

PUBLIC HEALTH
RESEARCH CENTER -
INTERIOR
RENOVATIONS

OSE # H27-1988

TAG	DESCRIPTION	DATE

Project: 11USC396
Drawn By: BEK
Checked By: CRB
Date: 5 MAR 2012
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MECHANICAL
LEGEND AND
ABBREVIATIONS

GENERAL SYMBOLS

SYMBOL	DESCRIPTION
	PIPE DROP
	PIPE RISE
	PIPE CAP
	BRANCH TAKE OFF
	PIPE DROP TEE
	PIPE RISE TEE
	SHUTOFF VALVE (REFER TO SPECIFICATIONS FOR TYPE)
	AUTOMATIC CONTROL VALVE (TWO-WAY)
	AUTOMATIC CONTROL VALVE (THREE-WAY)
	BUTTERFLY VALVE
	AUTOMATIC BUTTERFLY VALVE
	BALANCING VALVE (WITH MEMORY STOP)
	CHECK VALVE
	OUTSIDE STEM AND YOKE VALVE
	SAFETY RELIEF VALVE
	STRAINER
	STRAINER WITH BLOWDOWN VALVE
	PRESSURE REDUCING VALVE
	PRESSURE RELIEF VALVE
	BALL VALVE
	SHUTOFF VALVE COCK
	GLOBE VALVE
	WEDGE PLUG VALVE
	SOLENOID VALVE
	ANGLE VALVE (ELEVATION)
	ANGLE VALVE (PLAN VIEW)
	UNION
	PIPE FLANGE
	ECCENTRIC REDUCER (FLAT ON BOTTOM)
	ECCENTRIC REDUCER (FLAT ON TOP)
	CONCENTRIC REDUCER
	FLOWMETER FITTING
	FLOWMETER
	HOSE END DRAIN VALVE
	PRESSURE SENSOR
	TEMPERATURE SENSOR
	SIGHT GLASS
	AUTOMATIC AIR VENT
	MANUAL AIR VENT
	PRESSURE GAUGE WITH BALL VALVE
	THERMOMETER
	PRESSURE/TEMPERATURE PLUG
	FLOW ARROW

DESIGNATION	DESCRIPTION
	DEMOLITION WORK (SHOWN ON DEMOLITION PLANS)
	EXISTING WORK
	NEW WORK
	MATCHLINE
	PART PLAN DESIGNATION

DESIGNATION	DESCRIPTION
	FLOOR PLAN NUMBER PARTIAL FLOOR PLAN NUMBER ELEVATION = LETTER DETAIL = NUMBER
	SHEET NUMBER ON WHICH THE PARTIAL PLAN, ELEVATION OR DETAIL IS DRAWN OR TAKEN FROM
	SECTION LETTER
	SHEET NUMBER ON WHICH THE SECTION IS DRAWN OR TAKEN FROM
	PIPE CONTINUATION DESIGNATION
	SHEET FOR CONTINUATION, SHEET COORDINATES OR PIPE CONTINUATION DESIGNATION LETTER
	SYSTEM CONTINUATION NOTES
	NORTH ARROW
	AIR DEVICE
	SUPPLY VARIABLE AIR VOLUME BOX

SYMBOL	DESCRIPTION
&	AND
@	AT
°F	DEGREE(S) FAHRENHEIT
°C	DEGREE(S) CELSIUS
Ø	DIAMETER, PHASE
/	DIVIDE BY, PER
\$	DOLLAR
=	EQUALS, EQUAL TO
'	FEET, FOOT
>	GREATER THAN
≥	GREATER THAN OR EQUAL TO
"	INCH(ES)
<	LESS THAN
≤	LESS THAN OR EQUAL TO
-	MINUS
x	MULTIPLY BY, BY
#	NUMBER, POUND
%	PERCENT
+	PLUS
±	PLUS OR MINUS

MECHANICAL LEGEND

SYMBOL	DESCRIPTION
	THERMOSTAT
	AIR FLOW
	TRANSFER AIR FLOW (INDICATE CFM)
	SUPPLY AIR DIFFUSER
	RETURN AIR GRILLE
	EXHAUST AIR GRILLE
	FIRE DAMPER
	VOLUME DAMPER
	FLEXIBLE CONNECTION
	HORIZONTAL ACCESS DOOR
	VERTICAL ACCESS DOOR
	ELBOW WITH DOUBLE THICKNESS TURNING VANES
	RECTANGULAR BRANCH TAKE-OFF
	BELL MOUTH BRANCH TAKE-OFF
	ROUND BRANCH TAKE-OFF
	ROUND DUCT DROP OFF BOTTOM
	DUCT TRANSITION
	SQUARE TO ROUND TRANSITION
	DUCTWORK CHANGE IN ELEVATION (UP OR DOWN)
	SUPPLY/OUTSIDE AIR DUCT RISER
	RETURN AIR DUCT RISER
	EXHAUST/RELIEF AIR DUCT RISER
	ROUND DUCT RISER (SMALLER THAN 12")
	ROUND DUCT RISER (12" AND LARGER)
	TERMINAL UNIT
	TERMINAL UNIT WITH REHEAT COIL
	TERMINAL UNIT WITH ATTENUATOR AND REHEAT COIL
	SUPPLY AIR VOLUME TERMINAL UNIT IDENTIFIER

SYMBOL	DESCRIPTION
	HEATING WATER RETURN
	HEATING WATER SUPPLY

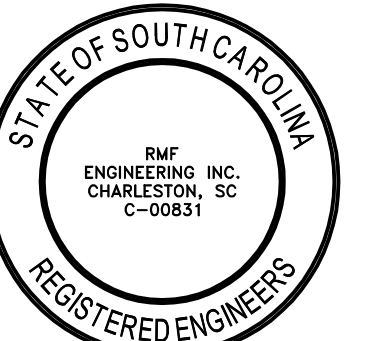
ABBREVIATIONS

NOTE: THIS IS A STANDARD ABBREVIATION LIST. SOME ABBREVIATIONS MAY NOT APPEAR ON THE ACCOMPANYING DRAWINGS.

A	COMPRESSED AIR	FOT	FUEL OIL TRANSFER	OED	OPEN ENDED DUCT
AAV	AUTOMATIC AIR VENT	FOV	FUEL OIL VENT	OS&Y	OUTSIDE STEM AND YOKE
ACV	AUTOMATIC CONTROL VALVE	FPM	FEET PER MINUTE	P&ID	PROCESS AND INSTRUMENTATION DIAGRAM
AD	ACCESS DOOR, AREA DRAIN	FPS	FEET PER SECOND	PA	PLANT AIR
AF	ANTIFREEZE	FS	FLOW SWITCH	PC	PUMPED CONDENSATE
AFF	ABOVE FINISHED FLOOR	FT	FOOT, FEET	PCR	PUMPED CONDENSATE RECIRCULATION
AR	ARGON GAS	FWR	FEED WATER RETURN	PCHR	PRIMARY CHILLED WATER RETURN
ATC	AUTOMATIC TEMPERATURE CONTROL	FWS	FEED WATER SUPPLY	PCHS	PRIMARY CHILLED WATER SUPPLY
BAS	BUILDING AUTOMATION SYSTEM	G	NATURAL GAS	PCWR	PROCESS COOLING WATER RETURN
BBD	BOILER BLOWDOWN	GHR	GLYCOL HEATING RETURN	PCWS	PROCESS COOLING WATER SUPPLY
BCWR	BEARING COOLING WATER RETURN	GHS	GLYCOL HEATING SUPPLY	PD	PRESSURE DROP, PUMP DISCHARGE
BCWS	BEARING COOLING WATER SUPPLY	GPH	GALLONS PER HOUR	PCR	PROCESS GLYCOL WATER RETURN
BDD	BACKDRAFT DAMPER	GPM	GALLONS PER MINUTE	PGS	PROCESS GLYCOL WATER SUPPLY
BFP	BACKFLOW PREVENTER	GR	AUTOMOTIVE LUBRICATION PIPING	PH	PHASE
BHP	BRAKE HORSEPOWER	H	HIGH	PHR	PRIMARY HEATING RETURN
BMS	BUILDING MANAGEMENT SYSTEM	HB	HOSE BIBB	PHS	PRIMARY HEATING SUPPLY
BO	BLOW OFF	HED	HOSE END DRAIN VALVE	PIV	POST INDICATING VALVE
BTU	BRITISH THERMAL UNIT	HP	HORSEPOWER	PPH	POUNDS PER HOUR
BTUH	BRITISH THERMAL UNIT PER HOUR	HPR	HIGH PRESSURE STEAM RETURN	PRV	PRESSURE REDUCING VALVE, PRESSURE REGULATING VALVE
°C	DEGREE(S) CELSIUS	HPS	HIGH PRESSURE STEAM SUPPLY	PSI	POUNDS PER SQUARE INCH
CA	CONTROL AIR	HR	HEATING WATER RETURN	PSIG	POUNDS PER SQUARE INCH GAUGE
CBD	CONTINUOUS BLOWDOWN	HRR	HEAT RECOVERY RETURN	RA	RETURN AIR, RELIEF AIR
CC	CAMPUS CONDENSATE	HRS	HEAT RECOVERY SUPPLY	RD	REFRIGERANT DISCHARGE
CCMS	CENTRAL CONTROL AND MONITORING SYSTEM	HS	HEATING WATER SUPPLY	RH	RELATIVE HUMIDITY
CD	CONDENSATE DRAIN	HT	HEIGHT	RHR	REHEAT WATER RETURN
CF	CHEMICAL FEED	HTHR	HIGH TEMPERATURE HEATING WATER RETURN	RHS	REHEAT WATER SUPPLY
CFM	CUBIC FEET PER MINUTE	HTHS	HIGH TEMPERATURE HEATING WATER SUPPLY	RL	REFRIGERANT LIQUID
CHR	CHILLED WATER RETURN	HW	HOT WATER	ROR	REVERSE OSMOSIS WATER RETURN
CHS	CHILLED WATER SUPPLY	HWR	HOT WATER RECIRCULATION	ROS	REVERSE OSMOSIS WATER SUPPLY
CO	CLEANOUT	HZ	HERTZ	RPM	REVOLUTIONS PER MINUTE
CO2	CARBON DIOXIDE	IA	INSTRUMENT AIR	RS	REFRIGERANT SUCTION
CS	CLEAN STEAM	ICW	INDUSTRIAL COLD WATER	RV	RELIEF VENT, REFRIGERANT VENT
CW	COLD WATER, CITY WATER	IHW	INDUSTRIAL HOT WATER	RX	REMOVE EXISTING
CWR	CONDENSER WATER RETURN	IHR	INDUSTRIAL HOT WATER RECIRCULATION	SA	SUPPLY AIR
CWS	CONDENSER WATER SUPPLY	IN	INCH, INCHES	SAN	SANITARY, SOIL, WASTE
D	DEEP, DRAIN WATER	INV	INVERT ELEVATION	SCHR	SECONDARY CHILLED WATER RETURN
DB	DECIBEL, DRY BULB	KW	KILOWATTS	SCHS	SECONDARY CHILLED WATER SUPPLY
DDC	DIRECT DIGITAL CONTROL	L	LONG, LENGTH	SD	STORM DRAIN, SMOKE DETECTOR
DHR	DISTRIBUTION HEATING WATER RETURN	LAT	LABORATORY AIR	SF	SQUARE FOOT
DHS	DISTRIBUTION HEATING WATER SUPPLY	LBS	POUNDS	SHR	SECONDARY HEATING WATER RETURN
DIR	DEIONIZED WATER RETURN	LBS/HR	POUNDS PER HOUR	SHS	SECONDARY HEATING WATER SUPPLY
DIS	DEIONIZED WATER SUPPLY	LN	LIQUID NITROGEN	SL	SOUND LINING
DL	DOOR LOUVER	LP	LIQUID PROPANE	SP	STATIC PRESSURE
DN	DOWN	LPG	LIQUID PETROLEUM GAS	SPR	SPRINKLER LINE
DSP	DRY SPRINKLER PIPE	LPR	LOW PRESSURE STEAM RETURN	SS	STAINLESS STEEL
DTR	DUAL TEMPERATURE RETURN	LPS	LOW PRESSURE STEAM SUPPLY	SQ FT	SQUARE FOOT
DTS	DUAL TEMPERATURE SUPPLY	LV	LABORATORY VENT, LABORATORY VACUUM	SW	SOFT WATER
DW	DISTILLED WATER	LW	LABORATORY WASTE	ΔT	TEMPERATURE DIFFERENCE
EA	EXHAUST AIR	LWT	LEAVING WATER TEMPERATURE	TS	TAMPER SWITCH
EAT	ENTERING AIR TEMPERATURE	MA	MEDICAL AIR	TSP	TOTAL STATIC PRESSURE
EJ	EXPANSION JOINT	MAV	MANUAL AIR VENT	TWR	TEMPERED WATER RETURN
EMS	ENERGY MANAGEMENT SYSTEM	MBH	THOUSAND BRITISH THERMAL UNITS PER HOUR	TWS	TEMPERED WATER SUPPLY
ESP	EXTERNAL STATIC PRESSURE	MCC	MOTOR CONTROL CENTER	TW	TREATED WATER
ETC	ETCETERA	MO	MOTOR OIL PIPING	TYP	TYPICAL
EVAC	GAS EVACUATION	MOD	MOTOR OPERATED DAMPER	UCD	UNDERCUT DOOR
EWT	ENTERING WATER TEMPERATURE	MPR	MEDIUM PRESSURE STEAM RETURN	UL	UNDERWRITERS LABORATORIES
EX	EXISTING	MPS	MEDIUM PRESSURE STEAM SUPPLY	V	VACUUM, VOLTS
°F	DEGREE(S) FAHRENHEIT	MV	MEDICAL VACUUM	VD	VOLUME DAMPER
F	FIRE LINE	N	NITROGEN	VFD	VARIABLE FREQUENCY DRIVE
FC	FLEXIBLE CONNECTION	NA	NOT APPLICABLE	VPD	VACUUM PUMP DISCHARGE
FD	FIRE DAMPER, FOUNDATION DRAIN	NC	NOISE CRITERIA, NORMALLY CLOSED	VSD	VARIABLE SPEED DRIVE
FDV	FIRE DEPARTMENT VALVE	NFPA	NATIONAL FIRE PROTECTION ASSOCIATION	VTR	VENT THROUGH ROOF
FF	FINISHED FLOOR	NO	NORMALLY OPEN, NITROUS OXIDE	W	WATTS, WIDE
FFE	FINISHED FLOOR ELEVATION	NPSH	NET POSITIVE SUCTION HEAD	WB	WET BULB
FIN/FT	FINS PER FOOT	O	OXYGEN	WC	WATER COLUMN
FIN/INCH	FINS PER INCH	OA	OUTSIDE AIR	WG	WATER GAUGE
FM	FLOWMETER	OD	OVERFLOW DRAIN	WH	WALL HYDRANT
FMF	FLOWMETER FITTING			WWF	WELDED WIRE FABRIC
FOF	FUEL OIL FILL			WWM	WELDED WIRE MESH
FOO	FUEL OIL OVERFLOW				
FOR	FUEL OIL RETURN				
FOS	FUEL OIL SUPPLY				

GENERAL NOTES

1. NOTIFY THE OWNER, IN WRITING, AT LEAST SEVEN (7) DAYS IN ADVANCE OF ALL REQUIRED SHUTDOWNS OF WATER, FIRE, SEWER, GAS, ELECTRICAL SERVICE, OR OTHER UTILITIES. UPON WRITTEN RECEIPT OF APPROVAL FROM OWNER, SHUTDOWN SHALL BE PERFORMED BETWEEN THE HOURS OF SIX (6) P.M. AND SIX (6) A.M. OR AS DIRECTED OTHERWISE BY THE OWNER AND SHALL BE ACCOMPLISHED AT NO ADDITIONAL CONTRACT COST. AT THE END OF EACH SHUTDOWN ALL SERVICES SHALL BE RESTORED SO THAT NORMAL USE OF THE UTILITIES CAN CONTINUE.
2. WHEN WORKING IN AND AROUND THE EXISTING BUILDING, EXTREME CARE SHALL BE EXERCISED WITH REGARD TO PROTECTION OF THE EXISTING STRUCTURE AND MECHANICAL AND ELECTRICAL SERVICES WHICH WILL REMAIN. REPAIR, REPLACE, OR RESTORE TO THE SATISFACTION OF THE ARCHITECT, ENGINEER AND OWNER ALL EXISTING WORK DAMAGED IN THE PERFORMANCE OF DEMOLITION AND/OR NEW WORK.
3. ALL EXISTING PIPING, EQUIPMENT, DUCTWORK, AND MATERIALS NOT REQUIRED FOR RE-USE OR RE-INSTALLATION (SHOWN OR OTHERWISE) SHALL BE REMOVED. ALL EXISTING MATERIALS AND EQUIPMENT WHICH ARE REMOVED AND ARE DESIRED BY THE OWNER, OR ARE INDICATED TO REMAIN THE PROPERTY OF THE OWNER, SHALL BE DELIVERED TO HIM ON THE PREMISES BY THE CONTRACTOR. ALL OTHER MATERIALS AND EQUIPMENT WHICH ARE REMOVED SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED BY THE CONTRACTOR FROM THE PREMISES.
4. EXISTING CONDITIONS, I.E., PRESENCE AND LOCATION OF DUCTWORK, PIPING, EQUIPMENT AND MATERIALS, INDICATED ARE BASED ON INFORMATION OBTAINED FROM AVAILABLE RECORD DRAWINGS AND FIELD SURVEYS AND ARE NOT WARRANTED TO BE COMPLETE OR CORRECT. CONTRACTOR SHALL FIELD VERIFY EXACT LOCATION OF ALL DUCTWORK, PIPING, EQUIPMENT AND MATERIALS IN THE FIELD PRIOR TO STARTING ALL WORK.
5. EXISTING DUCT, PIPE, AND EQUIPMENT SIZES NOTED ARE FOR THE CONVENIENCE OF THE CONTRACTOR ONLY AND ARE NOT WARRANTED TO BE CORRECT. CONTRACTOR SHALL VERIFY ALL SIZES IN THE FIELD IF THEY EFFECT HIS WORK.
6. EXISTING PIPING NO LONGER REQUIRED TO REMAIN IN SERVICE (SHOWN OR OTHERWISE) SHALL BE DISCONNECTED AND REMOVED BACK TO SERVICE MAINS UNLESS OTHERWISE INDICATED OR NOTED ON THE PLANS. REMOVE EXISTING PIPE HANGERS, SUPPORTS, VALVES, ETC. EXISTING PIPING INDICATED OR REQUIRED TO REMAIN IN SERVICE OR IN PLACE SHALL BE CAPPED, PLUGGED, OR OTHERWISE SEALED. NO EXISTING PIPING SHALL BE LEFT OPEN END.
7. EXISTING DUCTWORK INDICATED TO BE DISCONNECTED AND REMOVED SHALL INCLUDE ALL RELATED AIR DEVICES, HANGERS, SUPPORTS, ETC., UNLESS OTHERWISE INDICATED OR NOTED ON THE PLANS. EXISTING DUCTWORK WHERE INDICATED TO BE CAPPED OR REQUIRED TO REMAIN IN SERVICE SHALL BE CAPPED WITH 1/8 GAUGE SHEET METAL. SECURE CAP WITH SHEET METAL SCREWS AND SEAL PERIMETER OF OPENING AIR TIGHT WITH DUCT SEALER. NO EXISTING DUCTWORK SHALL BE LEFT OPEN FOR ANY EXTENDED PERIOD OF TIME. CAP EXISTING DUCTWORK IMMEDIATELY AS REQUIRED OR DIRECTED BY THE ENGINEER. CONTRACTOR SHALL RETURN ALL AIR DEVICES TO OWNER.
8. EXISTING MECHANICAL AND ELECTRICAL EQUIPMENT, PIPING, DUCTWORK, AND MATERIALS AFFECTED BY DEMOLITION OR NEW WORK INSTALLATION AND REQUIRED TO REMAIN IN SERVICE SHALL BE RE-INSTALLED OR SUPPORTED AS REQUIRED IN ACCORDANCE WITH NEW WORK SPECIFICATION. ALL WORK SHALL BE COMPLETED TO THE SATISFACTION OF THE ENGINEER AND OWNER AND AT NO ADDITIONAL CONTRACT COST.
9. PATCH ALL DISTURBED SURFACES, INCLUDING WALLS, CEILINGS, ROOF, AND FLOOR. PATCHING SHALL MATCH EXISTING ADJACENT SURFACES AS TO THICKNESS, TEXTURE, MATERIALS, AND COLOR. ALL PATCHING SHALL BE PERFORMED TO THE SATISFACTION OF THE ARCHITECT, ENGINEER AND OWNER AND AT NO ADDITIONAL CONTRACT COST.
10. IN GENERAL ALL PIPING, EQUIPMENT, DUCTWORK, AND MATERIALS SHOWN "LIGHT" IS EXISTING TO REMAIN. ALL PIPING, CONDUIITS, EQUIPMENT, DUCTWORK, AND MATERIALS SHOWN "HEAVY AND DASHED" IS EXISTING TO BE DEMOLISHED.
11. ALL WORK SHALL BE PERFORMED IN A SEQUENCE AND DURING HOURS TO MINIMIZE DISRUPTION TO THE BUILDING WHICH WILL REMAIN OCCUPIED DURING CONSTRUCTION.
12. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE SOUTH CAROLINA CODES, CITY OF COLUMBIA, AND THE LOCAL FIRE MARSHALL'S REQUIREMENTS.
13. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING WITH ALL OTHER TRADES/ SUBCONTRACTORS INCLUDING BUT NOT LIMITED TO AUTOMATIC TEMPERATURE CONTROLS, ELECTRICAL, AND GENERAL TRADES.
14. CONTRACTOR SHALL MAINTAIN ACCESS TO ALL STAIRWELLS AND EGRESS CORRIDORS DURING CONSTRUCTION.
15. CONCRETE CORING OR CUTTING MAY BE REQUIRED IN ORDER TO RUN MECHANICAL, ELECTRICAL, PLUMBING, CABLING OR OTHER SERVICES TO A SPECIFIC AREA. IT IS IMPERATIVE WHEN CONSIDERING EITHER CORING, CUTTING OR CHIPPING THAT REBAR, PLUMBING, ELECTRICAL SERVICES, ETC WITHIN THE CONCRETE SLAB, WALL OR FLOOR BE LOCATED PRIOR TO DISTURBING THE INTEGRITY OF THE EXISTING CONCRETE. OBTAIN STRUCTURAL DRAWINGS OF THE AREA IN QUESTION AND, USING THE BUILDING GRIDLINES, DETERMINE AND MARK THE EXACT LOCATIONS REQUIRED FOR NEW SERVICES.
16. ALL PENETRATIONS MUST BE SEALED WITH FIRE STOP MATERIAL AFTER SERVICES ARE RUN THROUGH. ALL PENETRATIONS THROUGH EXTERIOR WALLS ABOVE AND BELOW GRADE OR SLAB ON GRADE MUST BE WATERPROOFED.
17. FINAL CEILING HEIGHTS TO BE DETERMINED WITH ARCHITECT IN FIELD AFTER DEMOLITION OF EXISTING CEILINGS. NO FABRICATION OF DUCTWORK, HVAC PIPING OR PLUMBING PIPING SHALL BEGIN UNTIL AFTER THE CONTRACTOR HAS COMPLETED COORDINATION DRAWINGS AND COORDINATED THE CEILING HEIGHTS WITH THE ARCHITECT.
18. AUTOMATIC TEMPERATURE CONTROL CONTRACTOR SHALL DESIGNATE AND NUMBER ALL EQUIPMENT IN ACCORDANCE WITH UNIVERSITY OF SOUTH CAROLINA STANDARDS. NO DUPLICATE DESIGNATION NUMBERS SHALL BE PROVIDED. ALL NUMBERS SHALL BE THE NEXT SEQUENTIAL NUMBER FOR THAT SPECIFIC PIECE OF EQUIPMENT.
19. THE CONTRACTOR SHALL NOTIFY THE ARCHITECT AND ENGINEER PRIOR TO CLOSING ANY CEILINGS FOR A COMPLETE CHECKOUT OF THE HVAC SYSTEM. THE SYSTEM MUST BE COMPLETE AND OPERATIONAL INCLUDING CONTROLS, REGISTERS, INSULATION, AND BALANCING WITH REPORT. THE SYSTEM SHALL BE RUN THROUGH ITS COMPLETE HEATING AND COOLING CYCLES. THE CONTRACTOR AND ALL APPROVED SUBCONTRACTORS SHALL BE PRESENT AT THE ARCHITECT-ENGINEER CHECKOUT. THE TESTING AND BALANCE AGENCY SHALL CERTIFY THAT THESE CONDITIONS ARE MET.



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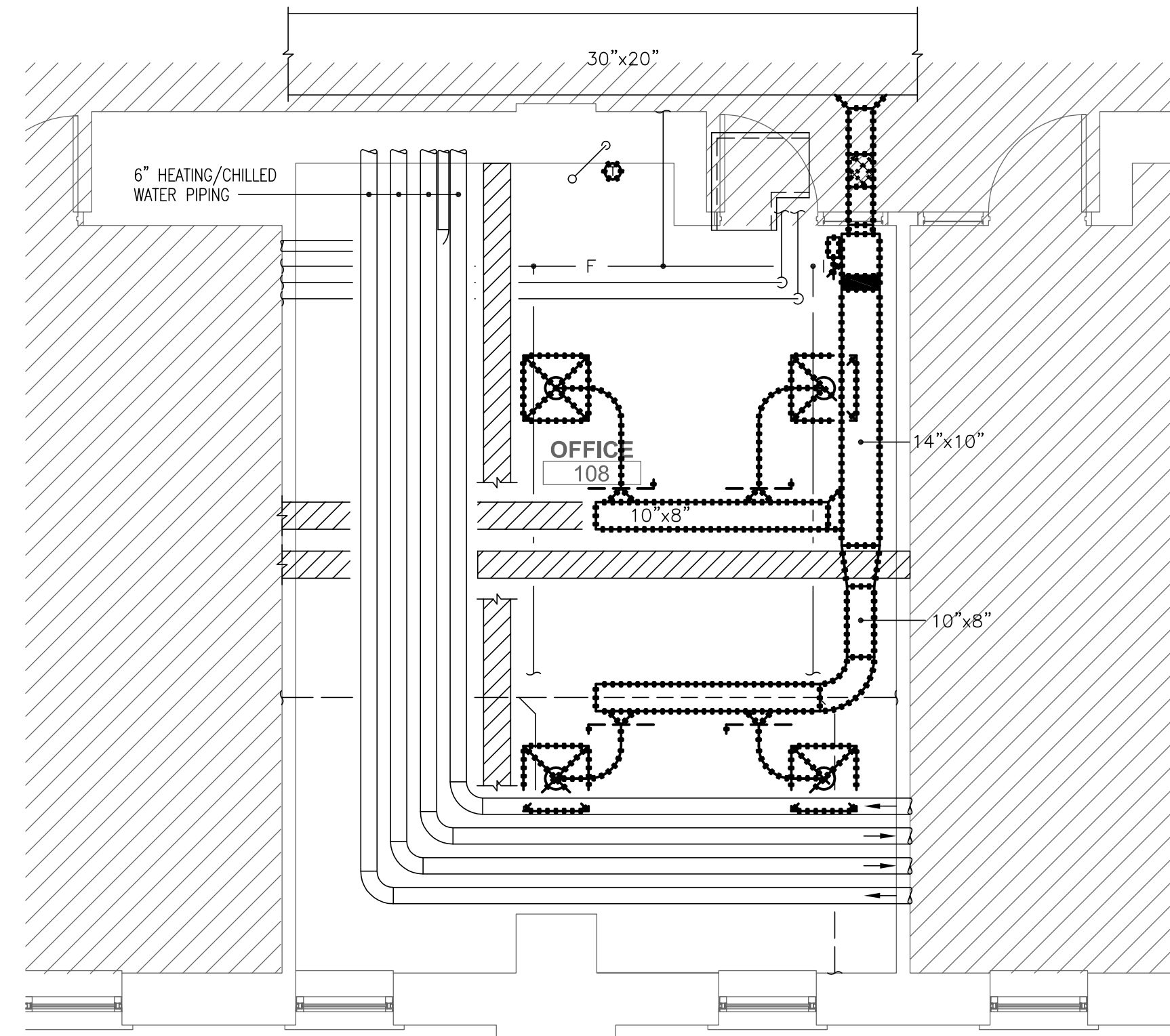
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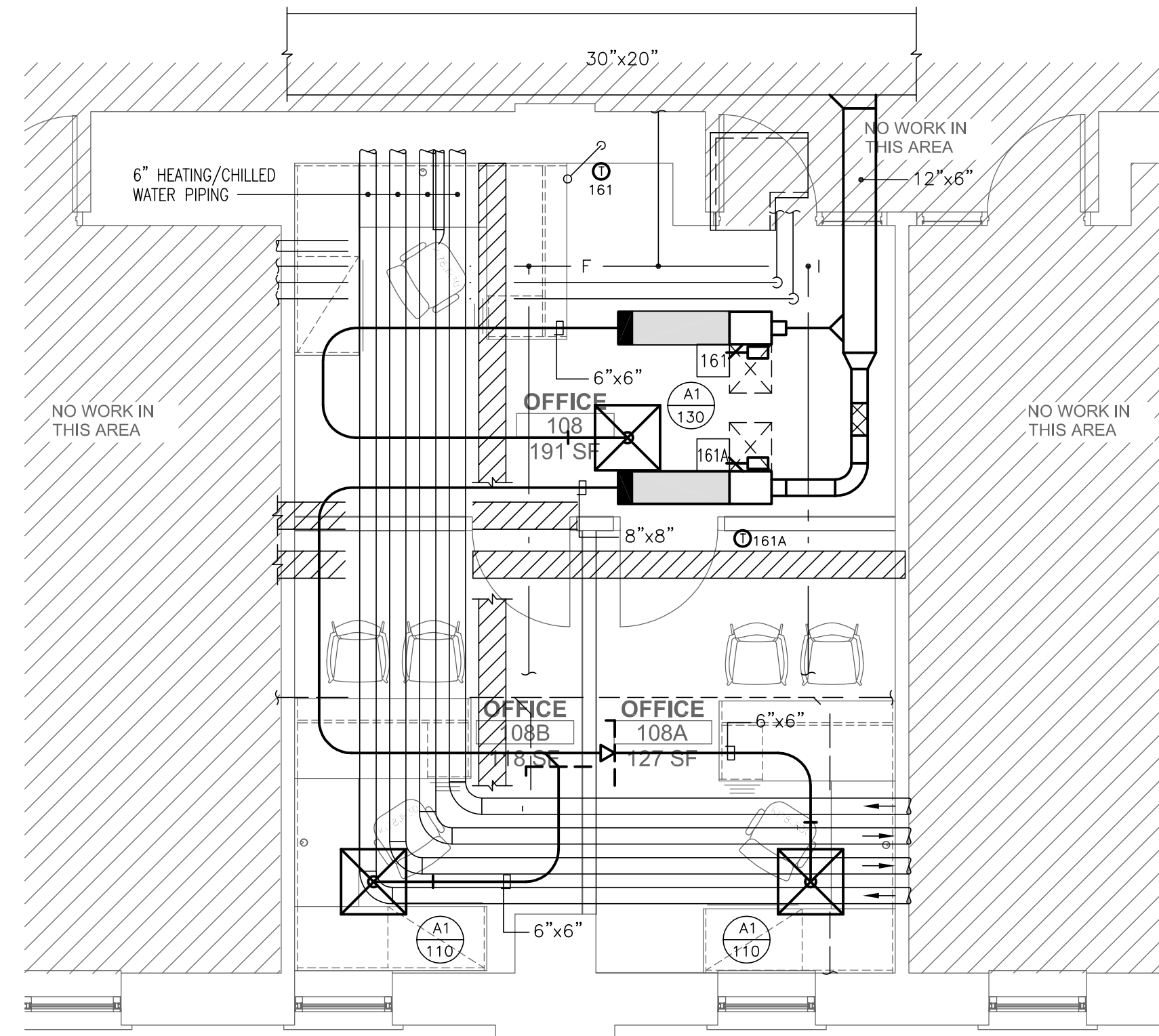
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MECHANICAL LEGEND AND ABBREVIATIONS



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



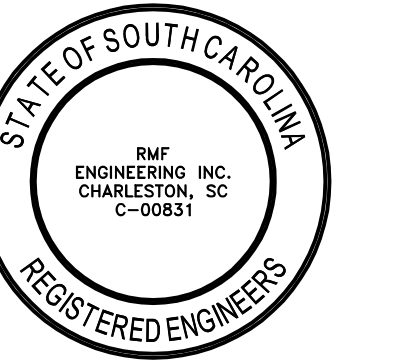
FIRST FLOOR — NEW WORK
SCALE: 1/4"=1'-0"

GENERAL NOTES:

1. REFER TO M001 FOR GENERAL DEMOLITION NOTES.
2. REFER TO AIR TERMINAL UNIT SCHEDULE FOR SUPPLY UNIT INLET DUCT SIZES UNLESS OTHERWISE NOTED.
3. ALL WALL MOUNTED THERMOSTATS SHALL BE LOCATED AT THE SAME HEIGHT AS THE LIGHT SWITCH. LOCATION SHALL BE FULLY COORDINATED WITH ARCHITECTURAL CASEWORK AND ELECTRICAL.

DRAWING NOTES:

- 1 DISCONNECT EXISTING RETURN AIR TAP.



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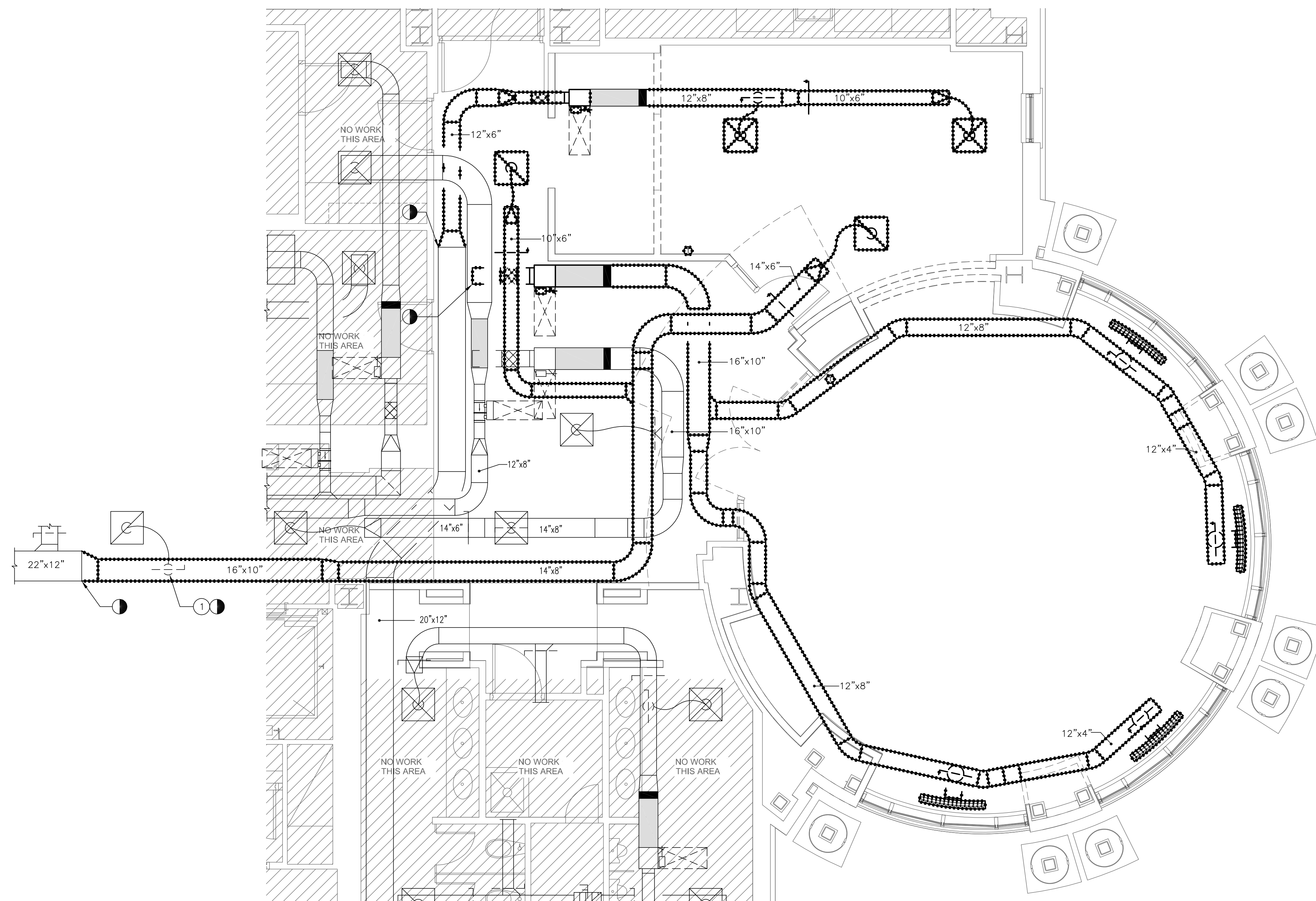
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FIRST AND FOURTH
MECHANICAL
ENLARGED PLANS -
HVAC



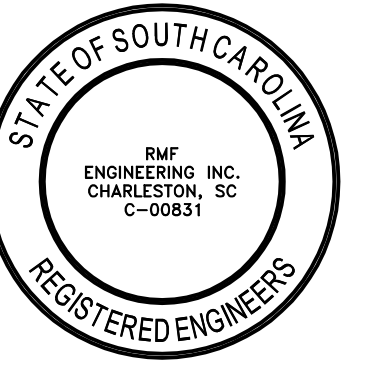
FOURTH FLOOR — DEMOLITION
SCALE: 1/4"=1'-0"

GENERAL NOTES:

1. REFER TO M000 FOR GENERAL DEMOLITION NOTES.
2. REFER TO AIR TERMINAL UNIT SCHEDULE FOR SUPPLY UNIT INLET DUCT SIZES UNLESS OTHERWISE NOTED.
3. ALL WALL MOUNTED THERMOSTATS SHALL BE LOCATED AT THE SAME HEIGHT AS THE LIGHT SWITCH. LOCATION SHALL BE FULLY COORDINATED WITH ARCHITECTURAL CASEWORK AND ELECTRICAL.

DRAWING NOTES:

- ① RECONNECT EXISTING RETURN AIR TAP.



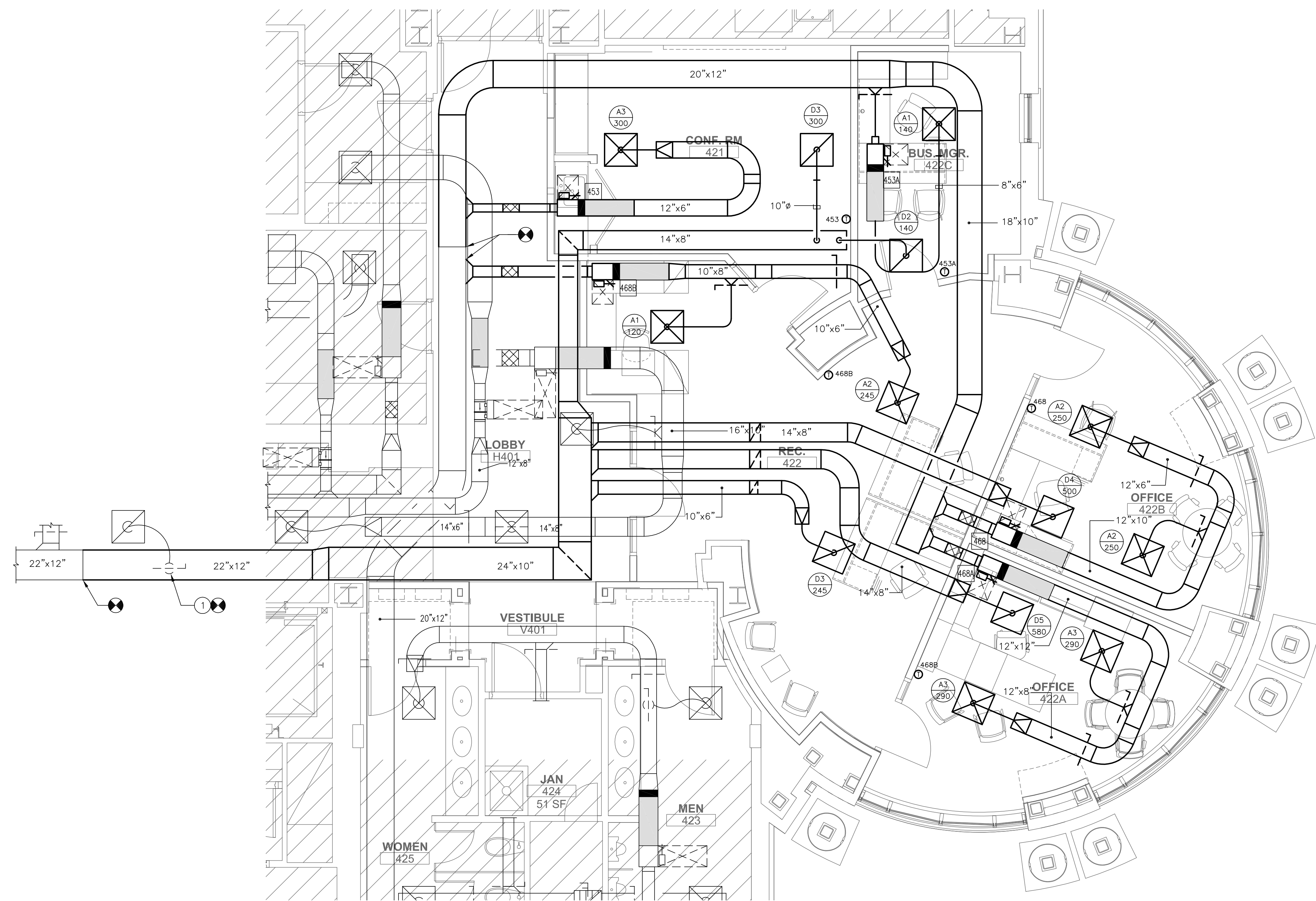
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FIRST AND FOURTH
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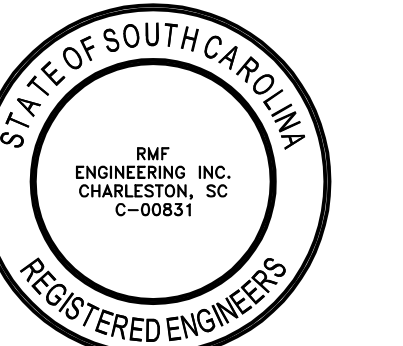
FOURTH FLOOR - NEW WORK
 SCALE: 1/4"=1'-0"

GENERAL NOTES:

1. REFER TO M000 FOR GENERAL DEMOLITION NOTES.
2. UNLESS OTHERWISE INDICATED, RETURN GRILLES SHALL BE 24"x24" TYPE C1 WITH 18"x18" NECK.
3. REFER TO AIR TERMINAL UNIT SCHEDULE FOR SUPPLY UNIT INLET DUCT SIZES UNLESS OTHERWISE NOTED.
4. ALL OPEN END RETURN AND TRANSFER DUCTS SHALL BE PROVIDED WITH MESH SCREEN OVER OPENING.
5. ALL WALL MOUNTED THERMOSTATS SHALL BE LOCATED AT THE SAME HEIGHT AS THE LIGHT SWITCH. LOCATION SHALL BE FULLY COORDINATED WITH ARCHITECTURAL CASEWORK AND ELECTRICAL.
6. UNLESS OTHERWISE SHOWN OR NOTED ALL TRANSFER DUCTS SHALL BE INSTALLED TIGHT TO STRUCTURE BETWEEN JOISTS.

DRAWING NOTES:

- ① CONTRACTOR SHALL PROVIDE TEMPORARY COOLING FOR ELECTRICAL ROOM DURING ANY OUTAGES THAT NEED TO OCCUR FOR THIS PROJECT.
- ② LOCATION OF EXISTING DIFFUSER SHALL BE MODIFIED TO MATCH NEW CEILING GRID.



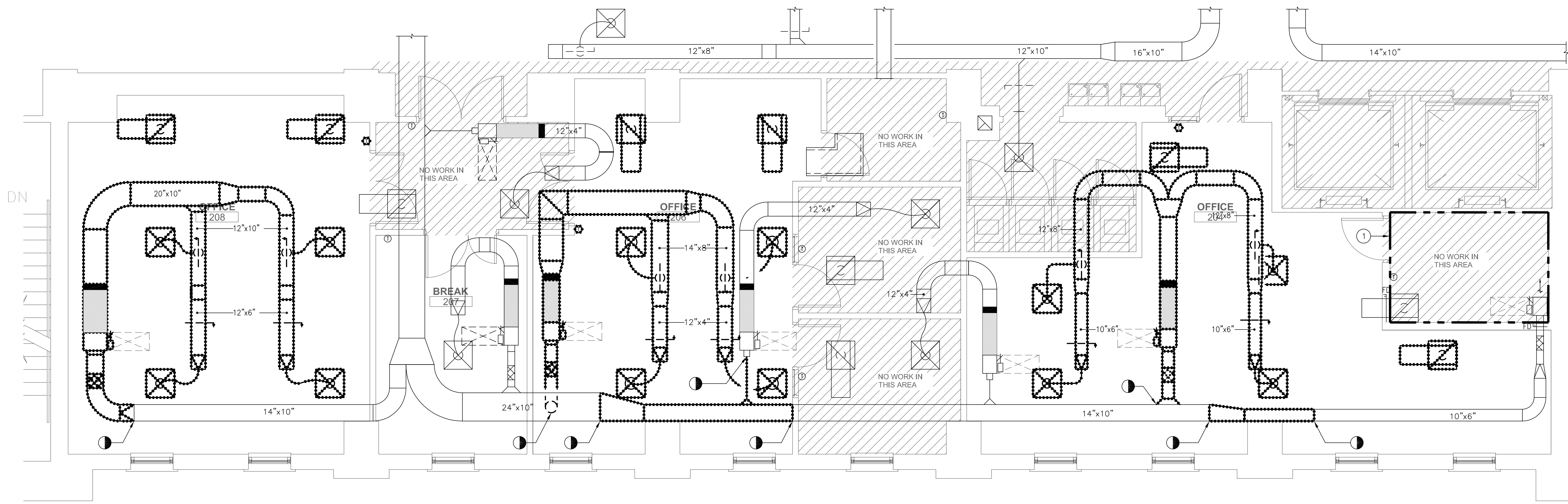
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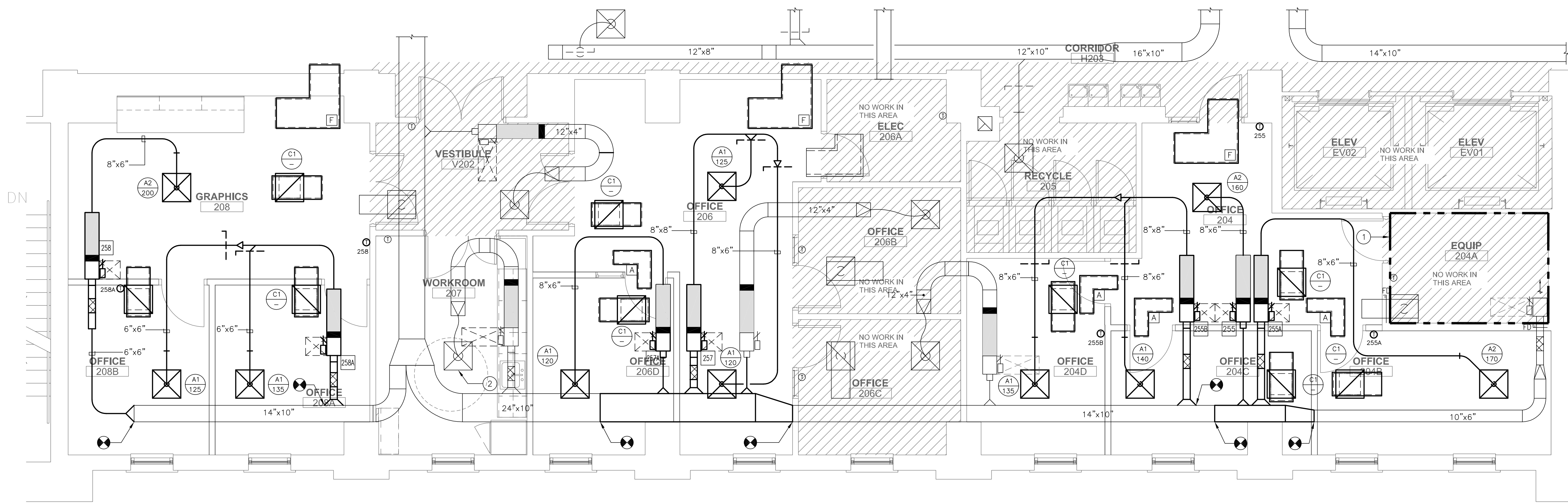
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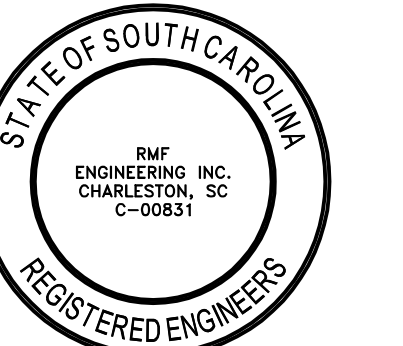
**SECOND FLOOR
MECHANICAL
ENLARGED PLANS -
HVAC**



SECOND FLOOR - DEMOLITION
SCALE: 1/4"=1'-0"



SECOND FLOOR - NEW WORK
SCALE: 1/4"=1'-0"



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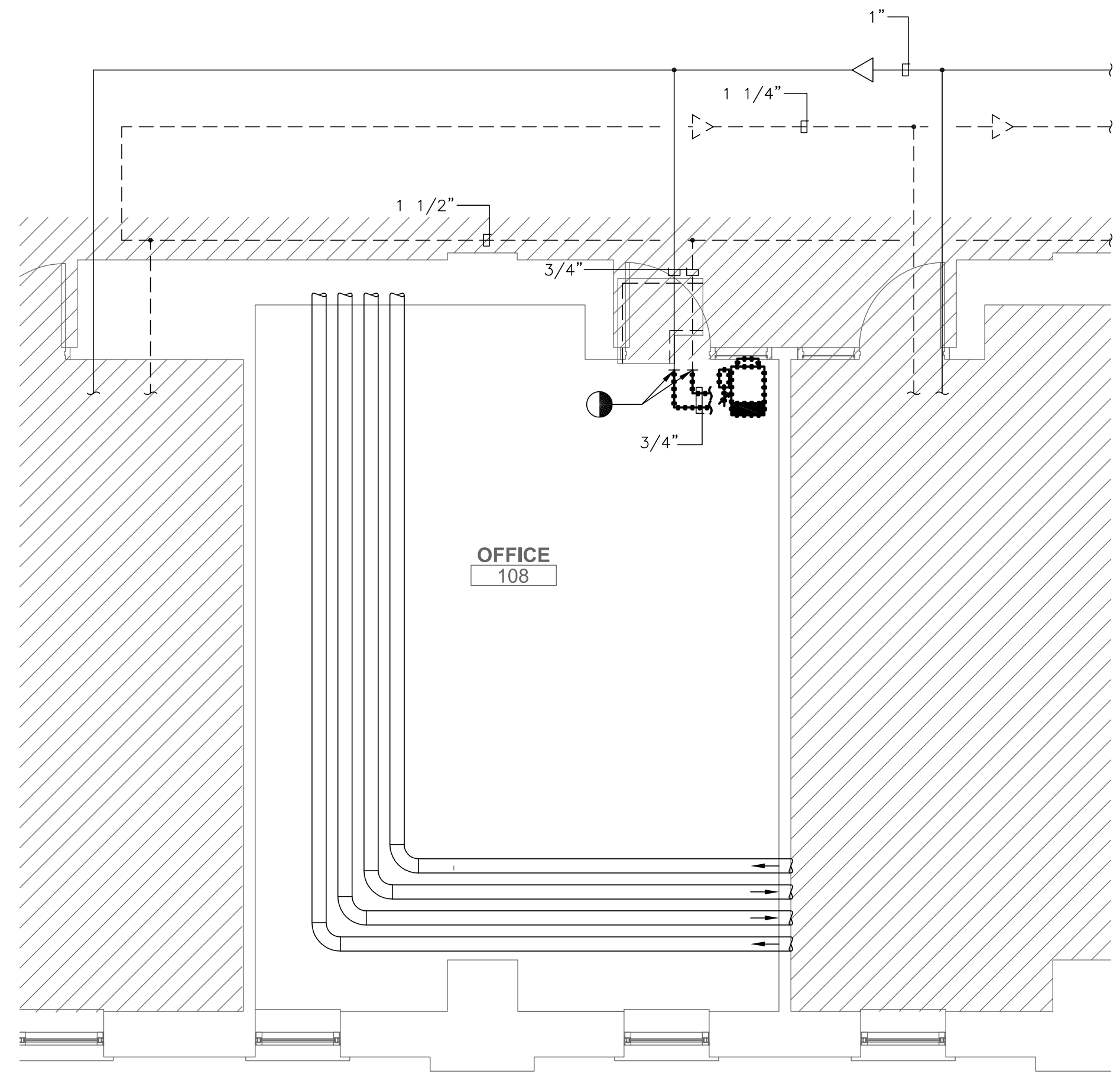
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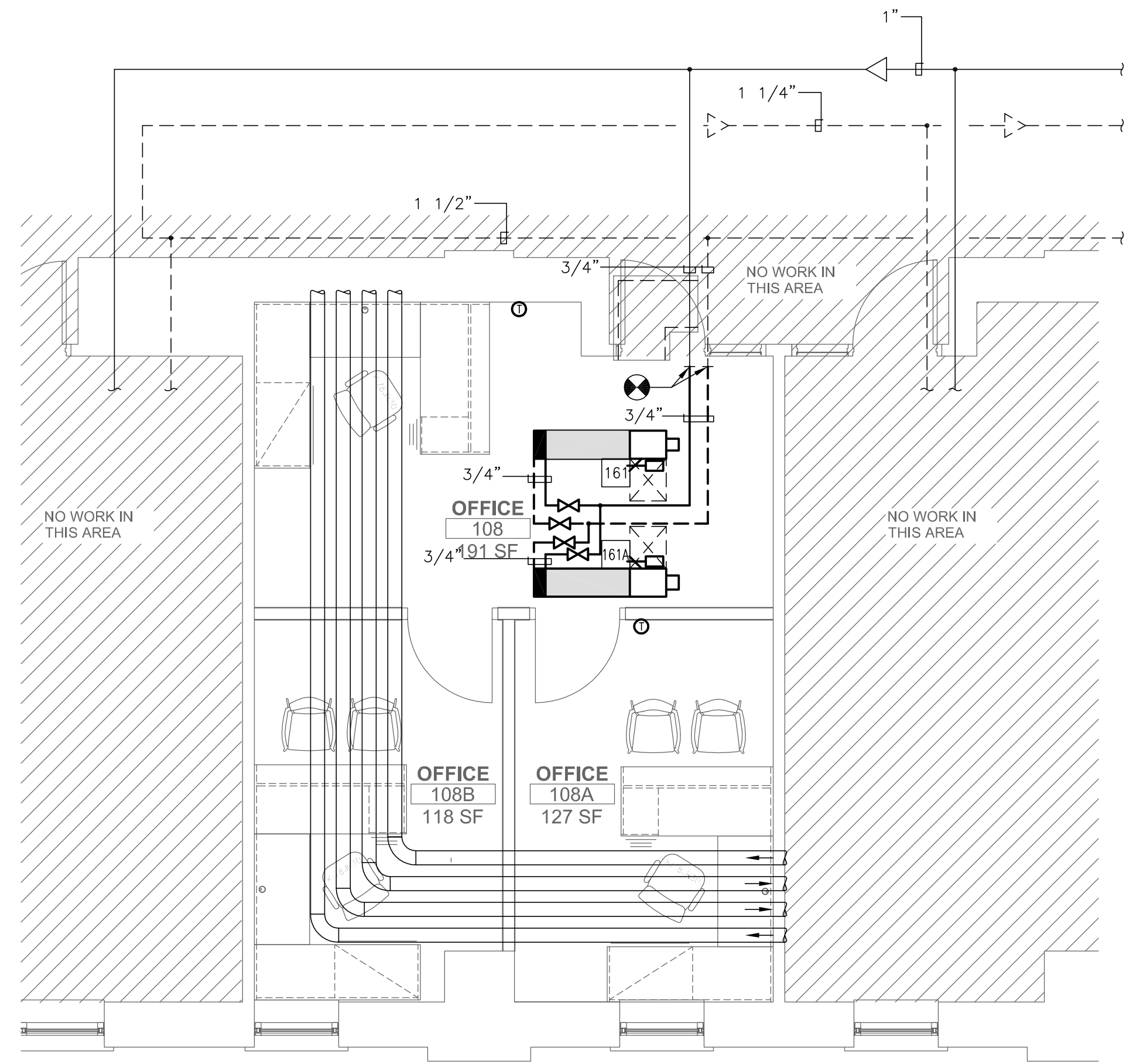
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**FIRST AND FOURTH
 MECHANICAL
 ENLARGED PLANS -
 HVAC PIPING**

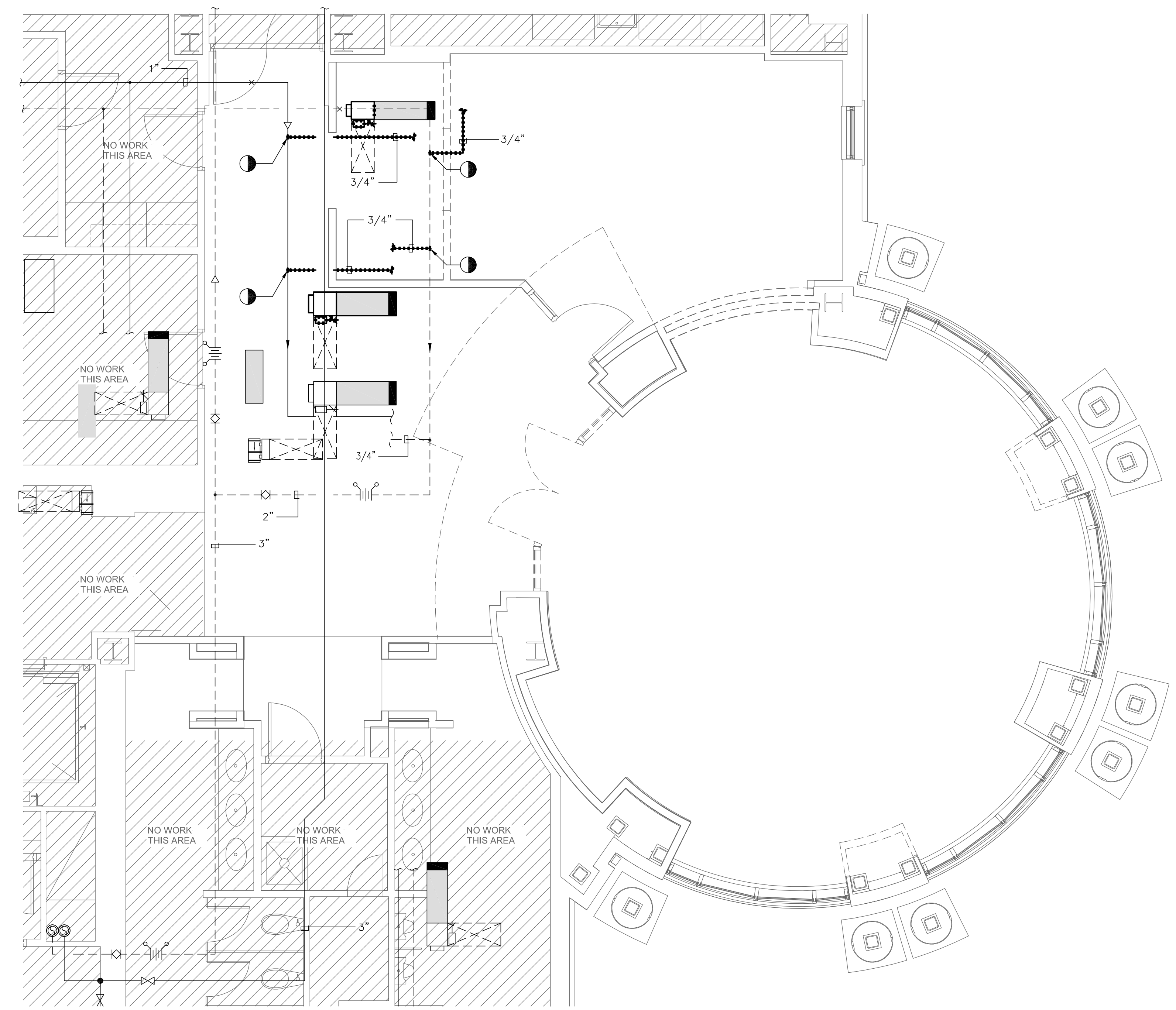
DRAWING NOTES:
 1 PROVIDE 3-WAY VALVE ON REHEAT COIL.



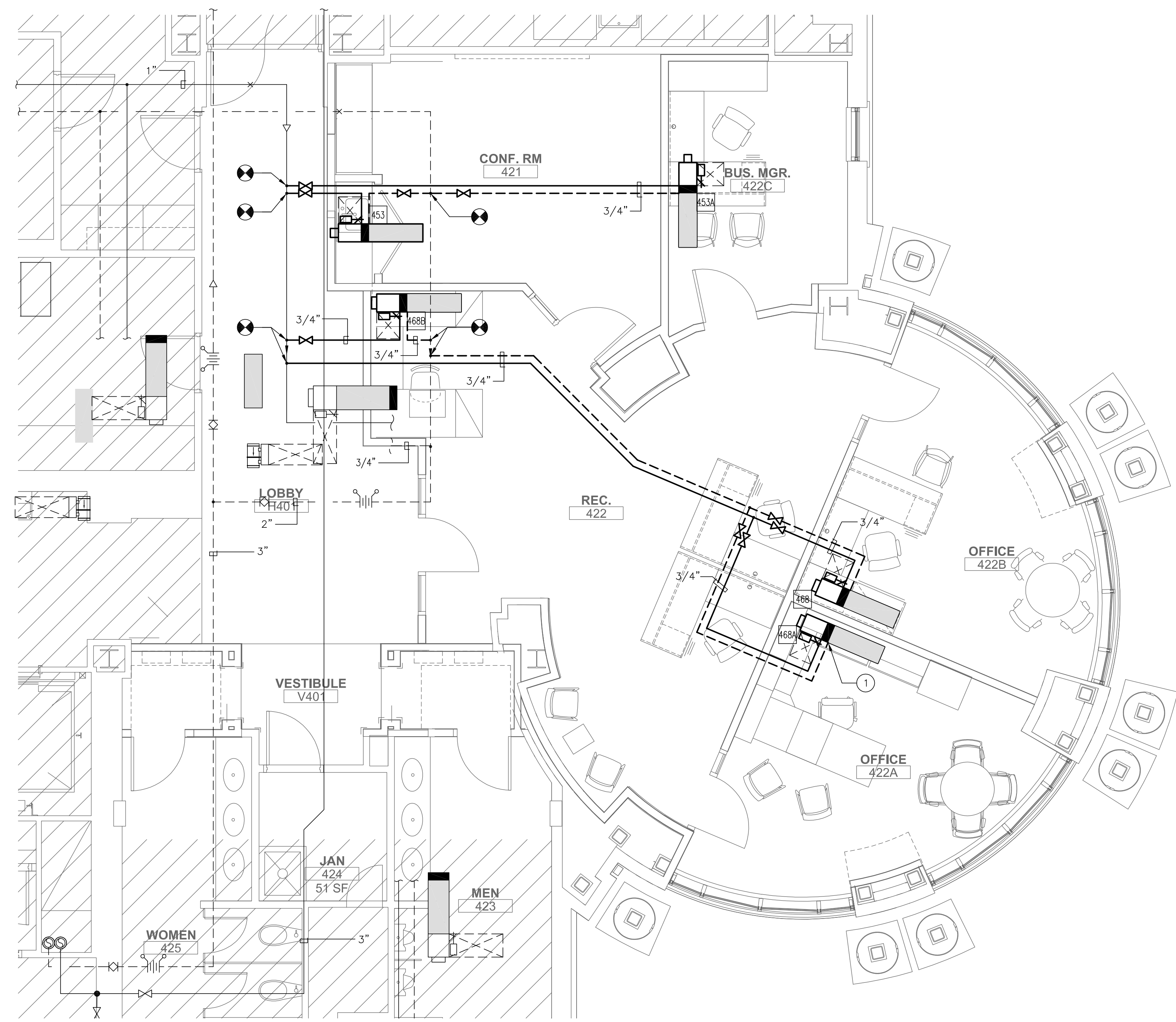
FIRST FLOOR — DEMOLITION
 SCALE: 1/4"=1'-0"



FIRST FLOOR — NEW WORK
 SCALE: 1/4"=1'-0"



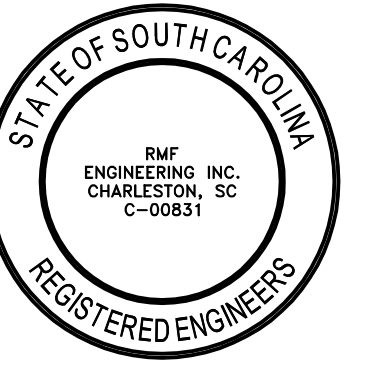
FOURTH FLOOR — DEMOLITION
 SCALE: 1/4"=1'-0"



FOURTH FLOOR — NEW WORK
 SCALE: 1/4"=1'-0"

GENERAL NOTES:

1. REFER TO M000 FOR GENERAL DEMOLITION NOTES.



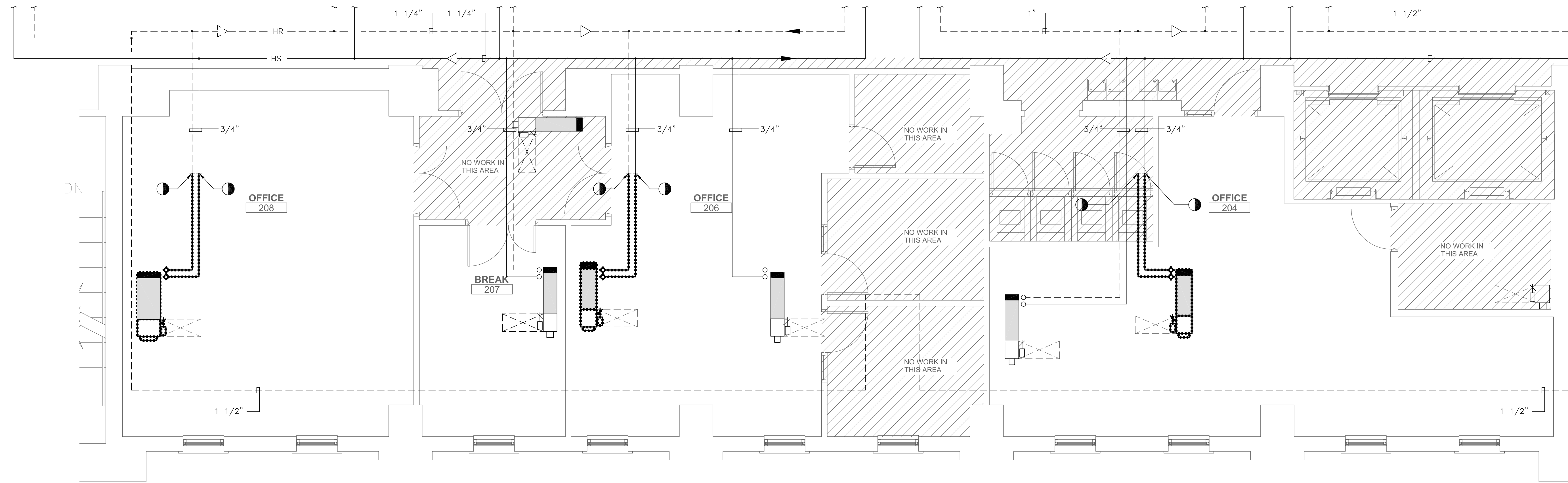
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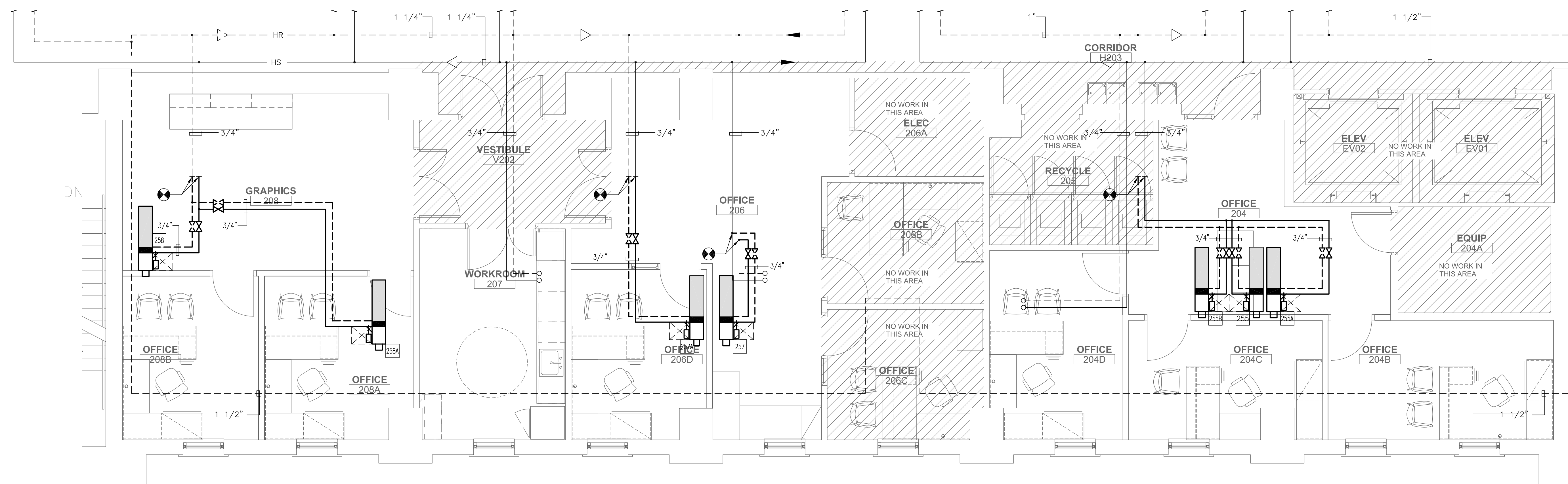
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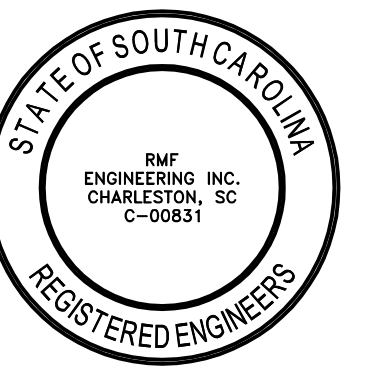
**SECOND FLOOR
 MECHANICAL
 ENLARGED PLANS -
 HVAC PIPING**



SECOND FLOOR – DEMOLITION
 SCALE: 1/4"=1'-0"



SECOND FLOOR – NEW WORK
 SCALE: 1/4"=1'-0"



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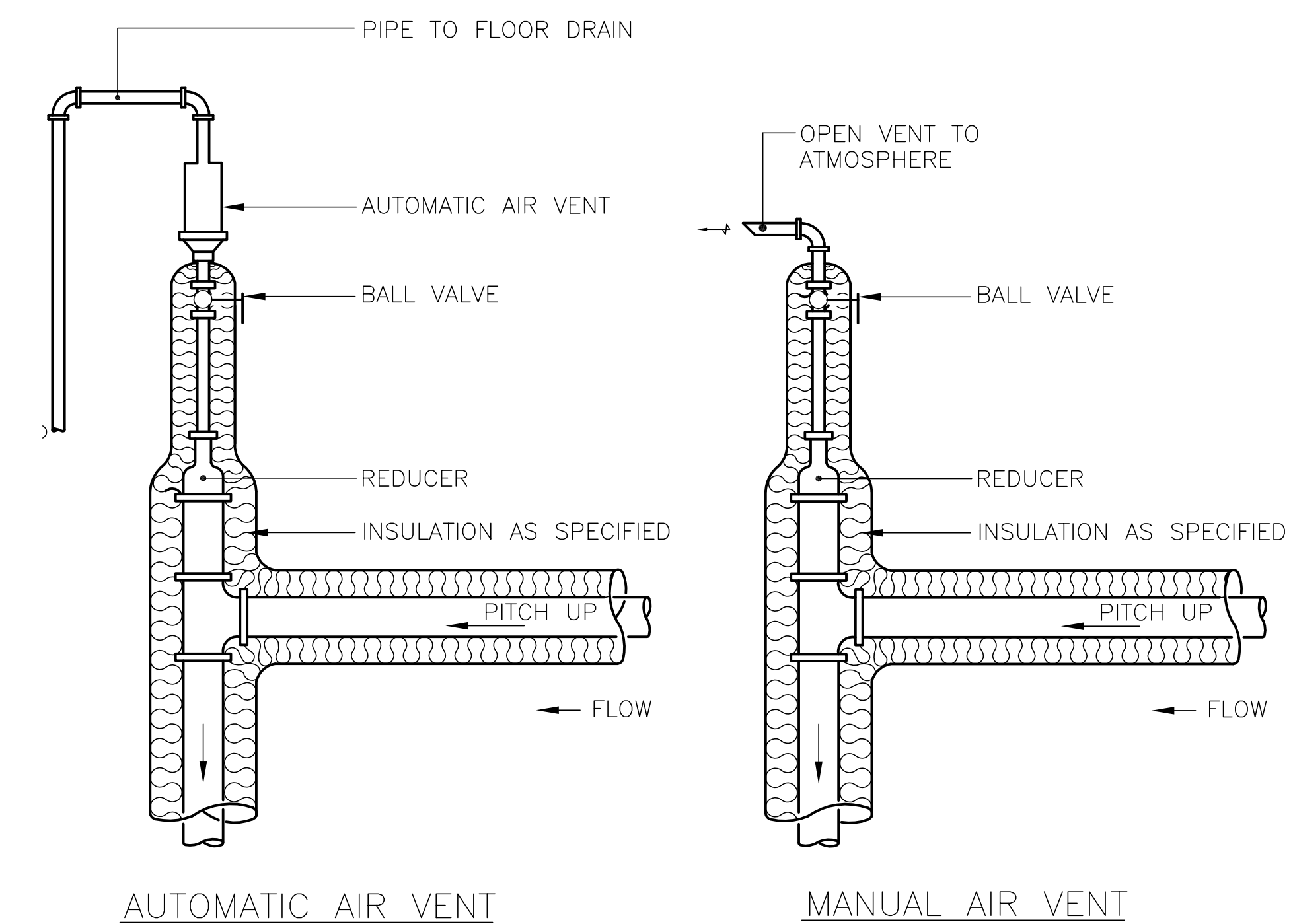
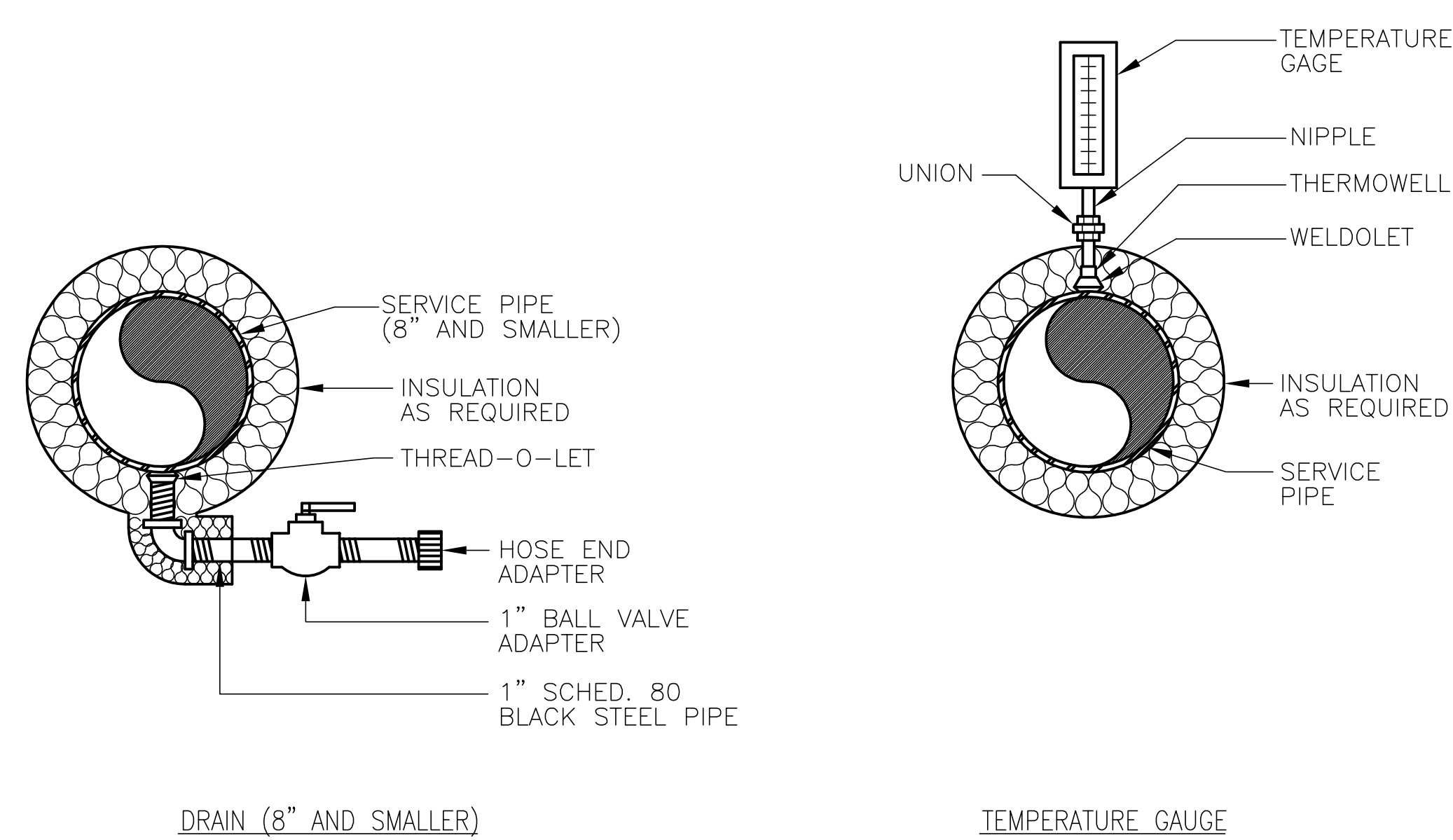
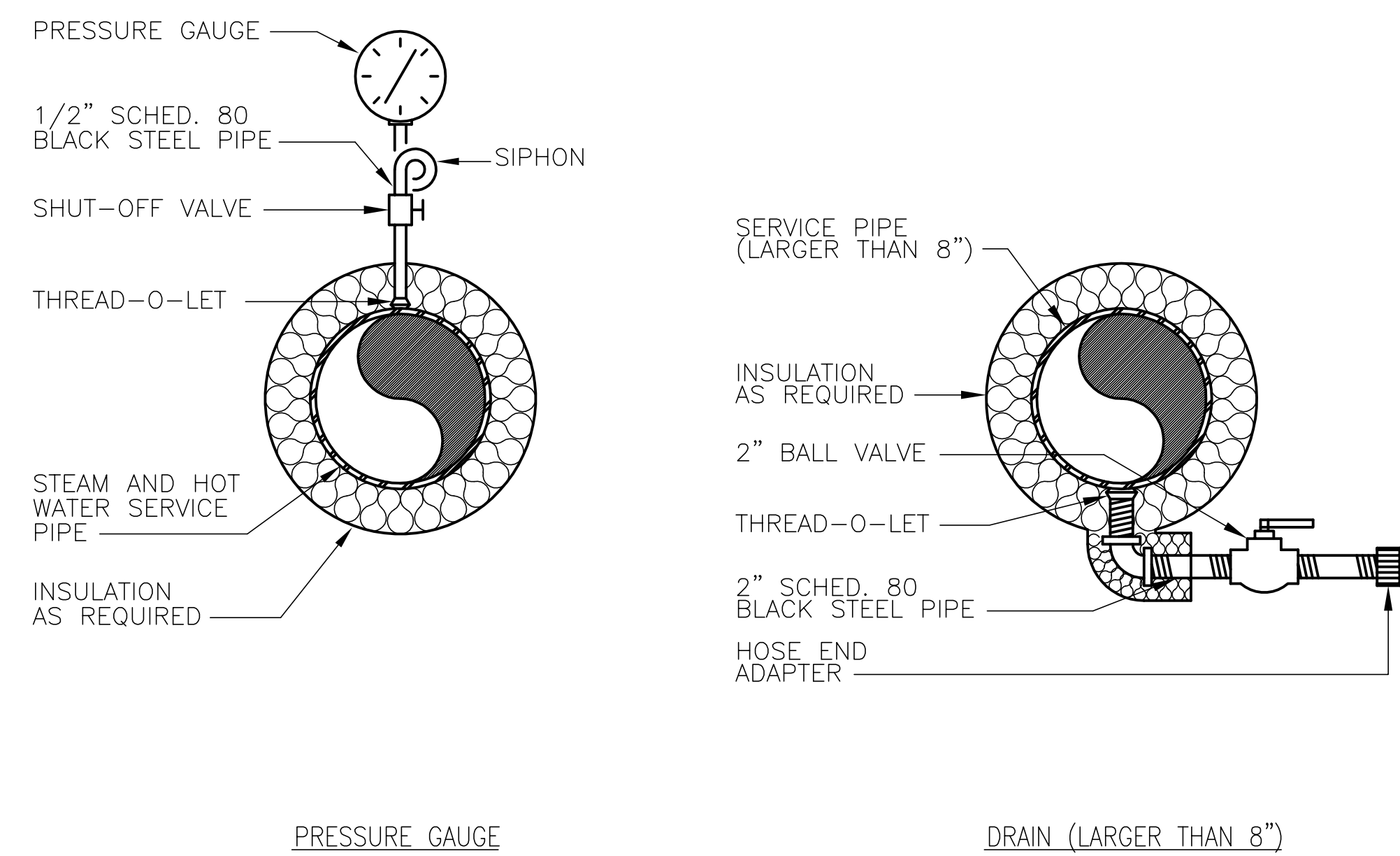
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DETAILS AND
SCHEMATICS**



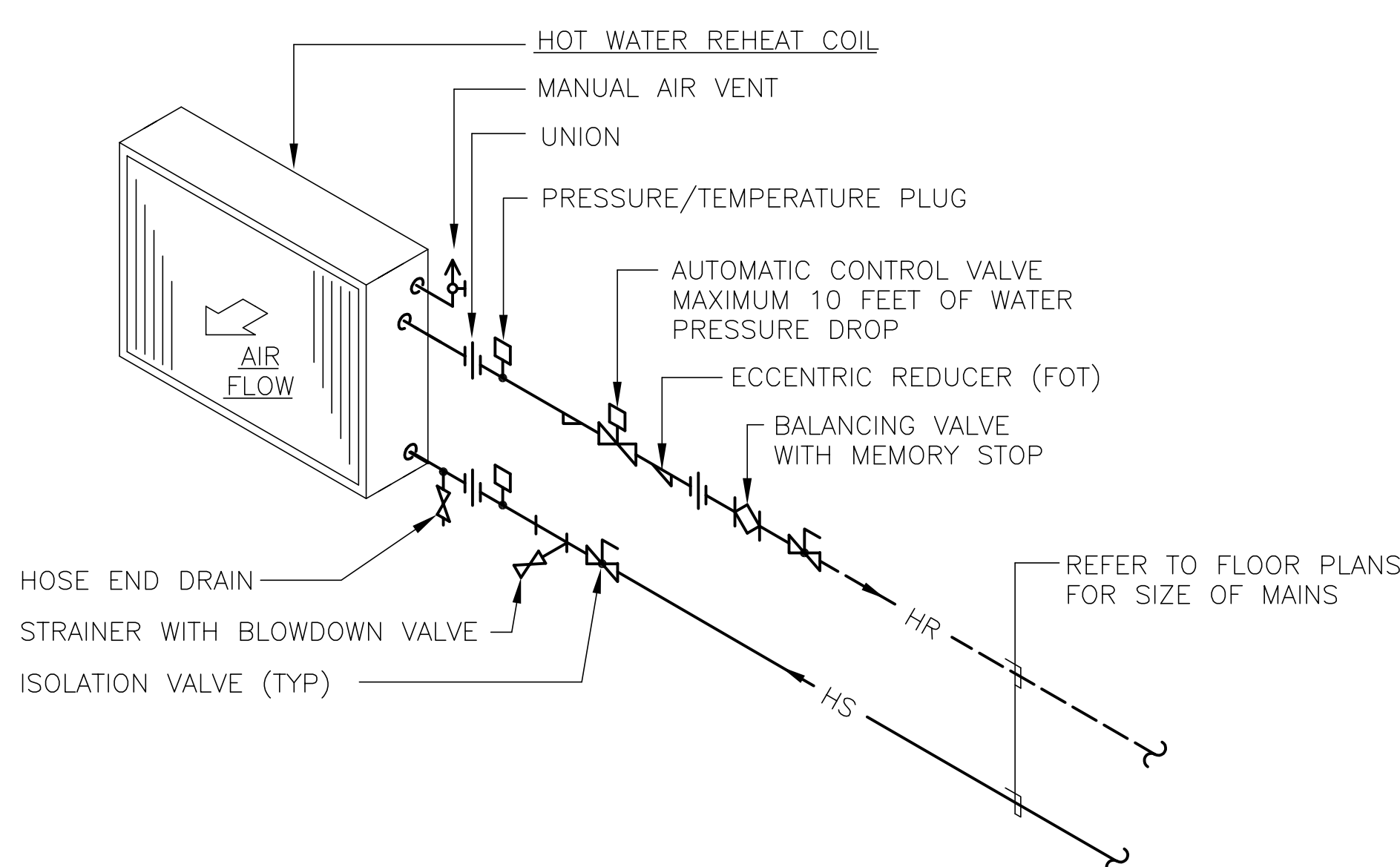
NOTE:
1. INSTALL DRAINS WHERE SHOWN ON DRAWINGS AND AT ALL LOW POINTS IN PIPING SYSTEMS.

DETAIL - TYPICAL PIPING ACCESSORIES INSTALLATION

SCALE: NONE 1

DETAIL - AIR VENT

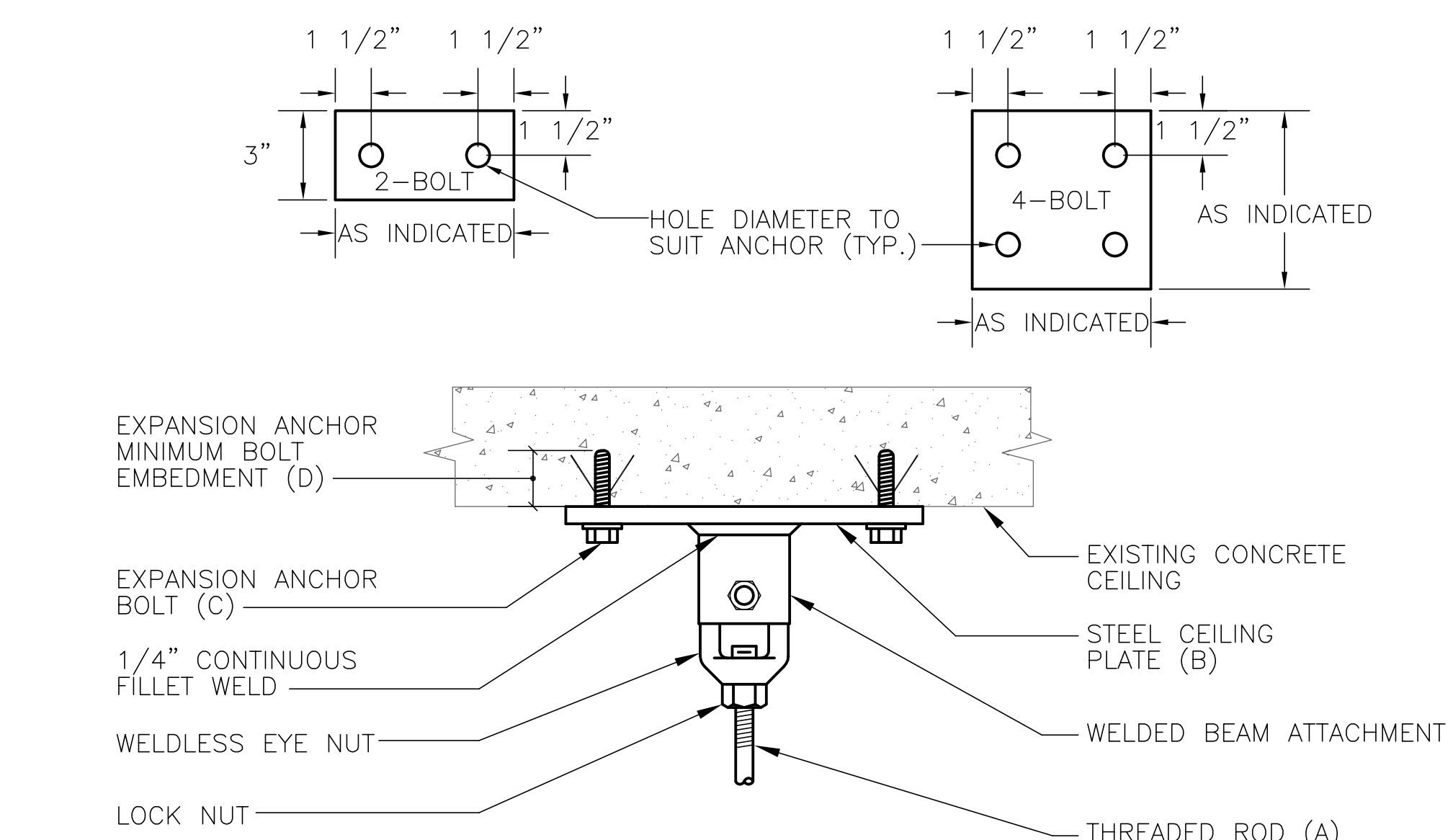
SCALE: NONE 2



NOTES:
1. ALL TERMINAL UNIT REHEAT COILS SHALL BE PIPED IN A 2-WAY VALVE CONFIGURATION UNLESS OTHERWISE NOTED ON THE FLOOR PLANS OR AIR TERMINAL REHEAT UNIT SCHEDULE.

DETAIL - REHEAT COIL PIPING (2-WAY VALVE)

SCALE: NONE 3

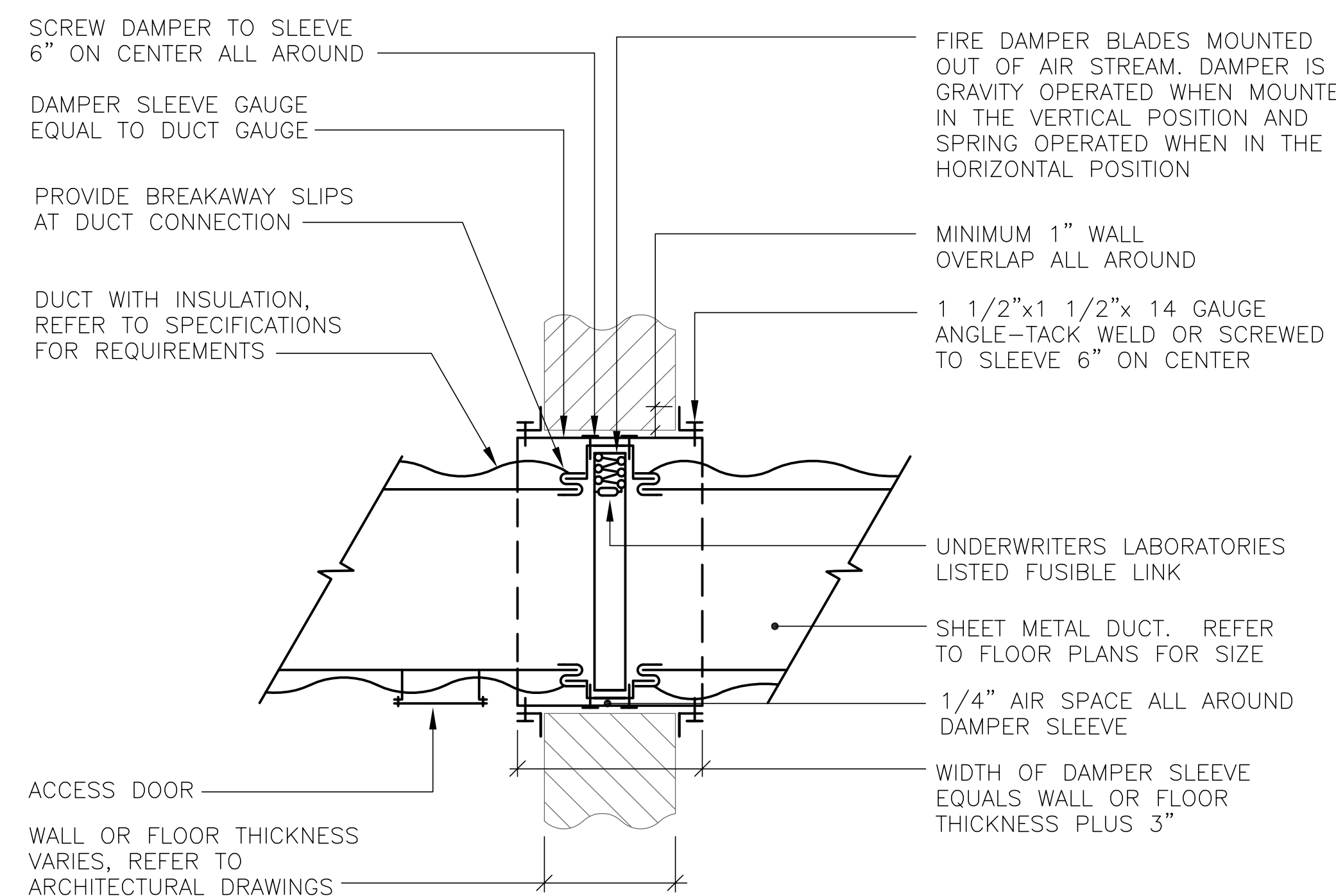


ROD SIZE (A)	MAX. LOAD	CEILING PLATE SIZE (B)	ANCHOR BOLTS (C)	EMBEDMENT (D)
3/8"	610 LBS	3"x8"x3/8"	(2) 1/2"x3 3/4"	2 1/4"
1/2"	1130 LBS	3"x8"x3/8"	(2) 1/2"x3 3/4"	2 1/4"
5/8"	1810 LBS	8"x8"x1/2"	(4) 1/2"x3 3/4"	2 1/4"
3/4"	2710 LBS	10"x10"x1/2"	(4) 1/2"x4 1/2"	3"
7/8"	3770 LBS	13"x13"x3/4"	(4) 3/4"x7"	5"

NOTE:
CONTRACTOR SHALL VERIFY MAXIMUM LOADING ON PIPE SUPPORT ASSEMBLIES.

DETAIL - BOLTED STRUCTURAL ATTACHMENT

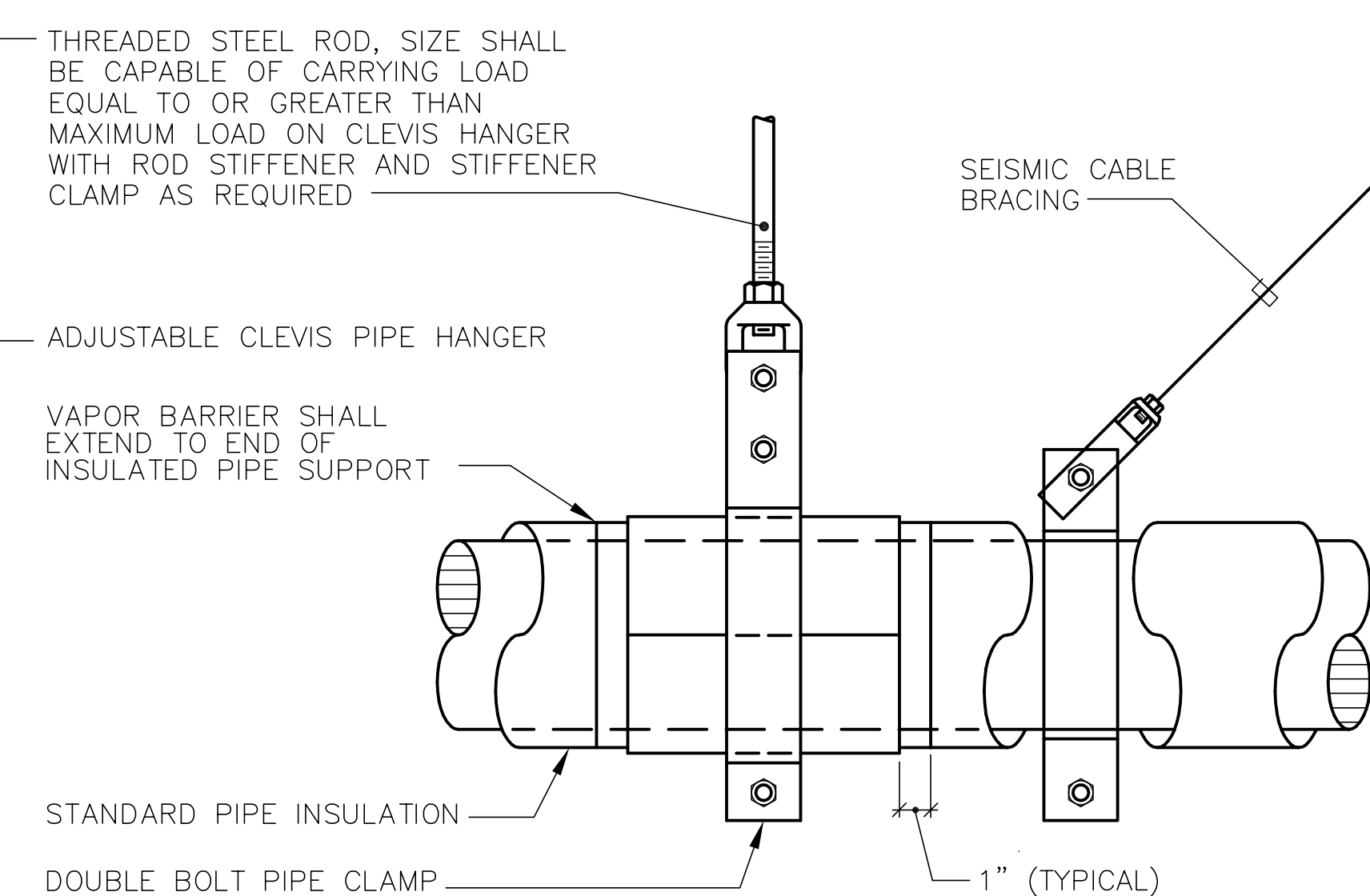
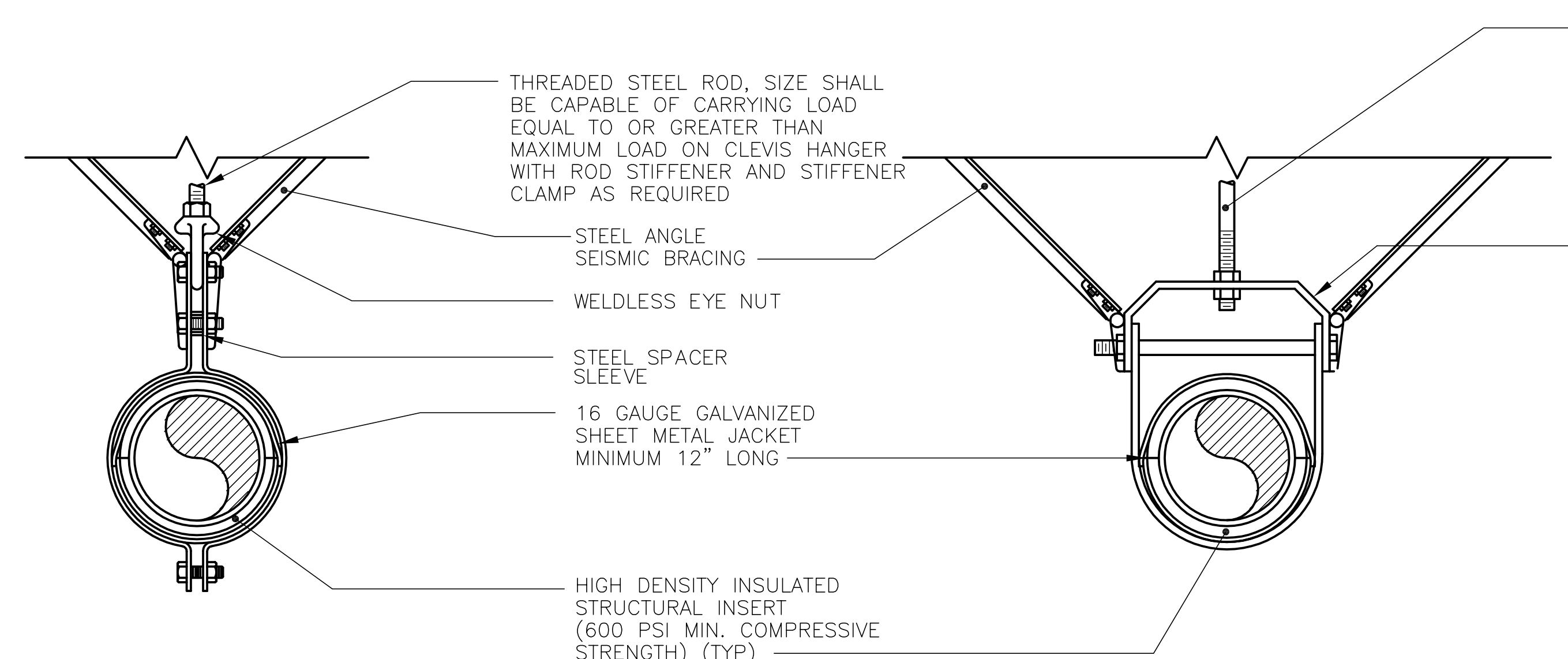
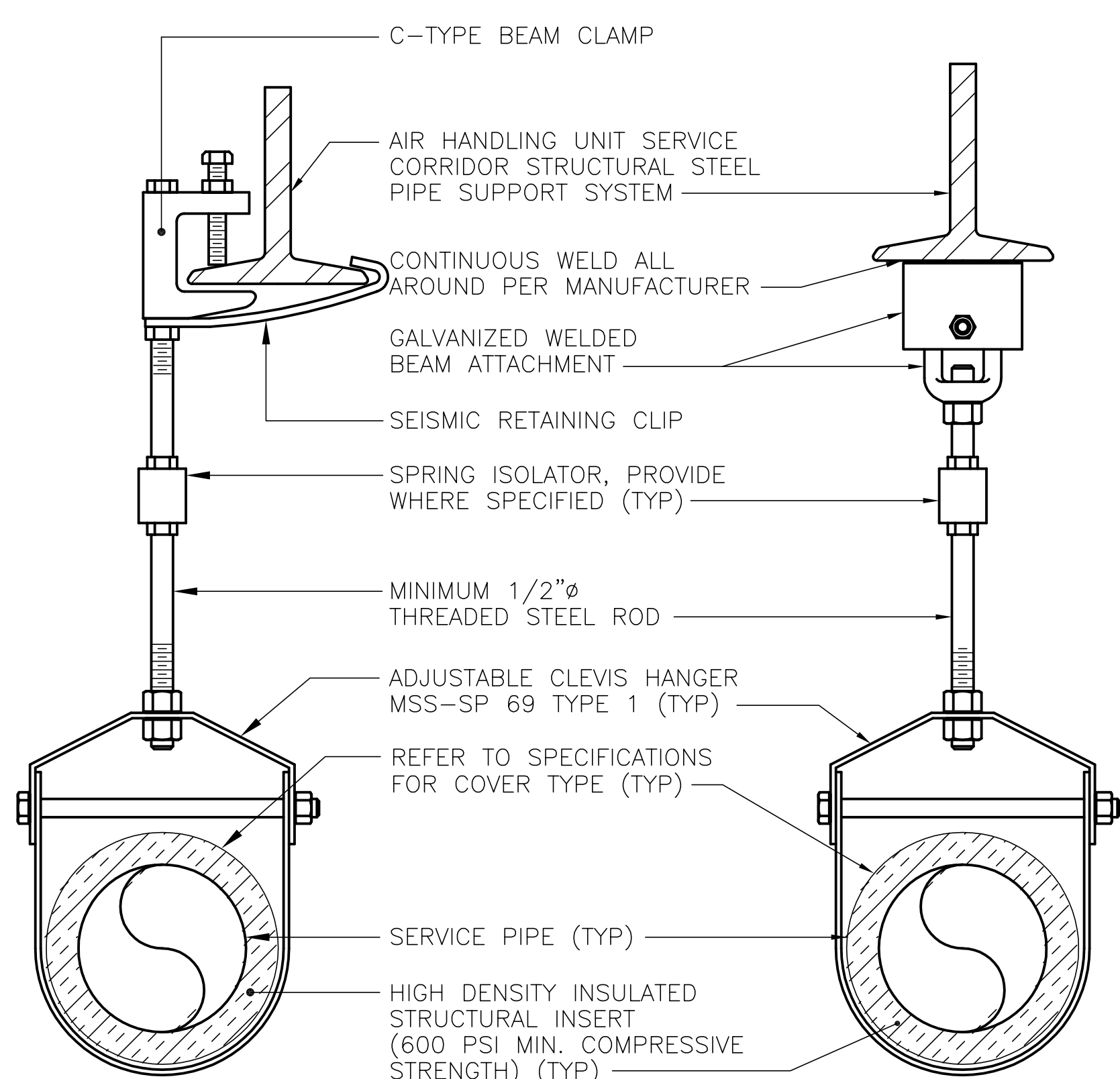
SCALE: NONE 4



NOTES:
1. TERMINATION OF WALL OR FLOOR OPENING AT DAMPER SLEEVE SHALL BE AS REQUIRED BY UNDERWRITER'S LABORATORIES AND AS DEFINED UNDER ANOTHER DIVISION OF THE SPECIFICATIONS.
2. INSTALLATION SHALL BE PER MANUFACTURER'S WRITTEN INSTRUCTIONS.

DETAIL - FIRE DAMPER INSTALLATION

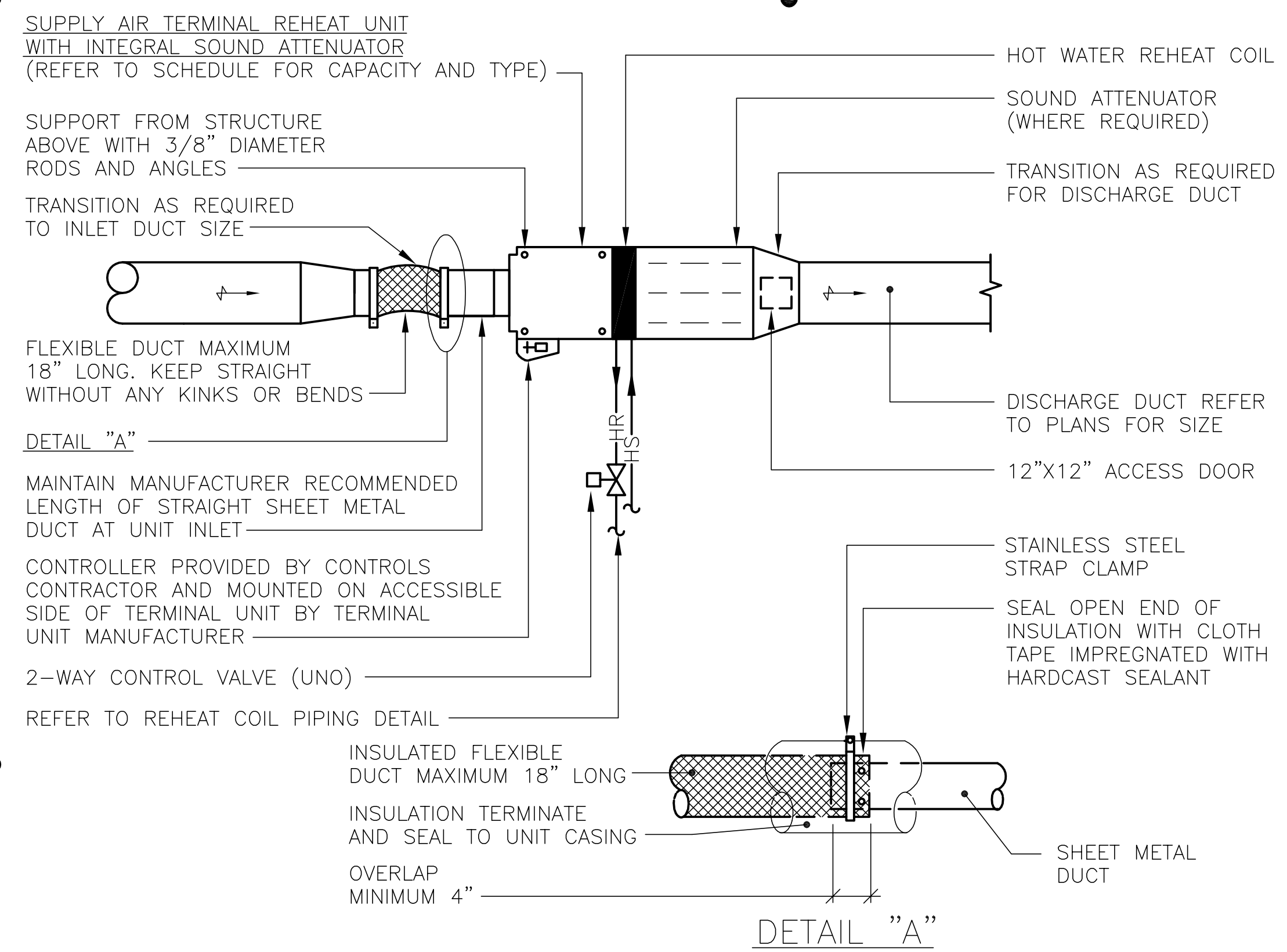
SCALE: NONE 5



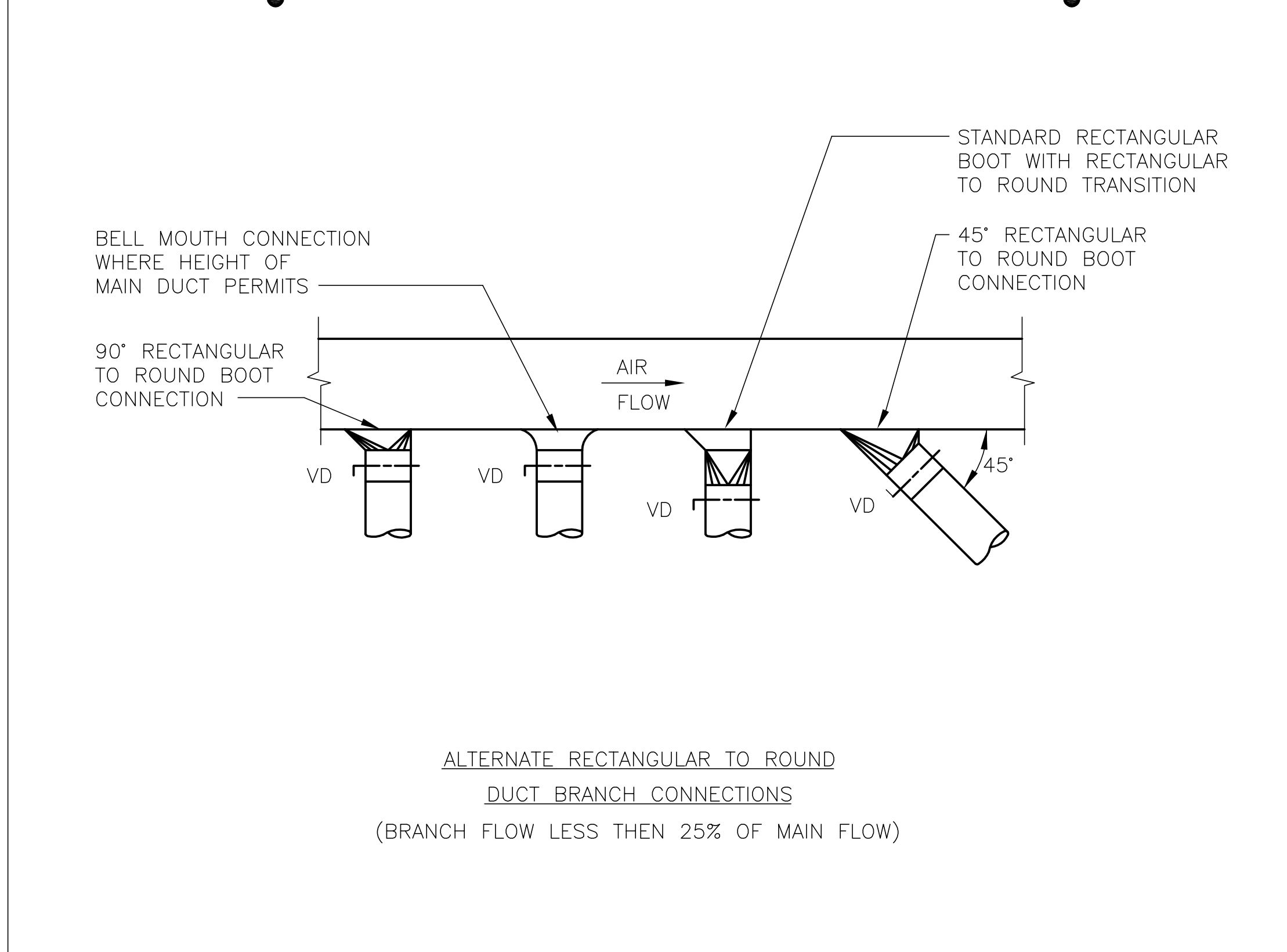
PIPE SIZE	MAXIMUM SPACING	ROD SIZE
1/2"-2"	8'	1/2"
2 1/2"	10'	5/8"
3"	10'	5/8"
4"	14'	5/8"
5"	14'	5/8"
6"	17'	3/4"
8"	19'	3/4"
10"	22'	7/8"
12"	23'	7/8"
14"	25'	1"
16"	27'	1"
18"	28'	1"
20"	30'	1 1/4"

DETAIL - PIPE HANGER

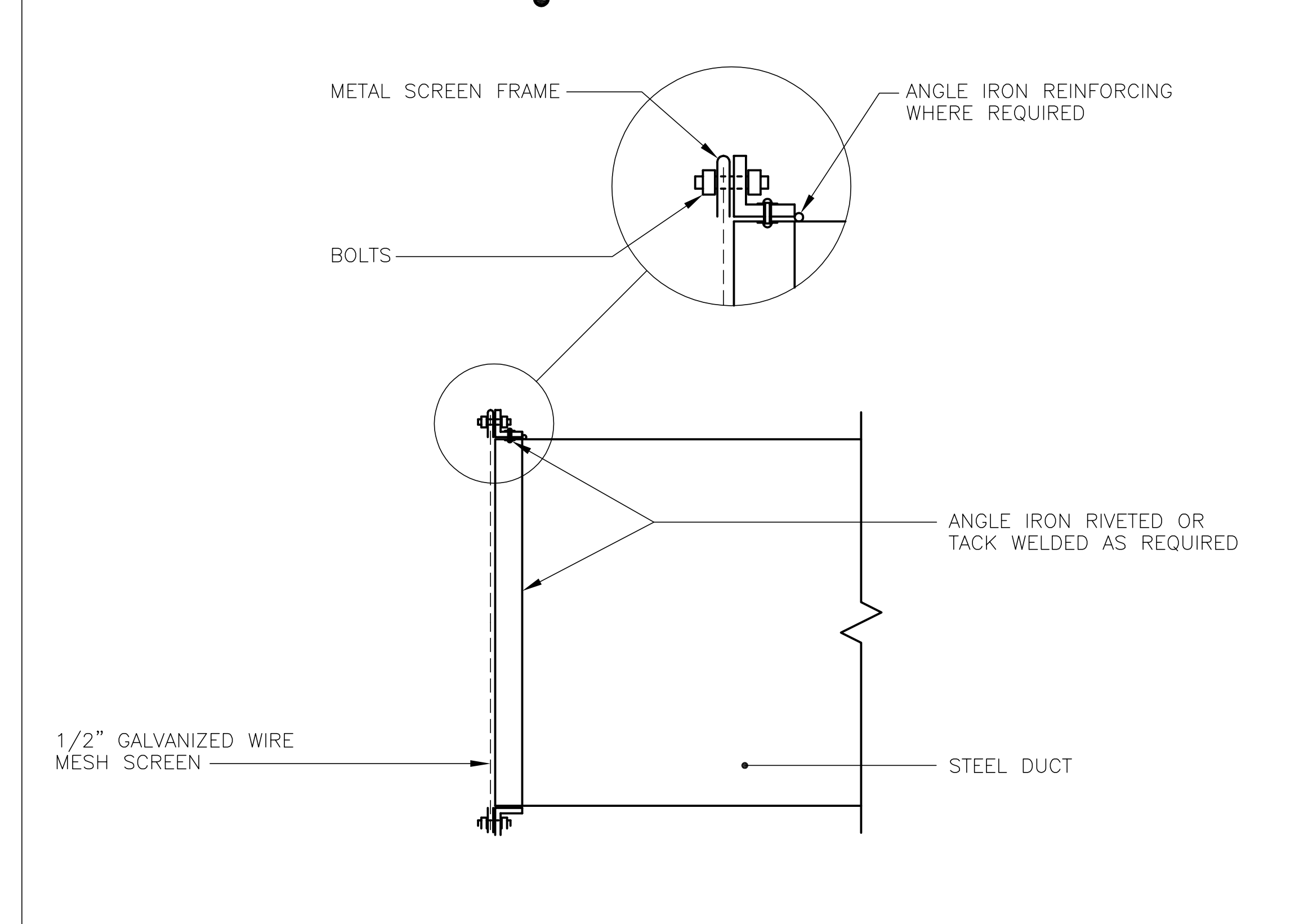
SCALE: NONE 6



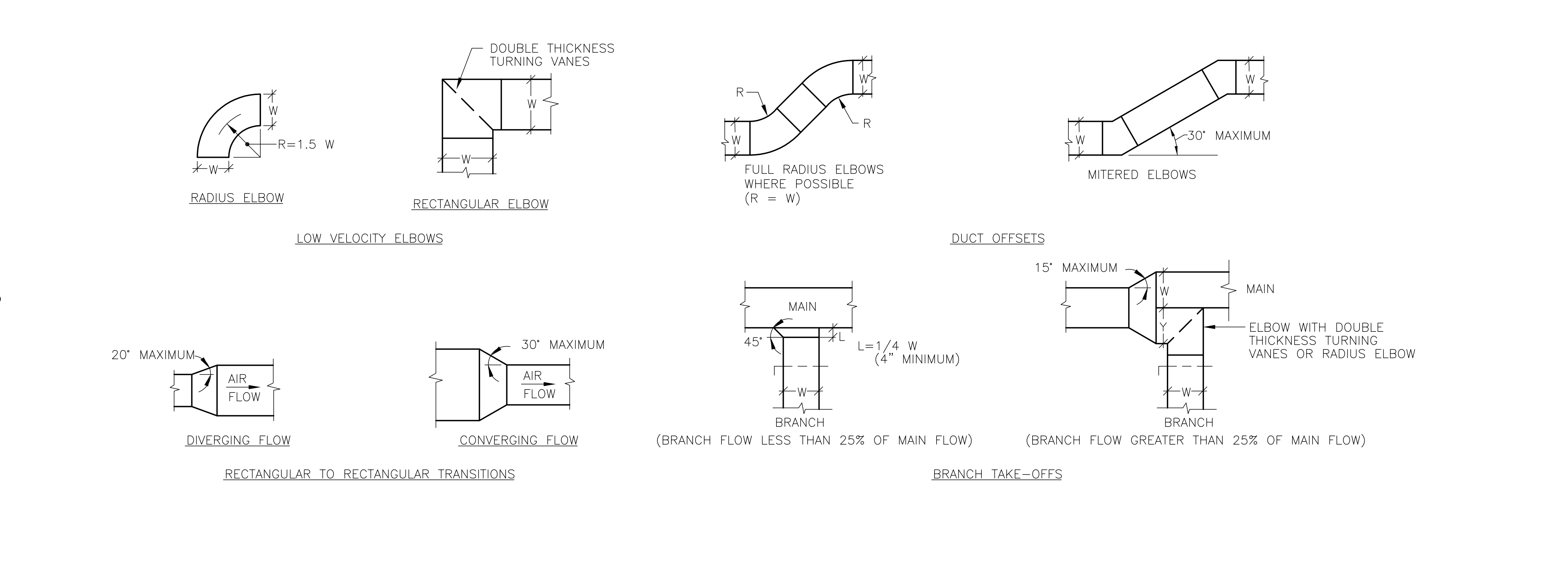
DETAIL - SUPPLY AIR TERMINAL REHEAT UNIT SCALE: NONE 1



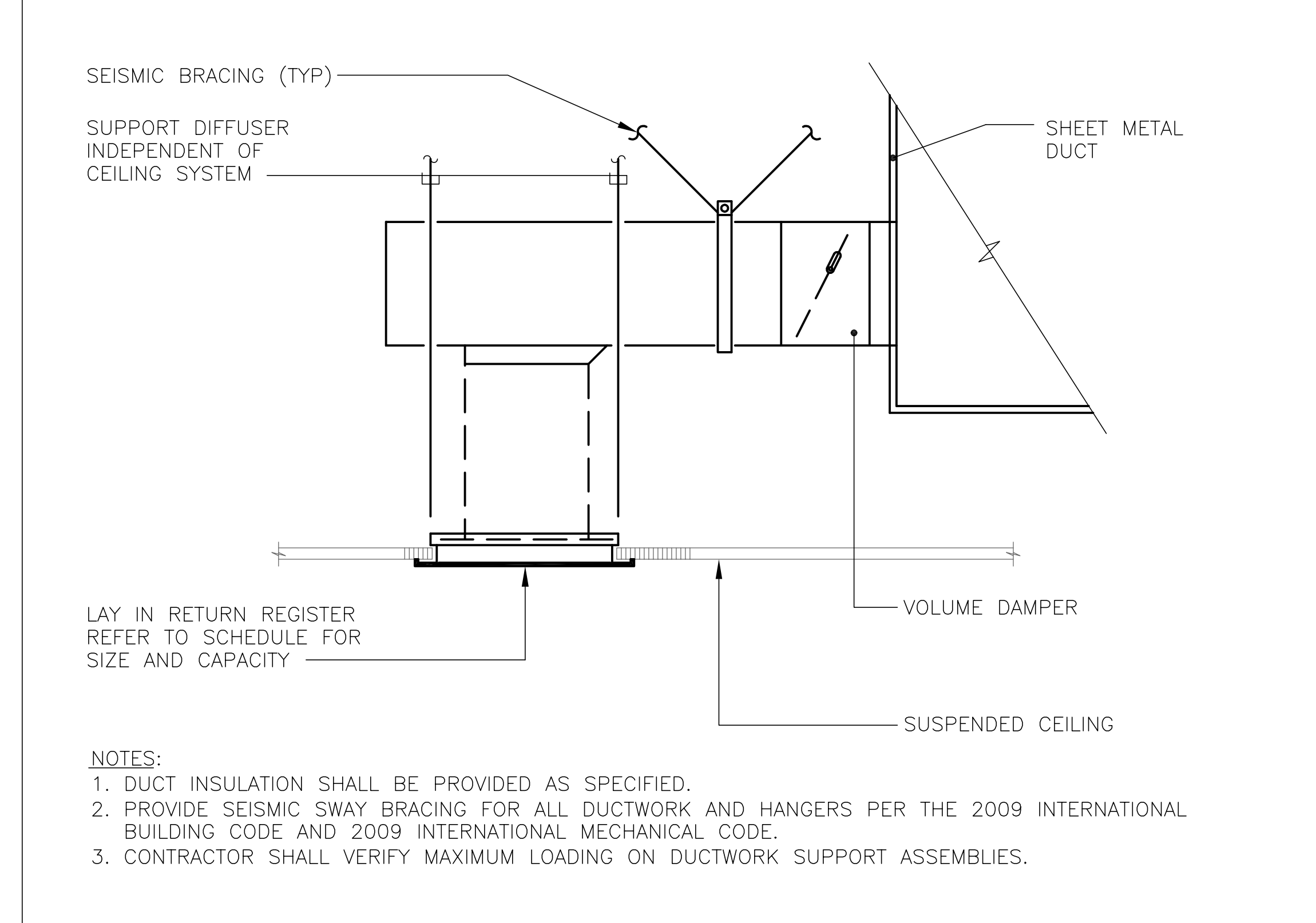
DETAIL - LOW VELOCITY BRANCH TAKE-OFF SCALE: NONE 2



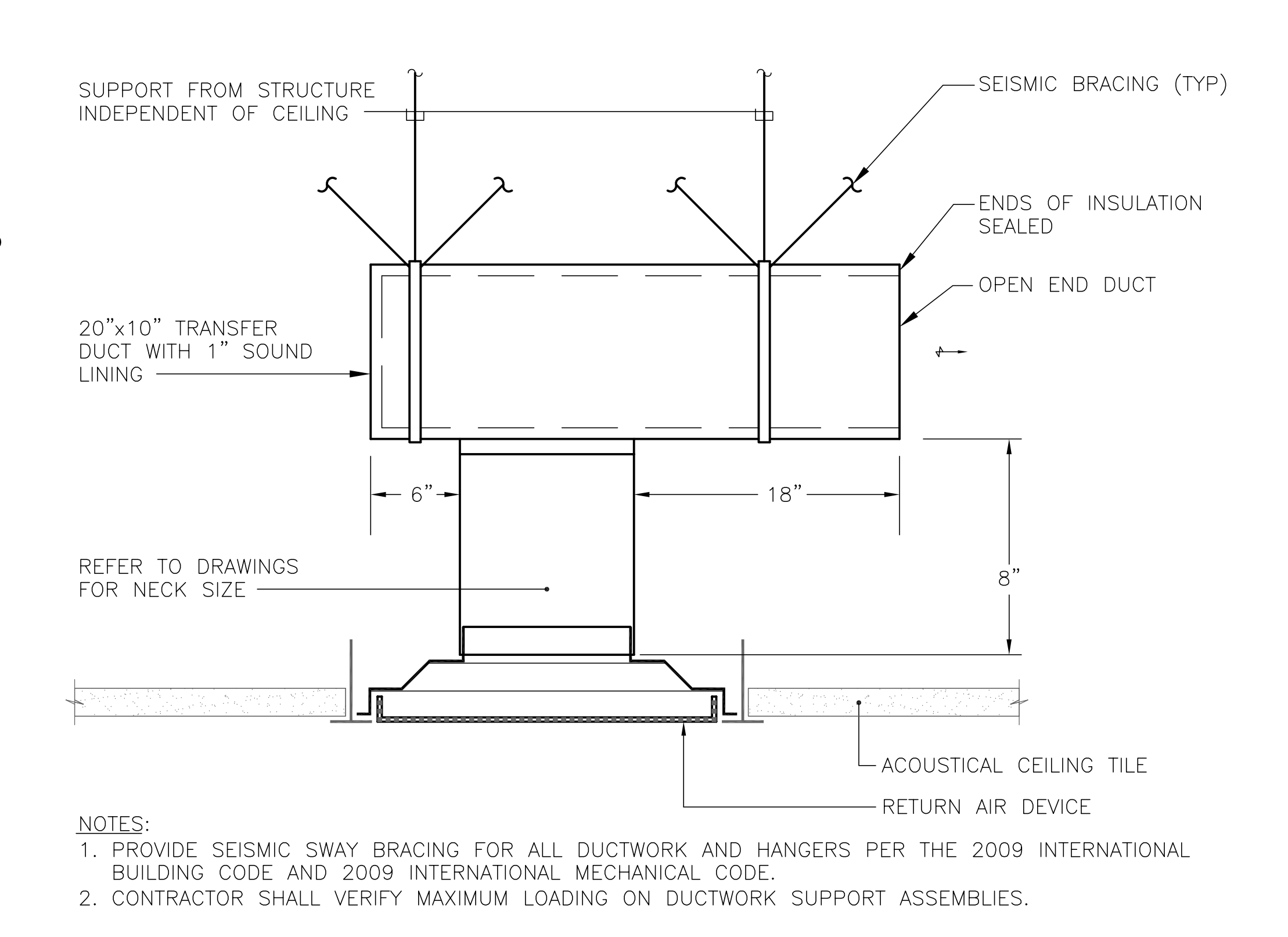
DETAIL - OPEN END DUCT WITH WIRE MESH SCREEN SCALE: NONE 3



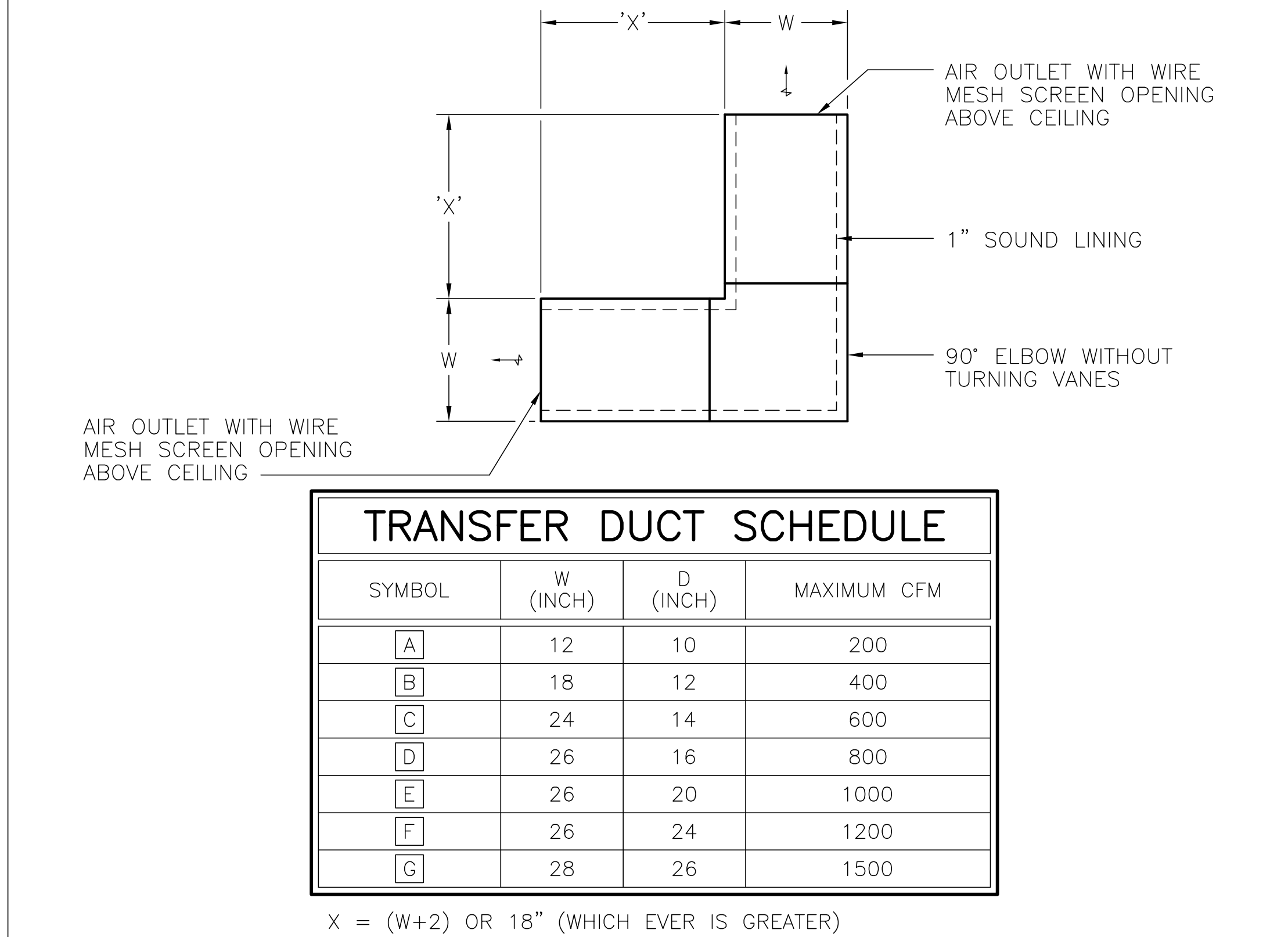
DETAIL - RECTANGULAR DUCT FITTINGS SCALE: NONE 4



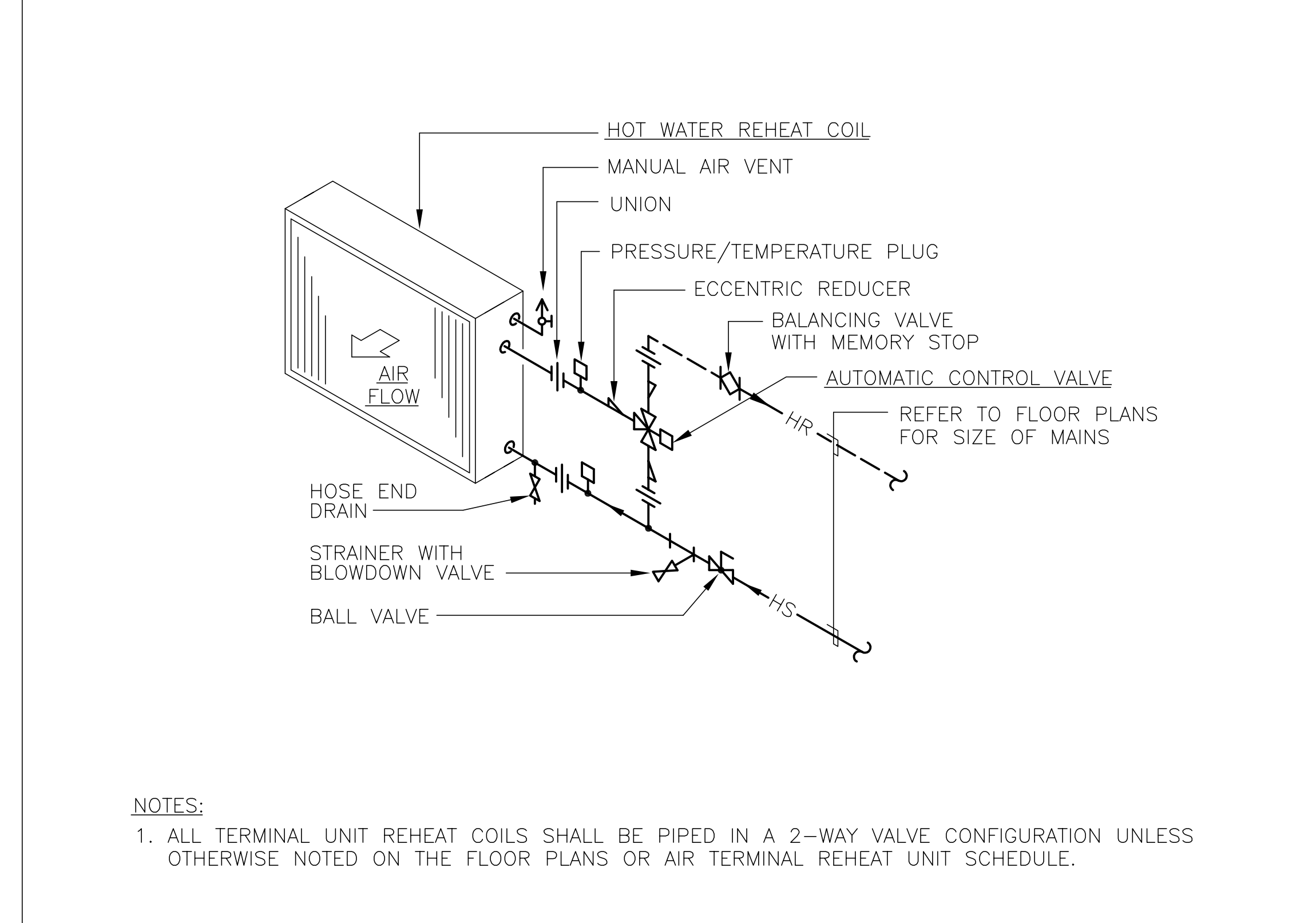
DETAIL - RETURN/EXHAUST AIR REGISTER BRANCH DUCT SCALE: NONE 5



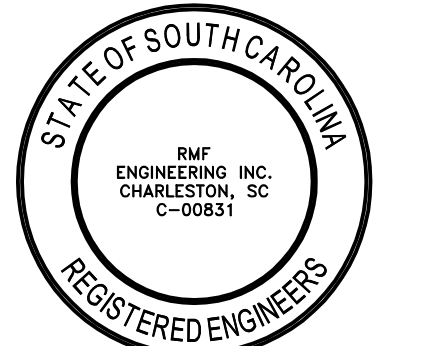
DETAIL - NON-DUCTED RETURN AIR REGISTER SCALE: NONE 6



DETAIL - TRANSFER DUCT SCALE: NONE 7



DETAIL - REHEAT COIL (3-WAY) SCALE: NONE 8



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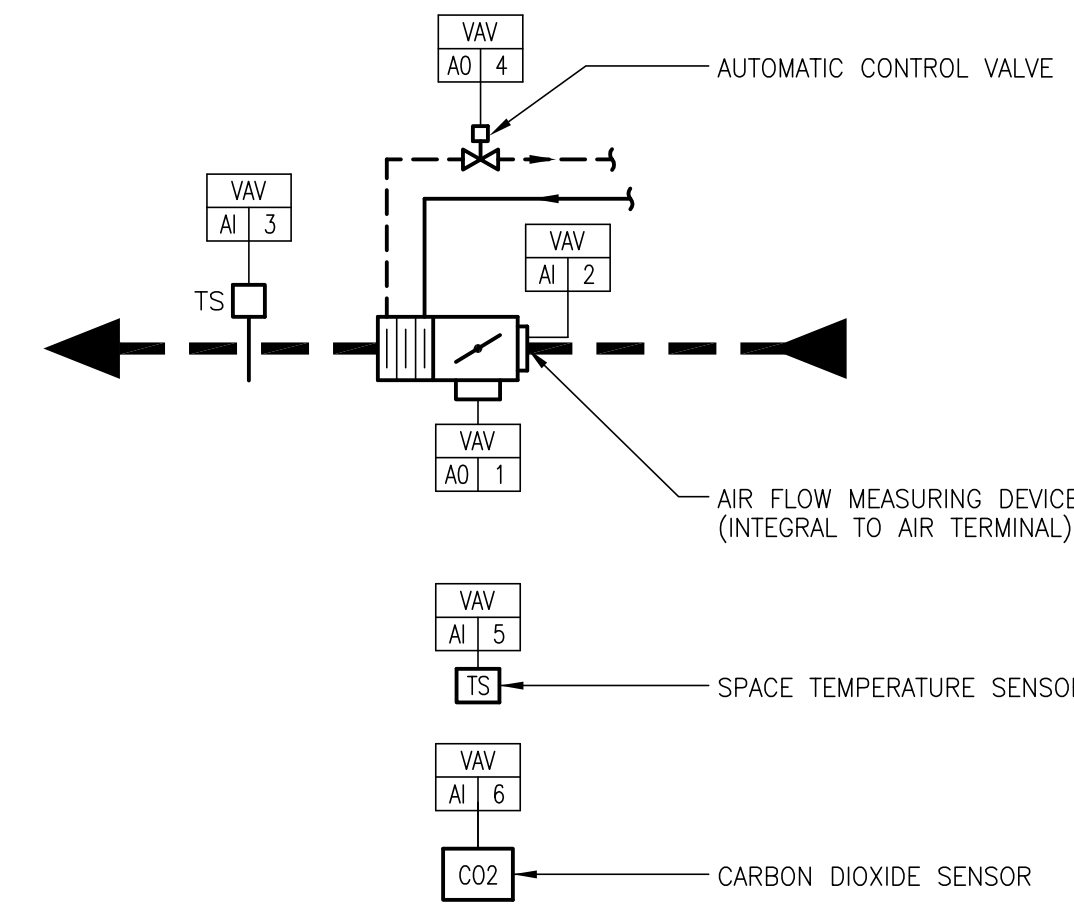
**MECHANICAL
DETAILS AND
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TERMINAL UNIT SEQUENCE OF OPERATION

- A. THE VARIABLE VOLUME AIR TERMINAL SHALL OPERATE ON AN OCCUPIED/UNOCCUPIED SCHEDULE. OCCUPIED/UNOCCUPIED MODES SHALL BE AS DETERMINED BY THE OCCUPIED/UNOCCUPIED PROGRAM OF THE BUILDING AUTOMATION SYSTEM (BAS).
- B. OCCUPIED MODE
1. THE SUPPLY AIR TERMINAL AIR VOLUME REGULATOR SHALL MODULATE TO MAINTAIN THE OCCUPIED SPACE TEMPERATURE SET POINT. ON A DROP IN SPACE TEMPERATURE BELOW THE OCCUPIED SPACE TEMPERATURE SET POINT, THE AIR VOLUME REGULATOR SHALL MODULATE TOWARD ITS MINIMUM POSITION SET POINT.
 2. ON A FURTHER DROP IN SPACE TEMPERATURE BELOW THE OCCUPIED SET POINT WITH THE AIR VOLUME REGULATOR AT ITS MINIMUM SET POINT, THE REHEAT COIL VALVE SHALL MODULATE OPEN.
 3. ON A RISE IN TEMPERATURE ABOVE THE OCCUPIED SET POINT, THE REVERSE SHALL OCCUR.
- C. UNOCCUPIED MODE
1. THE SUPPLY AIR TERMINAL UNIT AIR VOLUME REGULATOR SHALL CLOSE TO MINIMUM POSITION AND THE REHEAT VALVE SHALL BE FULLY CLOSED WHEN THE UNOCCUPIED MODE IS INITIATED.
 2. ON A DROP IN SPACE TEMPERATURE BELOW THE REDUCED UNOCCUPIED TEMPERATURE SET POINT OF 58° F, THE REHEAT COIL VALVE SHALL MODULATE OPEN TO MAINTAIN THE UNOCCUPIED SET POINT.
 3. ON A RISE IN TEMPERATURE ABOVE THE UNOCCUPIED SET POINT, THE REVERSE SHALL OCCUR.

D. WARM-UP MODE

1. THE SUPPLY AIR TERMINAL AIR VOLUME REGULATOR SHALL BE OPEN TO MINIMUM POSITION AND THE REHEAT VALVE SHALL BE MODULATED TO MAINTAIN THE OCCUPIED ROOM TEMPERATURE SET POINT.
- E. CO2 LEVEL CONTROL
1. REFER TO AHU SEQUENCE OF OPERATION FOR AIR HANDLING UNIT MINIMUM OUTDOOR AIR DAMPER AND CO2 LEVEL CONTROL.
 2. WHEN THE DIFFERENTIAL BETWEEN ANY SPACE CO2 LEVEL AND THE OUTDOOR AIR CO2 LEVEL EXCEEDS THE HIGH LIMIT SET POINT OF 700 PPM (ADJUSTABLE), ALL SUPPLY AIR TERMINAL UNIT AIR VOLUME REGULATORS SERVING THE SPECIFIC SPACE SHALL MODULATE OPEN TO MAINTAIN CO2 DIFFERENTIAL SET POINT. THE REHEAT COIL VALVE SHALL MODULATE OPEN TO MAINTAIN SPACE TEMPERATURE SET POINT (OCCUPIED OR UNOCCUPIED).
 3. ALL SUPPLY AIR TERMINAL AIR VOLUME REGULATORS SERVING THE SPECIFIC SPACE SHALL BE INDEXED BACK TO THE NORMAL SEQUENCE OF OPERATION AS DESCRIBED IN PARAGRAPH "B" & "C" ABOVE AFTER THE SPACE CO2 LEVEL HAS BEEN RETURNED BELOW THE CO2 DIFFERENTIAL SET POINT FOR A PERIOD OF 30 MINUTES (ADJUSTABLE).
- F. UPON LOSS OF POWER, AIR VOLUME REGULATOR SHALL FAIL TO THE LAST POSITION HELD PRIOR TO LOSS OF POWER.



VARIABLE VOLUME SUPPLY AIR TERMINAL UNIT WITH REHEAT

SCALE: NONE 1

SCALE: NONE 2

SCALE: NONE 3

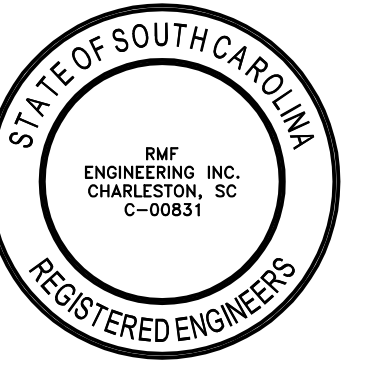
SCALE: NONE 4

SCALE: NONE 5

SCALE: NONE 6

SCALE: NONE 7

SCALE: NONE 8



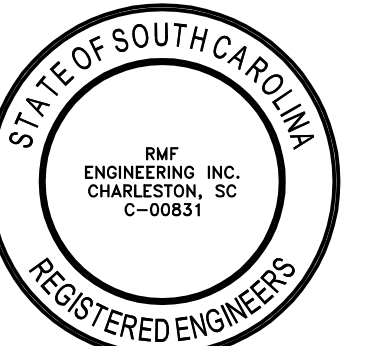
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**MECHANICAL
SCHEDULES**

DUCT CONSTRUCTION AND LEAK TEST SCHEDULE								
DUCT SYSTEM	MAXIMUM OPERATING PRESSURE (IN WG)	DUCT CONSTRUCTION			DUCT PRESSURE TEST			REMARKS
		PRESSURE CLASS (IN WG)	POSITIVE OR NEGATIVE	SMACNA DUCT SEAL CLASS	TEST REQUIRED (YES/NO)	TEST PRESSURE (IN WG)	DUCT LEAK CLASS	
SUPPLY AND OUTSIDE AIR (RECT)	6"	6"	POSITIVE	A	YES	4"	6	①②
SUPPLY AND OUTSIDE AIR (ROUND)	6"	6"	POSITIVE	A	YES	4"	3	①②
SUPPLY AND OUTSIDE AIR (RECT)	2"	2"	POSITIVE	B	NO	2"	12	③
SUPPLY AND OUTSIDE AIR (ROUND)	2"	2"	POSITIVE	B	NO	2"	6	③
RETURN AIR	-2"	2"	NEGATIVE	B	NO	2"	12	
EXHAUST AIR	-2"	2"	NEGATIVE	B	NO	2"	12	

- ① TEST PER SMACNA HVAC AIR DUCT LEAKAGE TEST MANUAL, 1ST EDITION.
- ② UPSTREAM OF SUPPLY TERMINAL UNIT (FROM AIR HANDLING UNIT TO TERMINAL UNIT).
- ③ DOWNSTREAM OF SUPPLY TERMINAL UNIT (FROM TERMINAL UNIT TO AIR DEVICE).

AIR DEVICE SCHEDULE											
No.	DUTY	TYPE	CFM RANGE		FACE/MODULE SIZE (IN)	NOMINAL DUCT SIZE (IN)	BLOW	MAX TOTAL AIR PD (IN H ₂ O)	MAX NOISE CRITERIA VALUE	BASIS OF DESIGN	REMARKS
			LOW	HIGH							
A1	CEILING SUPPLY DIFFUSER	A	0	150	24x24	6ø	4-WAY	0.15	25	TITUS/PAS	①④
A2	CEILING SUPPLY DIFFUSER	A	151	250	24x24	8ø	4-WAY	0.15	25	TITUS/PAS	②④
A3	CEILING SUPPLY DIFFUSER	A	251	350	24x24	10ø	4-WAY	0.15	25	TITUS/PAS	②④
A4	CEILING SUPPLY DIFFUSER	A	351	500	24x24	12ø	4-WAY	0.15	25	TITUS/PAS	③④
A5	CEILING SUPPLY DIFFUSER	A	501	700	24x24	14ø	4-WAY	0.15	25	TITUS/PAS	③④
A6	CEILING SUPPLY DIFFUSER	A	151	250	24x24	10ø	3-WAY	0.15	20	TITUS/PAS	③④
C1	RETURN REGISTER	B	0	800	24x24	18x18	0° DEFL	0.10	20	TITUS/PAR	④
D1	RETURN/EXHAUST REGISTER	B	0	125	12x12	6x6	0° DEFL	0.10	20	TITUS/PAR	④
D2	RETURN/EXHAUST REGISTER	B	126	225	24x24	8x8	0° DEFL	0.10	20	TITUS/PAR	④
D3	RETURN/EXHAUST REGISTER	B	226	350	24x24	10x10	0° DEFL	0.10	20	TITUS/PAR	④
D4	RETURN/EXHAUST REGISTER	B	351	500	24x24	12x12	0° DEFL	0.10	20	TITUS/PAR	④
D5	RETURN/EXHAUST REGISTER	B	501	780	24x24	15x15	0° DEFL	0.10	20	TITUS/PAR	④

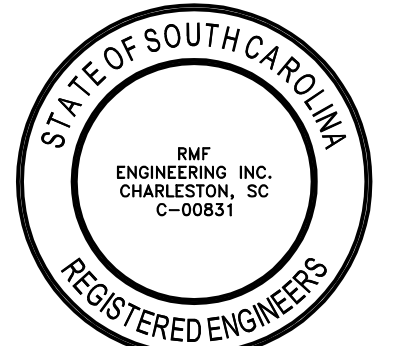
- ① 9"x9" BACKPAN SIZE
- ② 12"x12" BACKPAN SIZE
- ③ 18"x18" BACKPAN SIZE
- ④ SCHEDULED MODULE SIZE IS NOMINAL, AND WHERE REQUIRED SHALL FIT WITHIN 24"x24" ARCHITECTURAL ACOUSTICAL CEILING GRID.
- ⑤ CUSTOM COLOR, REFER TO ARCHITECT FOR COLOR SELECTION.

SUPPLY AIR TERMINAL REHEAT UNIT SCHEDULE															
DESIG.	CFM		INLET SIZE DIA (IN)	OUTLET SIZE WxH (IN)	MIN INLET SP INCH WG	MAX DISCHARGE NC @1.5 INCH H ₂ O Δ P SP	HEATING COIL PERFORMANCE						HS & HR RUNOUT SIZE (IN)	MFR/MODEL NO.	REMARKS
	MAX	MIN					EAT °F	LAT °F	MBH @180°F EWT	MAX H ₂ O PD FT H ₂ O	ROWS	GPM @20°F ΔT			
161	130	75	4	12x8	0.5	25	55	80	2.0	5.0	2	0.2	3/4	TITUS/DESV	-
161A	220	110	6	12x8	0.5	25	55	80	3.0	5.0	2	0.3	3/4	TITUS/DESV	-
255	160	80	4	12x8	0.5	25	55	80	2.2	5.0	2	0.2	3/4	TITUS/DESV	-
255A	170	85	6	12x8	0.5	25	55	90	3.2	5.0	2	0.3	3/4	TITUS/DESV	-
255B	275	140	6	12x8	0.5	25	55	90	4.4	5.0	2	0.4	3/4	TITUS/DESV	-
257	245	125	6	12x8	0.5	25	55	80	3.4	5.0	2	0.3	3/4	TITUS/DESV	-
257A	120	75	4	12x8	0.5	25	55	84	2.3	5.0	2	0.2	3/4	TITUS/DESV	-
258	200	100	6	12x8	0.5	25	55	80	2.7	5.0	2	0.3	3/4	TITUS/DESV	-
258A	260	130	6	12x8	0.5	25	55	84	4.1	5.0	2	0.4	3/4	TITUS/DESV	-
453	300	150	6	12x8	0.5	25	55	80	4.1	5.0	2	0.4	3/4	TITUS/DESV	-
453A	140	75	4	12x8	0.5	25	55	84	2.3	5.0	2	0.2	3/4	TITUS/DESV	-
468	500	250	8	12x10	0.5	25	55	90	9.5	5.0	2	0.9	3/4	TITUS/DESV	-
468A	580	290	10	14x12	0.5	25	55	84	9.1	5.0	2	0.9	3/4	TITUS/DESV	-
468B	365	185	8	12x10	0.5	25	55	80	5.0	5.0	2	0.5	3/4	TITUS/DESV	-

- ① COOLING ONLY

SOUND ATTENUATOR SCHEDULE															
SERVICE	TYPE	SIZE WxHxL (INCHES)	MAXIMUM CAPACITY (CFM)	MAXIMUM AIR PD (IN H ₂ O)	MAX FACE VELOCITY (FPM)	INSERTION LOSS (dB) OCTAVE BAND								REMARKS	BASIS OF DESIGN
						2	3	4	5	6	7	8			
SUPPLY AIR TERMINAL UNITS W/ 4" INLET	-	12x8x36	100	0.10	500	-	-	-	-	-	-	-	-	①②③	
SUPPLY AIR TERMINAL UNITS W/ 5" INLET	-	12x8x36	200	0.10	500	-	-	-	-	-	-	-	-	①②③	
SUPPLY AIR TERMINAL UNITS W/ 6" INLET	-	12x8x36	300	0.10	500	-	-	-	-	-	-	-	-	①②③	
SUPPLY AIR TERMINAL UNITS W/ 7" INLET	-	12x10x36	415	0.10	500	-	-	-	-	-	-	-	-	①②③	
SUPPLY AIR TERMINAL UNITS W/ 8" INLET	-	12x10x36	500	0.10	500	-	-	-	-	-	-	-	-	①②③	
SUPPLY AIR TERMINAL UNITS W/ 9" INLET	A	14x12x36	600	0.10	500	9	12	12	17	23	18	11	①②	VIBRO-ACOUSTICS	
SUPPLY AIR TERMINAL UNITS W/ 10" INLET	A	16x12x36	700	0.10	500	9	12	12	17	23	18	11	①②	VIBRO-ACOUSTICS	
SUPPLY AIR TERMINAL UNITS W/ 12" INLET	A	18x16x36	1,000	0.10	500	9	12	12	17	23	18	11	①②	VIBRO-ACOUSTICS	
SUPPLY AIR TERMINAL UNITS W/ 14" INLET	A	22x18x36	1,350	0.10	500	9	12	12	17	23	18	11	①②	VIBRO-ACOUSTICS	
SUPPLY AIR TERMINAL UNITS W/ 16" INLET	A	24x18x36	1,500	0.10	500	9	12	12	17	23	18	11	①②	VIBRO-ACOUSTICS	
SUPPLY AIR TERMINAL UNITS W/ 24"x16" INLET	A	38x18x36	2,000	0.10	500	9	12	12	17	23	18	11	①②	VIBRO-ACOUSTICS	

- ① REFER TO FLOOR PLANS FOR QUANTITY OF SUPPLY AIR TERMINAL UNITS.
- ② PROVIDE ALL NECESSARY DUCTWORK TRANSITIONS REQUIRED FOR CONNECTION TO SUPPLY TERMINAL UNIT SOUND ATTENUATORS.
- ③ TERMINAL UNIT MANUFACTURER SHALL PROVIDE INTEGRAL SOUND ATTENUATOR.



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**MECHANICAL
SCHEDULES**

THROUGH PENETRATION FIRESTOP SCHEDULE

- A. THIS SCHEDULE IDENTIFIES REQUIREMENTS FOR ACCEPTABLE THROUGH PENETRATION FIRESTOPS BASED ON BARRIER TYPE, BASIS OF BARRIER CONSTRUCTION, AND PENETRANT TYPE. THIS IS A STANDARD THROUGH PENETRATION FIRESTOP SCHEDULE. SOME BARRIERS AND/OR PENETRANT TYPES MAY NOT APPEAR ON THE DRAWINGS.
- B. THROUGH PENETRATION FIRESTOPS ARE NOT REQUIRED FOR FLOOR PENETRATIONS CONTAINED TOTALLY WITHIN A RATED SHAFT ENCLOSURE.
- C. FOR EACH PENETRATION, SELECT A THROUGH PENETRATION FIRESTOP BASED ON ACTUAL FIELD CONDITIONS, WHICH INCLUDE BUT ARE NOT LIMITED TO PENETRATION SIZE, PENETRATION SHAPE, PENETRANT MATERIAL(S), QUANTITY OF PENETRANTS PER PENETRATION, AND LOCATION(S) OF PENETRANT(S) WITHIN PENETRATION.
- D. NOMENCLATURE OF UL CLASSIFIED FIRESTOP ASSEMBLIES USED IN THIS SCHEDULE IS IDENTICAL TO THAT USED IN CATALOGS OF APPROVED FIRESTOP MANUFACTURERS (SEE DIVISION 15) AND IN UNDERWRITERS LABORATORIES "FIRE RESISTANCE DIRECTORY."

RATED BARRIER		FIRESTOP ASSEMBLY REQUIREMENTS		PENETRANT TYPE						
TYPE	BASIS OF CONSTRUCTION			NO PENETRANTS	METALLIC, UNINSULATED PIPE OR TUBING (EX. COPPER, IRON, STEEL) (NOTE 14)	NONMETALLIC, UNINSULATED PIPE OR TUBING (EX. PVC, PP, CPVC, GLASS, FRPP)	INSULATED PIPES (EX. COPPER, IRON PLASTIC, STEEL) IN SYSTEMS OPERATING BETWEEN 32°F AND 122°F (NOTE 1)	INSULATED PIPES (EX. COPPER, IRON PLASTIC, STEEL) IN SYSTEMS OPERATING BELOW 32°F OR ABOVE 122°F (NOTE 2)	METAL DUCT (NOTE 3)	RECESSED DEVICES (NOTE 4)
WALL	WOOD STUDS & GYPSUM WALLBOARD (U300 SERIES)	UL CLASSIFIED SERIES	SINGLE PENETRANT	W-L-0000 SERIES OR NOTE 5	W-L-1000 SERIES	W-L-2000 SERIES	W-L-5000 SERIES	W-L-5000 SERIES	W-L-7000 SERIES	W-L-7000 SERIES NOTE 8
			MULTIPLE PENETRANTS		W-L-8000 SERIES (NOTE 6)			W-L-8000 SERIES (NOTE 6)	W-L-8000 SERIES (NOTE 6)	N/A
		F RATING		EQUAL TO WALL RATING	EQUAL TO WALL RATING	EQUAL TO WALL RATING	EQUAL TO WALL RATING	EQUAL TO WALL RATING	EQUAL TO WALL RATING	EQUAL TO WALL RATING
		T RATING		NOTE 10	NOTE 10	NOTE 10	NOTE 10	NOTE 10	NOTE 10	NOTE 10
EXCEPTIONS/ ADDED REQUIREMENTS		NONE	NOTE 13	NOTE 13	NONE	NOTE 7	NONE	NONE		
WALL	METAL STUDS & GYPSUM WALLBOARD (U400 SERIES)	UL CLASSIFIED SERIES	SINGLE PENETRANT	W-L-0000 SERIES OR NOTE 5	W-L-1000 SERIES	W-L-2000 SERIES	W-L-5000 SERIES	W-L-5000 SERIES	W-L-7000 SERIES	W-L-7000 SERIES NOTE 8
			MULTIPLE PENETRANTS		W-L-8000 SERIES (NOTE 6)			W-L-8000 SERIES (NOTE 6)	W-L-8000 SERIES (NOTE 6)	N/A
		F RATING		EQUAL TO WALL RATING	EQUAL TO WALL RATING	EQUAL TO WALL RATING	EQUAL TO WALL RATING	EQUAL TO WALL RATING	EQUAL TO WALL RATING	EQUAL TO WALL RATING
		T RATING		NOTE 10	NOTE 10	NOTE 10	NOTE 10	NOTE 10	NOTE 10	NOTE 10
EXCEPTIONS/ ADDED REQUIREMENTS		NONE	NOTE 13	NOTE 13	NONE	NOTE 7	NONE	NONE		
WALL	POURED CONCRETE, CONCRETE BLOCK OR MASONRY (BLOCK & U900 SERIES) (ANY THICKNESS)	UL CLASSIFIED SERIES	SINGLE PENETRANT	W-J-0000 SERIES OR NOTE 5	C-AJ-1000 OR W-J-1000 SERIES	C-AJ-2000 OR W-J-2000 SERIES	C-AJ-5000 OR W-J-5000 SERIES	C-AJ-5000 OR W-J-5000 SERIES	C-AJ-7000 OR W-J-7000 SERIES	NOTE 8
			MULTIPLE PENETRANTS		C-AJ-8000 OR W-J-8000 SERIES (NOTE 6)			C-AJ-8000 OR W-J-8000 (NOTE 6)	C-AJ-8000 OR W-J-8000 (NOTE 6)	N/A
		F RATING		EQUAL TO WALL RATING	EQUAL TO WALL RATING	EQUAL TO WALL RATING	EQUAL TO WALL RATING	EQUAL TO WALL RATING	EQUAL TO WALL RATING	EQUAL TO WALL RATING
		T RATING		NOTE 10	NOTE 10	NOTE 10	NOTE 10	NOTE 10	NOTE 10	NOTE 10
EXCEPTIONS/ ADDED REQUIREMENTS		NONE	NOTES 12 & 13	NOTE 13	NONE	NOTE 7	NONE	NONE		
FLOOR	POURED CONCRETE (ANY THICKNESS)	UL CLASSIFIED SERIES	SINGLE PENETRANT	C-AJ-0000 SERIES F-A-0000 SERIES OR NOTE 5	C-AJ-1000 OR F-A-1000 SERIES	C-AJ-2000 OR F-A-2000 SERIES	C-AJ-5000 OR F-A-5000 SERIES	C-AJ-5000 OR F-A-5000 SERIES	C-AJ-7000 OR F-A-7000 SERIES	NOTE 8
			MULTIPLE PENETRANTS		C-AJ-8000 OR F-A-8000 SERIES (NOTE 6)			C-AJ-8000 OR F-A-8000 (NOTE 6)	C-AJ-8000 OR F-A-8000 (NOTE 6)	N/A
		F RATING		EQUAL TO FLOOR RATING, BUT NOT LESS THAN 1 HR	EQUAL TO FLOOR RATING, BUT NOT LESS THAN 1 HR	EQUAL TO FLOOR RATING, BUT NOT LESS THAN 1 HR	EQUAL TO FLOOR RATING, BUT NOT LESS THAN 1 HR	EQUAL TO FLOOR RATING, BUT NOT LESS THAN 1 HR	EQUAL TO FLOOR RATING, BUT NOT LESS THAN 1 HR	EQUAL TO FLOOR RATING, BUT NOT LESS THAN 1 HR
		T RATING		NOTE 11	NOTE 11	NOTE 11	NOTE 11	NOTE 11	NOTE 11	NOTE 11
EXCEPTIONS/ ADDED REQUIREMENTS		NONE	NOTE 12	NONE	NONE	NOTE 7	NONE	NONE		

NOTES

1. EXAMPLES OF SYSTEMS THAT OPERATE BETWEEN 32 DEGF AND 122 DEGF:
 CHILLED WATER SUPPLY & RETURN DOMESTIC HOT WATER LESS THAN 122 DEGF
 HEAT PUMP WATER SUPPLY & RETURN DOMESTIC HOT WATER RECIRCULATION LESS THAN 122 DEGF
 DOMESTIC COLD AND TEMPERED WATER
2. EXAMPLES OF SYSTEMS OPERATING BELOW 32 DEGF OR ABOVE 122 DEGF:
 STEAM SUPPLY & RETURN HEATING HOT WATER SUPPLY & RETURN
 STEAM VENT HOT-CHILLED WATER SUPPLY & RETURN
 CONDENSATE PUMP DISCHARGE GLYCOL HEATING HOT WATER SUPPLY & RETURN
 BOILER BLOWDOWN DOMESTIC HOT WATER SUPPLY 140 DEGF
 CRYOGENIC VENT DOMESTIC HOT WATER SUPPLY 140 DEGF
 ENGINE GENERATOR EXHAUST DOMESTIC HOT WATER RECIRCULATION 140 DEGF
3. THIS SCHEDULE'S DATA APPLY ONLY TO PENETRATIONS WITHOUT DAMPERS. FOR DAMPERED PENETRATIONS, REFER TO SPECIFICATIONS. AT DAMPERS, DO NOT APPLY MATERIAL THAT IS NOT INCLUDED IN THE DAMPER'S CLASSIFICATION.
4. EXAMPLES OF RECESSED DEVICES:
 MEDICAL GAS ZONE VALVES UNIT HEATERS
 MEDICAL GAS OUTLETS FIRE FIGHTERS' PHONE
 FIRE VALVE CABINETS FIRE EXTINGUISHER CABINET
 FIRE HOSE CABINETS CENTRAL VACUUM OUTLETS
5. SEAL OPENING USING BARRIER'S ORIGINAL CONSTRUCTION.
6. WHERE A SERIES 8000 CLASSIFIED SYSTEM IS NOT AVAILABLE, INSTALL PENETRANTS SINGLY, AND PROVIDE SINGLE-PENETRANT SYSTEMS.
7. FOR SYSTEMS THAT OPERATE BELOW 32°F OR ABOVE 122°F, COMPLY WITH THE FOLLOWING ADDITIONAL REQUIREMENTS:
 A. PROVIDE TPFS SYSTEM USING INTUMESCENT ELASTOMERIC WRAP STRIP AS ITS FILL, VOID, OR CAVITY MATERIAL.
 B. DO NOT USE SERIES 8000 PENETRATIONS. PROVIDE ONLY SINGLE PENETRATIONS.
8. WHERE UL CLASSIFIED SYSTEMS ARE NOT AVAILABLE FOR OTHER RECESSED DEVICES, MAINTAIN CONTINUITY OF RATED BARRIER CONSTRUCTION AROUND RECESS.
9. REQUIREMENTS FOR MEMBRANE PENETRATIONS AND THROUGH PENETRATIONS ARE IDENTICAL.
10. TEMPERATURE (T) RATINGS OF ASSEMBLIES IN WALLS MAY EQUAL ZERO.
11. TEMPERATURE (T) RATINGS OF ASSEMBLIES IN FLOORS SHALL EQUAL THE GREATER OF EITHER THE BARRIER RATING OR ONE HOUR EXCEPT AS FOLLOWS:
 A. AN ASSEMBLY'S T RATING MAY EQUAL ZERO WHEN THE PENETRANT ABOVE THE FLOOR PENETRATION IS CONTAINED AND LOCATED WITHIN THE CAVITY OF A WALL.
12. CLASSIFIED TPFS ASSEMBLY IS NOT REQUIRED WHEN ALL THE FOLLOWING CONDITIONS ARE MET:
 A. PENETRANT HAS A MAXIMUM NOMINAL DIAMETER OF 6-INCHES.
 B. PENETRATION HAS A MAXIMUM AREA OF 144 SQUARE INCHES.
 C. ANNULAR SPACE IS COMPLETELY FILLED WITH CONCRETE, GROUT, OR MORTAR THE FULL THICKNESS OF THE BARRIER.
13. OPENINGS ACCOMMODATING NONCOMBUSTIBLE CONDUITS, PIPES AND TUBES THROUGH SINGLE MEMBRANES WHICH ARE PART OF A FIRE RESISTANCE RATED WALL ASSEMBLY ARE PERMITTED WHEN:
 A. AGGREGATE AREA OF THE MEMBRANE OPENINGS DO NOT EXCEED 100 SQUARE INCHES FOR ANY 100 SQUARE FEET OF WALL AREA.
14. THIS COLUMN ALSO INCLUDES WIRES AND CABLES WITH STEEL JACKETS.

SECTION 15000 – MECHANICAL AND ELECTRICAL GENERAL PROVISIONS

1.1 SCOPE
A. THIS SECTION DESCRIBES THE GENERAL PROVISIONS FOR THE MECHANICAL WORK INCLUDED IN DIVISIONS 15. THIS SECTION APPLIES TO ALL SECTIONS OF DIVISION 15.
B. THE DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS, GENERAL REQUIREMENTS AND ALL OTHER SPECIFICATION SECTIONS APPLY TO THE WORK SPECIFIED IN THIS SECTION. IN THE EVENT OF CONFLICT BETWEEN SPECIFIC REQUIREMENTS OF THE VARIOUS DOCUMENTS, THE MORE RESTRICTIVE, THE MORE EXTENSIVE (I.E.: MORE EXPENSIVE) REQUIREMENT SHALL GOVERN.

1.10 RECORD DRAWINGS
A. CONTRACTOR SHALL KEEP ACCURATE RECORDS OF ALL DEVIATIONS IN WORK, AS A ACTUALLY INSTALLED, FROM WORK INDICATED.
1.11 ELECTRICAL WORK
A. UNDER DIVISION 16 ELECTRICAL, PROVIDE:
1. POWER WIRING
PART 2 – PRODUCTS
2.1 MATERIALS
A. ALL MATERIALS SHALL BE NEW, THE BEST OF THEIR RESPECTIVE KINDS, SUITABLE FOR THE CONDITIONS AND DUTIES IMPOSED ON THEM AT THE BUILDING, AND SHALL BE OF REPUTABLE MANUFACTURERS'.

A. ALL EQUIPMENT, DEVICES, CONTROLS, AND HARDWARE SHALL BE PROVEN TO OPERATE SUCCESSFULLY THROUGHOUT THE GUARANTEE PERIOD. SYSTEM COMPONENTS OR EQUIPMENT ITEMS THAT FAIL TO CONSISTENTLY DELIVER THE DESIGN CAPACITY SHALL BE REMOVED AND REPLACED AS DIRECTED BY THE ARCHITECT. THE COST OF REQUIRED EQUIPMENT REPLACEMENTS SHALL BE BORNE BY THE CONTRACTOR.
B. ALL EQUIPMENT SHALL BE TESTED AFTER INSTALLATION AND BE PROVEN TO DELIVER THE MANUFACTURERS QUOTED DESIGN CAPACITY. WHEN CAPACITY IS IN QUESTION AS DEEMED BY THE ARCHITECT, THE CONTRACTOR SHALL PERFORM A DETAILED AND COMPREHENSIVE FIELD PERFORMANCE TEST TO CERTIFY THE EQUIPMENT CAPACITY. SYSTEM EFFECT OR INSTALLED PERFORMANCE FACTORS MAY NOT BE APPLIED TO PERFORMANCE RATINGS UNLESS THEY WERE PREVIOUSLY INCLUDED WHEN THE EQUIPMENT WAS SUBMITTED FOR APPROVAL. EQUIPMENT THAT FAILS TO DELIVER MANUFACTURERS' QUOTED DESIGN CAPACITY SHALL BE REMOVED AND REPLACED AT THE CONTRACTORS EXPENSE.

SCREWED FITTINGS BY REMAKING JOINTS. CUT OUT AND REWELD. REPEAT TESTS AFTER DEFECTS HAVE BEEN ELIMINATED.
PART 2 – PRODUCTS
2.1 HANGERS
A. HANGERS AND ACCESSORIES SHALL BE GRINNELL, CARPENTER-PATTERSON, MICHIGAN, B-LINE, OR BASIC ENGINEERING OF THE TYPES SPECIFIED IN SECTION 15000.
B. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE AN ADEQUATE PIPE SUSPENSION SYSTEM IN ACCORDANCE WITH RECOGNIZED ENGINEERING PRACTICES, USING STANDARD, COMMERCIALY ACCEPTED PIPE HANGERS AND SUSPENSION EQUIPMENT.

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OSE # H27-1988
TAG DESCRIPTION DATE
Project: 11USC396
Drawn By: BEK
Checked By: CRB
Date: 5 MAR 2012
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MECHANICAL SPECIFICATIONS
M6.00

PART 3 - EXECUTION

3.1 GENERAL

- A. CONDUCT BALANCING AND TESTING IN ACCORDANCE WITH TECHNICAL PORTIONS OF THE ASSOCIATED AIR BALANCING COUNCIL--"NATIONAL STANDARDS FOR FIELD MEASUREMENTS AND INSTRUMENTATION VOL. 2, NO. 12173 - "TOTAL SYSTEM BALANCE" - 1973 EDITION. TEST PROCEDURES NOT IN ACCORDANCE OR NOT DESCRIBED IN THE STANDARDS, I.E., VARIABLE AIR VOLUME SYSTEMS SHALL BE APPROVED BY THE ENGINEER IN WRITING.
- B. PROVIDE ALL LABOR, TESTING EQUIPMENT, AND MATERIALS REQUIRED TO CONDUCT TESTS AND BALANCE SYSTEMS.
- C. SYSTEM SHALL BE OPERATED AT LEAST FOUR (4) HOURS AFTER STABILIZED OPERATING CONDITIONS HAVE BEEN ESTABLISHED BEFORE CONDUCTING CAPACITY.
- D. TESTS, CAPACITY AND PERFORMANCE TESTS OF EQUIPMENT AND SYSTEMS SHALL BE PERFORMED ONLY AFTER BALANCING IS COMPLETE.

3.2 AIR DISTRIBUTION SYSTEMS

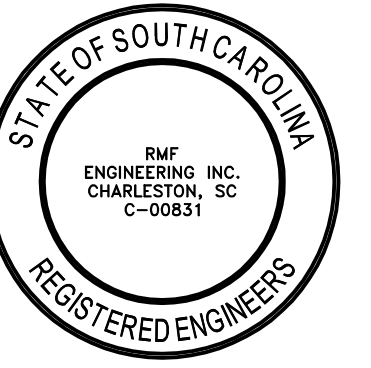
- A. ALL AIR DISTRIBUTION SYSTEMS INCLUDING SUPPLY DUCTWORK SHALL BE TESTED AND BALANCED.
- B. WHERE THE SYSTEM CANNOT BE PROPERLY BALANCED OR EQUIPMENT TESTED DUE TO SYSTEM DEFICIENCIES SUCH AS INABILITY TO PROPERLY ADJUST FAN SPEEDS, IMPROPERLY SIZED MOTORS, EXCESSIVELY NOISY EQUIPMENT, MALFUNCTIONING CONTROLS, EXCESSIVELY OUT OF BALANCE AIR DISTRIBUTION SYSTEM BRANCH RUNS, AND SIMILAR ITEMS, FURNISH TO THE ARCHITECT IN WRITING A LIST OF THE DEFICIENCIES PRIOR TO THE SUBMISSION OF THE TEST REPORT.
- C. MAKE OPENINGS IN DUCTS REQUIRED FOR PITOT TUBE INSERTION AND SEAL THOSE OPENINGS WITH SNAP-IN PLUGS. NEATLY REMOVE DUCT INSULATION AS REQUIRED FOR TEST. REPLACEMENT OF INSULATION, AFTER TESTING IS COMPLETED, IS INCLUDED UNDER DIVISION 15 SECTION "INSULATION".
- D. SPECIFIC TESTING AND BALANCING PROCEDURES SHALL INCLUDE:
 1. TEST AND ADJUST SPEED OF ALL AIR APPARATUS.
 2. TEST AND RECORD MOTOR VOLTAGE AND AMPERAGE.
 3. MAKE PITOT TUBE TRAVERSE OF MAIN DUCTS AND OBTAIN DESIGN AIR QUANTITY AT FANS.
 4. TEST AND ADJUST SYSTEMS FOR DESIGN SUPPLY AND RETURN AIR QUANTITIES.
 5. TEST AND RECORD AIR ENTERING AND LEAVING CONDITIONS AT AIR UNIT ON BOTH HEATING AND COOLING MODES.
 6. ADJUST ALL MAIN AND BRANCH DUCTS FOR SUPPLY AND RETURN AIR. SET AND "MARK" ALL VOLUME DAMPERS. IDENTIFY, TEST, AND ADJUST EACH GRILLE, REGISTER, AND DIFFUSER TO WITHIN TEN (10) PERCENT OF DESIGN QUANTITIES.
 7. VERIFY OPERATION OF EACH ROOM THERMOSTAT OVER FULL RANGE OF HEATING AND COOLING TO INSURE PROPER SEQUENCE OF CONTROL. RECORD RESULTS.

3.3 EQUIPMENT PERFORMANCE

- A. CONDUCT PERFORMANCE TESTS ONLY AFTER THE AIR SYSTEMS HAVE BEEN BALANCED AND THE PROPER FLOW RATES ESTABLISHED.
- B. TEST AND RECORD CAPACITY OF HEAT TRANSFER EQUIPMENT INCLUDING ALL COILS. AIR SIDE CAPACITIES MUST AGREE WITHIN FIVE (5) PERCENT OF EACH OTHER. INCLUDE THE MANUFACTURER'S RATED CAPACITY AT THE TEST OPERATING CONDITIONS WITH THE REPORT. PERFORM TESTS WHERE POSSIBLE AT DESIGN CONDITIONS. IF TESTS ARE NOT PERFORMED UNDER DESIGN CONDITIONS, INTERPOLATE RESULTS TO DETERMINE CAPACITY AT FULL LOAD OPERATING CONDITIONS.

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Checked By: CRB
Date: 5 MAR 2012
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**MECHANICAL
SPECIFICATIONS**