGRAM
NOT TO SCALE

AIR CURTAIN

1. RUN CONDITIONS - CONTINUOUS:
THE UNIT SHALL RUN CONTINUOUSLY AND SHALL MAINTAIN A HEATING SET POINT OF 70°F (ADJ.).
WHEN THE OA IS BELOW 55 DEGF (ADJ.)

THE UNIT SHALL RUN IN ADDITION TO ABOVE WHENEVER THE EXTERIOR DOOR IS COMMANDED OPEN, VIA DOOR SWITCH

ALARMS SHALL BE PROVIDED AS FOLLOWS:

- LOW ZONE TEMP: IF THE ZONE TEMPERATURE IS LESS THAN THE HEATING SETPOINT BY A USER DEFINABLE AMOUNT (ADJ.)

2. HEATING COIL VALVE:
THE CONTROLLER SHALL MEASURE THE ZONE TEMPERATURE AND OPEN THE HEATING COIL VALVE TO MAINTAIN ITS HEATING SETPOINT.

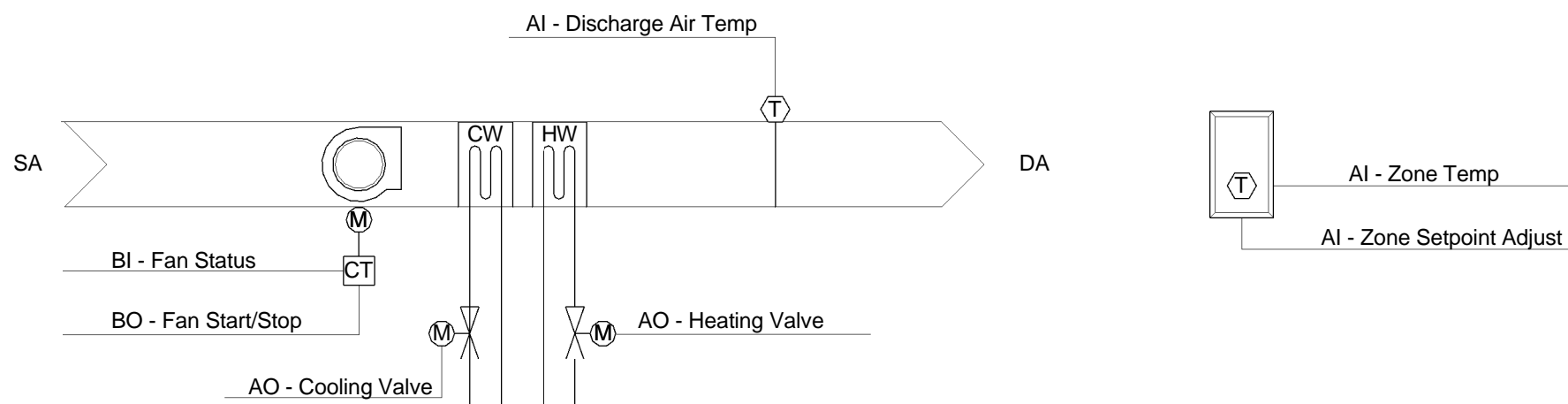
THE HEATING SHALL BE ENABLED WHENEVER:

- AND SUPPLY WATER TEMPERATURE IS GREATER THAN 100°F
- AND THE ZONE TEMPERATURE IS BELOW HEATING SETPOINT.
- AND THE OUTSIDE AIR TEMPERATURE IS LESS THAN 55°F (ADJ.).
- AND THE FAN IS ON

3. FAN:
THE FAN SHALL RUN ANYTIME THE UNIT IS COMMANDED TO RUN, UNLESS SHUTDOWN ON SAFETIES.

POINT NAME	HARDWARE POINTS				SOFTWARE POINTS				GRAPHIC
	AI	AO	BI	BO	AV	BV	SCHED	TREND	ALARM
ZONE TEMP	●							●	●
VALVE		●						●	●
HEATING SETPOINT								●	●
LOW ZONE TEMP									●

NOTE: PROVIDE ANY ADDITIONAL POINTS REQUIRED FOR SEQUENCES OF OPERATION



2 FCU CONTROL DIAGRAM
NOT TO SCALE

FAN COIL UNIT

1. RUN CONDITIONS - SCHEDULED:
THE UNIT SHALL RUN ACCORDING TO A USER DEFINABLE TIME SCHEDULE IN THE FOLLOWING MODES:

OCCUPIED MODE: THE UNIT SHALL MAINTAIN

- A 75°F (ADJ.) COOLING SETPOINT
- A 68°F (ADJ.) HEATING SETPOINT

UNOCCUPIED MODE (NIGHT SETBACK): THE UNIT SHALL MAINTAIN

- A 85°F (ADJ.) COOLING SETPOINT
- A 55°F (ADJ.) HEATING SETPOINT

ALARMS SHALL BE PROVIDED AS FOLLOWS:

- HIGH ZONE TEMP: IF THE ZONE TEMPERATURE IS GREATER THAN THE COOLING SETPOINT BY A USER DEFINABLE AMOUNT (ADJ.)
- LOW ZONE TEMP: IF THE ZONE TEMPERATURE IS LESS THAN THE HEATING SETPOINT BY A USER DEFINABLE AMOUNT (ADJ.)

2. ZONE SETPOINT ADJUST:
THE OCCUPANT SHALL BE ABLE TO ADJUST THE ZONE TEMPERATURE HEATING AND COOLING SETPOINTS AT THE ZONE SENSOR.

3. ZONE OPTIMAL START:
THE UNIT SHALL USE AN OPTIMAL START ALGORITHM FOR MORNING START-UP. THIS ALGORITHM SHALL MINIMIZE THE UNOCCUPIED WARM-UP OR COOL-DOWN PERIOD WHILE STILL ACHIEVING COMFORT CONDITIONS BY THE START OF SCHEDULED OCCUPIED PERIOD.

4. ZONE UNOCCUPIED OVERRIDE:
A TIMED LOCAL OVERRIDE CONTROL SHALL ALLOW AN OCCUPANT TO OVERRIDE THE SCHEDULE AND PLACE THE UNIT INTO AN OCCUPIED MODE FOR AN ADJUSTABLE PERIOD OF TIME. AT THE EXPIRATION OF THIS TIME, CONTROL OF THE UNIT SHALL AUTOMATICALLY RETURN TO THE SCHEDULE.

5. FAN:
THE FAN SHALL RUN ANYTIME THE UNIT IS COMMANDED TO RUN, UNLESS SHUTDOWN ON SAFETIES.

6. COIL VALVE:
THE CONTROLLER SHALL MEASURE THE ZONE TEMPERATURE AND MODULATE THE COIL VALVE TO MAINTAIN ITS SETPOINT.

COOLING SHALL BE ENABLED WHENEVER:

- AND THE ZONE TEMPERATURE IS ABOVE COOLING SETPOINT.
- AND SUPPLY WATER TEMPERATURE IS LESS THAN 55°F
- AND THE FAN IS ON.

HEATING SHALL BE ENABLED WHENEVER:

- AND THE ZONE TEMPERATURE IS BELOW HEATING SETPOINT.
- AND SUPPLY WATER TEMPERATURE IS GREATER THAN 100°F
- AND THE FAN IS ON.

7. FILTER DIFFERENTIAL PRESSURE MONITOR:
THE CONTROLLER SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE FILTER.

ALARMS SHALL BE PROVIDED AS FOLLOWS:

- FILTER CHANGE REQUIRED: FILTER DIFFERENTIAL PRESSURE EXCEEDS A USER DEFINABLE LIMIT (ADJ.).

8. DISCHARGE AIR TEMPERATURE:
THE CONTROLLER SHALL MONITOR THE DISCHARGE AIR TEMPERATURE.

ALARMS SHALL BE PROVIDED AS FOLLOWS:

- HIGH DISCHARGE AIR TEMP: IF THE DISCHARGE AIR TEMPERATURE IS GREATER THAN 120°F (ADJ.).
- LOW DISCHARGE AIR TEMP: IF THE DISCHARGE AIR TEMPERATURE IS LESS THAN 40°F (ADJ.).

9. FAN STATUS:
THE CONTROLLER SHALL MONITOR THE FAN STATUS.

ALARMS SHALL BE PROVIDED AS FOLLOWS:

- FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
- FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.

POINT NAME	HARDWARE POINTS				SOFTWARE POINTS				GRAPHIC
	AI	AO	BI	BO	AV	BV	SCHED	TREND	ALARM
ZONE TEMP	●							●	●
ZONE SETPOINT ADJUST	●								●
FILTER DIFF PRESSURE								●	●
DISCHARGE AIR TEMP	●							●	●
SUPPLY WATER TEMP	●							●	●
VALVE		●						●	●
ZONE OVERRIDE			●					●	●
FAN STATUS			●					●	●
FAN START/STOP			●		●			●	●
SCHEDULE				●			●		●
HEATING SETPOINT								●	●
COOLING SETPOINT								●	●
HIGH ZONE TEMP									●
LOW ZONE TEMP									●
FILTER CHANGE REQUIRED									●
HIGH DISCHARGE AIR TEMP									●
LOW DISCHARGE AIR TEMP									●
FAN FAILURE									●
FAN IN HAND									●

NOTE: PROVIDE ANY ADDITIONAL POINTS REQUIRED FOR SEQUENCES OF OPERATION

WWHP MANUFACTURER'S MASTER CONTROLLER	BI - Heat Pump Module 1 Cooling Status
	BI - Heat Pump Module 1 Heating Status
	BI - Heat Pump Module 1 Fault
	AI - Heat Pump Module 1 Leaving Load Temp
	BI - Heat Pump Module 2 Cooling Status
	BI - Heat Pump Module 2 Heating Status
	BI - Heat Pump Module 2 Fault
	AI - Heat Pump Module 2 Leaving Load Temp
	BI - Heat Pump Module 3 Cooling Status
	BI - Heat Pump Module 3 Heating Status
	BI - Heat Pump Module 3 Fault
	AI - Heat Pump Module 3 Leaving Load Temp
	BI - Heat Pump Module 4 Cooling Status
	BI - Heat Pump Module 4 Heating Status
	BI - Heat Pump Module 4 Fault
	AI - Heat Pump Module 4 Leaving Load Temp
	BI - Heat Pump Module 5 Cooling Status
	BI - Heat Pump Module 5 Heating Status
	BI - Heat Pump Module 5 Fault
	AI - Heat Pump Module 5 Leaving Load Temp
	BI - Heat Pump Module 6 Cooling Status
	BI - Heat Pump Module 6 Heating Status
	BI - Heat Pump Module 6 Fault
	AI - Heat Pump Module 6 Leaving Load Temp
	AI - System Entering Chilled Water Temp
	AI - System Leaving Hot Water Temp
	AI - System Leaving Hot Water Temp
	AI - System Entering Source/Sink Water Temp
	AI - System Leaving Source/Sink Water Temp

ELEVATOR SUMP PIT:

THE DDC SYSTEM SHALL MONITOR THE WATER LEVEL IN THE SUMP PIT AND SHALL ISSUE AN ALARM WHENEVER THE WATER LEVEL REACHES ITS HIGH LIMIT.

GLYCOL MAKE-UP TANK AND PUMP PACKAGE:

- NON-DDC CONTROLS: THE PACKAGE CONTROLS SHALL ENERGIZE THE PUMP UPON A FALL IN SYSTEM STATIC FILL PRESSURE BELOW SETPOINT. SEE FLOW DIAGRAM.
- DDC SHALL MONITOR THE PUMP STATUS AND SHALL ISSUE AN ALARM WHENEVER THE PUMP IS ENERGIZED.

SANITARY SUMP PIT:

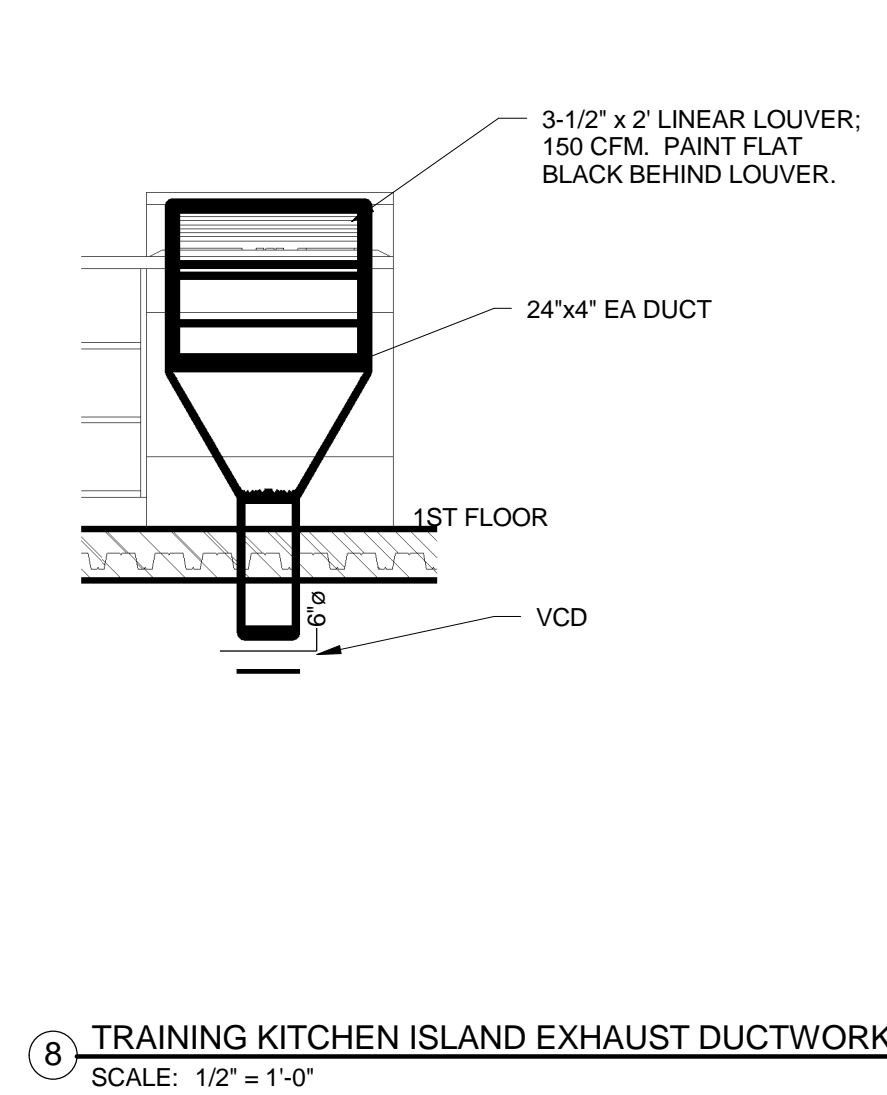
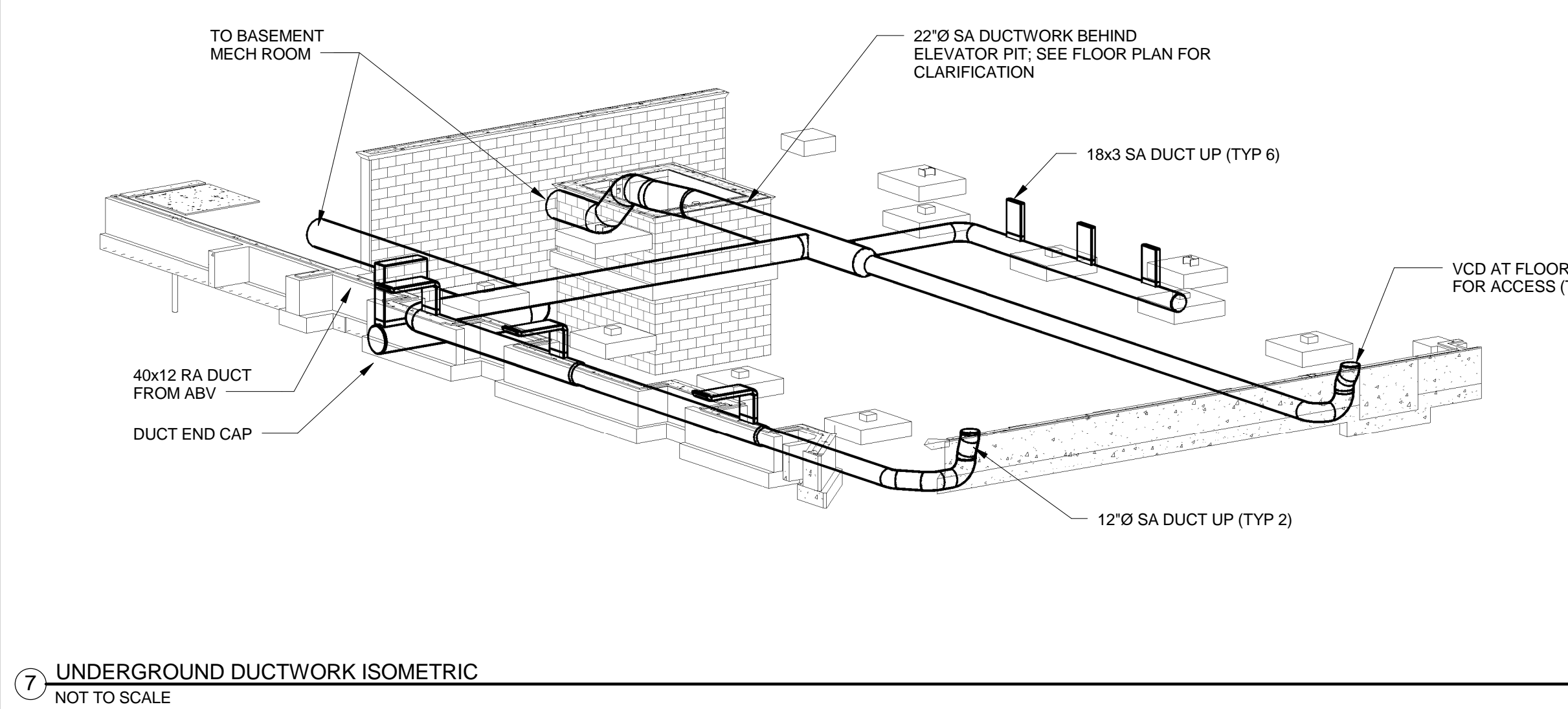
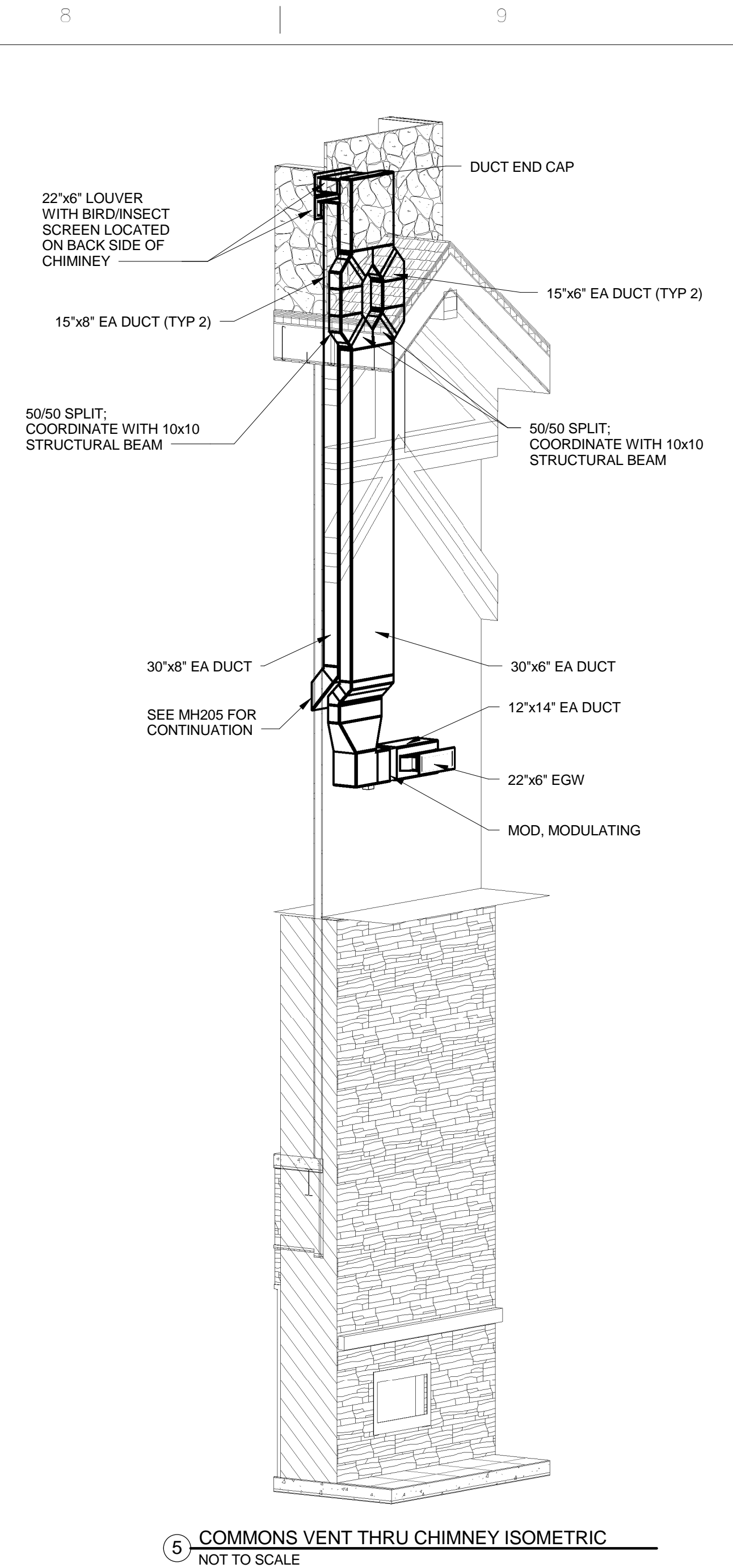
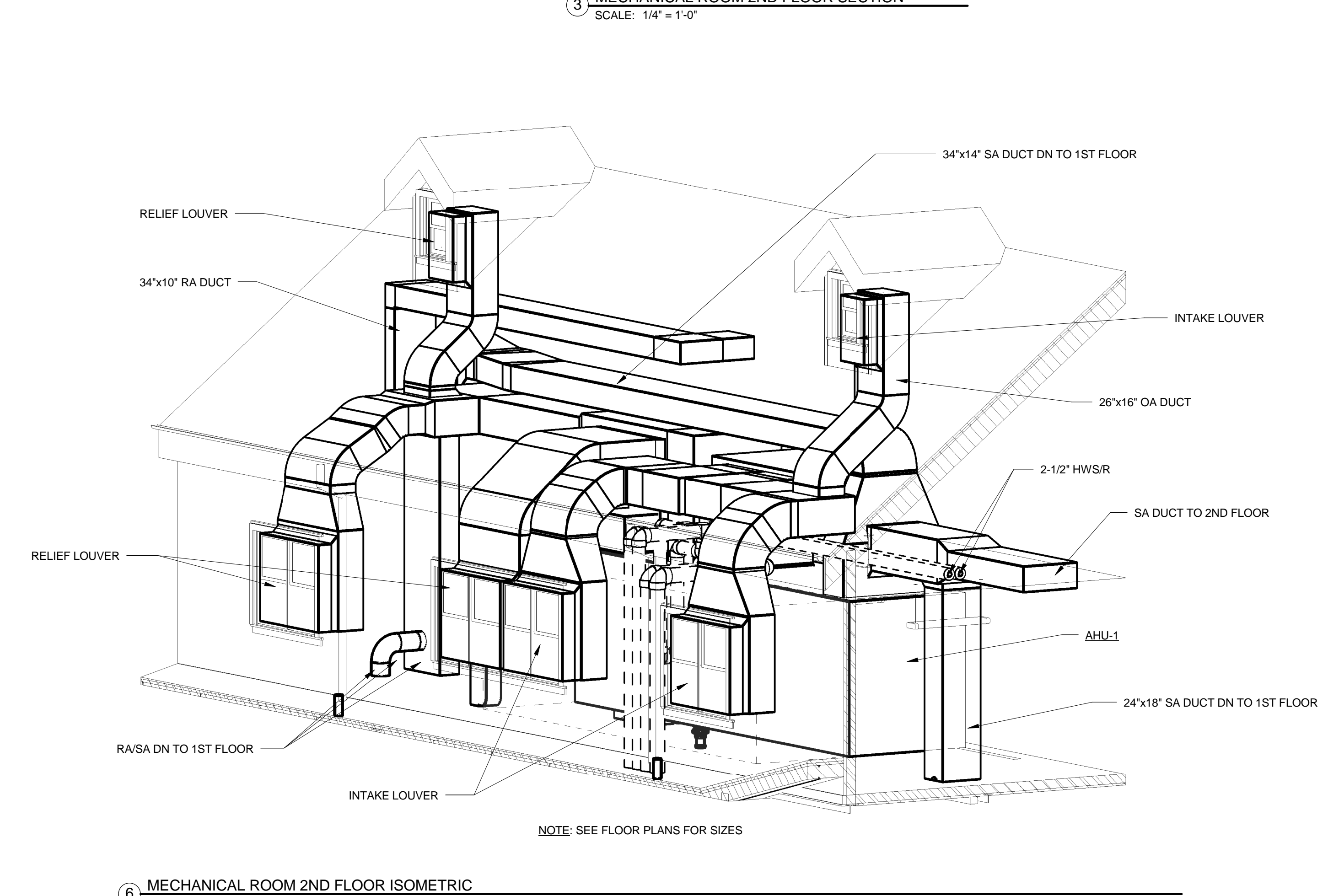
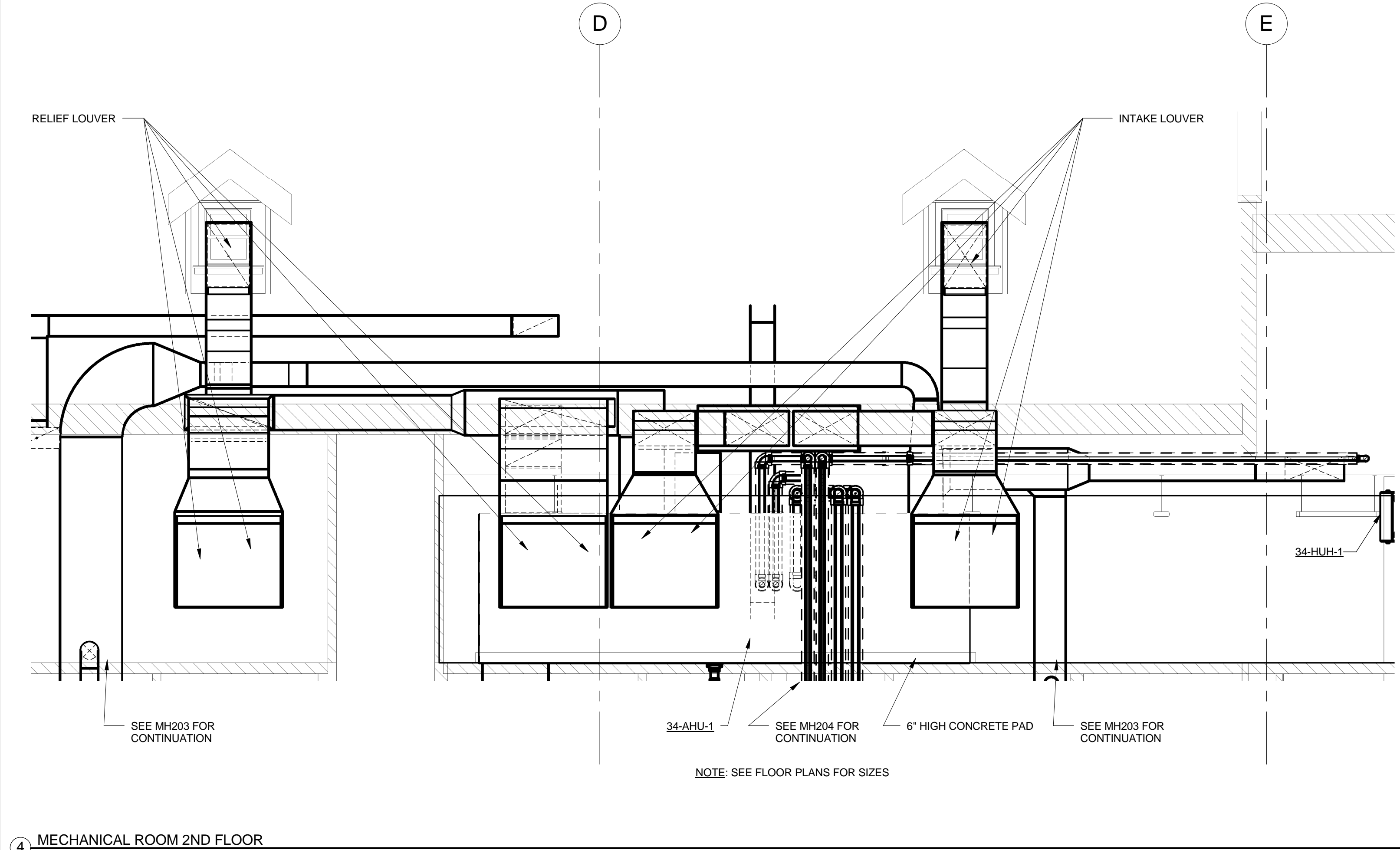
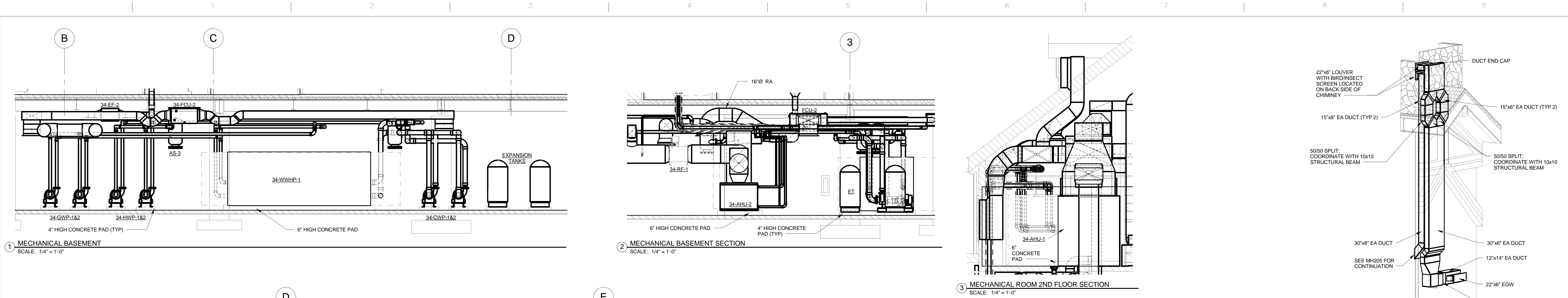
THE DDC SYSTEM SHALL MONITOR THE WATER LEVEL IN THE SUMP PIT AND SHALL ISSUE AN ALARM WHENEVER THE WATER LEVEL REACHES ITS HIGH LIMIT.

TERMINAL HEATERS (CUH'S AND HUH'S):

NON DDC CONTROLS: ON A FALL IN SPACE TEMPERATURE BELOW SETPOINT (88 DEGREES F. ADJ.), THE THERMOSTAT UNIT OR WALL MOUNTED REFER TO SCHEDULES AND DRAWINGS FOR WHICH KIND IS REQUIRED) SHALL ENERGIZE THE UNIT FAN AND OPEN THE UNIT HOT WATER VALVE. ON A RISE IN SPACE TEMPERATURE, THE THERMOSTAT SHALL DE-ENERGIZE THE FAN AND CLOSE THE HOT WATER VALVE.

FULLY SPRINKLERED
100% CONSTRUCTION DOCUMENTS


CONSULTANTS:		ARCHITECT:	Project Number 3468	Scale 1/8" = 1'-0"	Drawing Title MECHANICAL ATC DIAGRAMS	Project Title Behavioral Health Complex	VA Project Number 595-109	Office of Facilities Management Department of Veterans Affairs
Civil Engineer Dewberry 600 Parsippany Road, Suite 301 Parsippany, NJ 07054-3715 Tel (973) 576-9953 Fax (973) 739-9710	Structural Engineer WZIG 180 W. Ridge Pike Limerick, PA 19468 Tel (214) 329-5559	MEP Engineer H.E. LENZ COMPANY 1407 Scalp Avenue Johnstown, PA 15804 Tel (814) 269-9300 Fax (814) 269-9301	Environmental Consultant SSM 1047 North Park Road, P.O. Box 6307 Reading, PA 19610 Tel (610) 621-2000	Cost Estimator INTERNATIONAL CONSULTANTS, INC. 221 Chestnut Street, Suite 200 Philadelphia, PA 19106 Tel (215) 923-8888	Approved: Project Director	Location 1700 South Lincoln Ave. Lebanon, PA 17042	Building Number 34	
Revisions			Date		Date		Dwg. 85 of 123	



CONSULTANTS:		ARCHITECT:		Project Number 3468	Scale As indicated	Drawing Title MECHANICAL ISOMETRICS AND SECTIONS	Project Title Behavioral Health Complex	VA Project Number 595-109	Office of Facilities Management 		
<div>Civil Engineer  600 Parsippany Road, Suite 301 Parsippany, NJ 07054-3715 Tel (973) 576-9953 Fax (973) 739-9710</div>		<div>Structural Engineer  180 W. Ridge Pike Limerick, PA 19468 Tel (214) 329-5559</div>		<div>MEP Engineer  1407 Scalp Avenue Johnstown, PA 15804 Tel (814) 269-9300 Fax (814) 269-9301</div>		<div>Environmental Consultant  1047 North Park Road, P.O. Box 6307 Reading, PA 19610 Tel (610) 621-2000</div>		<div>Cost Estimator  221 Chestnut Street, Suite 200 Philadelphia, PA 19106 Tel (215) 923-8888</div>			
<div> </div>		<div> healthcare facilities solutions</div>		<div>2520 Renaissance Boulevard, Suite 110 King of Prussia, PA 19406 t: 610.270.0599 f: 610.270.0995 www.arrayffs.com</div>		Approved: Project Director		Location 1700 South Lincoln Ave. Lebanon, PA 17042		Drawing Number MH801	
Revisions		Date				Date 07/27/2012	Checked TME	Drawn DJA		Dwg. 86 of 123	

1

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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 Department of
Veterans Affairs