

**MECHANICAL ABBREVIATIONS**

#	FOUND OR NUMBER	F0B	FLAT ON BOTTOM	P	PUMP
ABV. CLG.	ABOVE CEILING	F0T	FLAT ON TOP	P.C.	PLUMBING CONTRACTOR
ACV	AUTOMATIC CONTROL VALVE	F.P.C.	FIRE PROTECTION CONTRACTOR	P.D.I.	PLUMBING AND DRAINAGE INSTITUTE
A.D.	ACCESS DOOR OR AREA DRAIN	FG	FEET PER MINUTE	PKG.	PACKAGE
AF	ABOVE FINISH FLOOR	FPS	FEET PER SECOND	PLBG.	PLUMBING
AFG	ABOVE FINISH GRADE	FS	FLOW SWITCH	PPH	POUNDS PER HOUR
AHU	AIR HANDLING UNIT	F.S.	FLOOR SINK OR FOOD SERVICE	PRS	PRESSURE REDUCING STATION
AI	ANALOG INPUT	F.S.E.C.	FOOD SERVICE EQUIPMENT CONTRACTOR	PRV	PRESSURE REDUCING VALVE
ALUM.	ALUMINUM	PS	PRESSURE SWITCH	PS	PRESSURE
ANS	AMERICAN NATIONAL STANDARD INSTITUTE	F&T	FLOAT & THERMOSTATIC FOOT	PSI	POUNDS PER SQUARE INCH
AO	ANALOG OUTPUT	FTG.	FOOTING	PSIA	POUNDS PER SQUARE INCH ABSOLUTE
A.P.	ACCESS PANEL	GAL.	GALLON	PSIG	POUNDS PER SQUARE INCH GAUGE
APD	AIR PRESSURE DROP	GALV.	GALVANIZED	PVC	POLYVINYL CHLORIDE
APPROX.	APPROXIMATE	GALV.	GALVANIZED	QTY.	QUANTITY
ARCH.	ARCHITECTURAL	GH	GALLONS PER HOUR	R.A.	RETURN AIR
AWWA	AMERICAN WATER WORKS ASSOCIATION	GM	GALLONS PER MINUTE	RD.	ROUND
BFF	BELOW FINISH FLOOR	HB	HOSE BIBB	RECIRC.	RECIRCULATING
BFG	BELOW FINISH GRADE	HD	HAND DAMPER OR HUB DRAIN	REINF.	REINFORCING
BFP	BACKFLOW PREVENTER	HGR.	HANGER	REQ'D	REQUIRED
BHP	BRAKE HORSE POWER	HORIZ.	HORIZONTAL	REV.	REVISION
BOD	BOTTOM OF DUCT	HP	HORSE POWER	RH	RELIEF HOOD
BOP	BOTTOM OF PIPE	HS	HEATING SOURCE HEAT PUMP	RM.	ROOM
BTU	BRITISH THERMAL UNIT	HTC.	HEATING	RPW	REVOLUTIONS PER MINUTE
BTUH	BRITISH THERMAL UNIT PER HOUR	HVAC	HEATING VENTILATING AND AIR CONDITIONING	RPZ	REDUCED PRESSURE ZONE BACKFLOW PREVENTER
CB	CATCH BASIN	HYD.	HYDRANT	R.S.	RISING STEM
C/C	CENTER TO CENTER	HWB	HOT WATER BOILER	S.A.	SUPPLY AIR
CD	CONDENSATE DRAIN	HWP	HOT WATER PUMP	S.C.	SITE CONTRACTOR
CF	CHEMICAL FEED	HX	HEAT EXCHANGER	SCH.	SCHEDULE
CFH	CUBIC FEET PER HOUR	I.B.	INVERTED BUCKET	SGM	STANDARD CUBIC FEET PER MINUTE
CFM	CUBIC FEET PER MINUTE	IH	INTAKE HOOD	SECT.	SECTION
CL	CAST IRON	I.D.	IONIZATION DETECTOR OR INSIDE DIAMETER	SLP	SECONDARY LOOP PUMP
CLG.	CEILING	ID	INDIRECT DRAIN	S.P.	STATIC PRESSURE
C.O.	CLEAN OUT	IN.	INCH	SPEC.	SPECIFICATION
CONC.	CONCRETE	INV.	INVERT	SQ.	SQUARE
CONFIG.	CONFIGURATION	IS	ISOLATION	SS	SERVICE SINK, STAINLESS STEEL OR SANITARY SEWER
CONN.	CONNECTION	JST.	JOIST	STA.	STATION
CONT.	CONTINUATION	KW	KILOWATT	STM	STEAM
CONSTR.	CONSTRUCTION	LAB.	LABORATORY	SYM	SYMBOL OR SYMMETRICAL SYSTEM
CONTR.	CONTRACTOR	LB/HR	POUNDS PER HOUR	T & B	TOP AND BOTTOM
COORD.	COORDINATE	L.P.	LOW PRESSURE	TAB	TEST AND BALANCE
CTR	CENTER	L.V.	LOUVER	TD	TRENCH DRAIN
CU. FT.	CUBIC FOOT	LWT	LEAVING WATER TEMPERATURE	T.E.C.	TELECOMMUNICATION CONTRACTOR
CU. YD.	CUBIC YARD	MAV	MANUAL AIR VENT	T.O.P.	TOP OF PIPE
DI	DIGITAL INPUT	MAX.	MAXIMUM	T.O.S.	TOP OF STEEL
D.I.	DUCTILE IRON	MBH	MBTUH x 1000	TPC	TRAP PRIMER CONNECTION
DIA.	DIAMETER	M.C.	MECHANICAL CONTRACTOR	TYP.	TYPICAL
DO	DIGITAL OUTPUT	MD	MOTORIZED DAMPER	U.F.	UNDER FLOOR
DN	DOWN	MECH.	MECHANICAL	UL	UNDERWRITERS LABORATORIES
DS	DOWNSPOUT	MFR.	MANUFACTURE	UNO	UNLESS NOTED OTHERWISE
DTA	DRIP TRAP ASSEMBLY	MIN.	MINIMUM	VAV	VARIABLE AIR VOLUME
DWG.	DRAWING	MTD	MOUNTED	VERT.	VERTICAL
DX	DIRECT EXPANSION	NC	NORMALLY CLOSED	VLV.	VALVE
E.C.	ELECTRICAL CONTRACTOR	NEC	NATIONAL ELECTRICAL CODE	VOL.	VOLUME
ECC	ECCENTRIC	NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION	VSD	VARIABLE SPEED DRIVE
EFF	EFFICIENCY	NFPA	NATIONAL FIRE PROTECTION ASSOCIATION	WSHP	WATER SOURCE HEAT PUMP
EH	EXHAUST FAN	N.I.C.	NOT IN CONTRACT	WHHP	WATER-WATER HEAT PUMP
EJ	ELECTRIC HEATER	NO	NORMALLY OPEN	W/O	WITHOUT
EJ	EXPANSION JOINT	NO.	NUMBER	WB	WET BULB
EL	ELEVATION	NPSH	NET POSITIVE SUCTION HEAD	WG	WATER GAUGE
ELEC.	ELECTRIC OR ELECTRICAL	N.R.S.	NON RISING STEM	WH	WALL HYDRANT OR WALL HEATER
EQUIP.	EQUIPMENT	NSF	NATIONAL SANITATION FOUNDATION	WP	WEATHERPROOF
EQUIV.	EQUIVALENT	N.T.S.	NOT TO SCALE	WPD	WATER PRESSURE DROP
ET	EXPANSION TANK	O.A.	OUTSIDE AIR	ZD	ZONE DAMPER
EUH	ELECTRIC UNIT HEATER	O.C.	ON CENTER		
E.W.T.	ENTERING WATER TEMPERATURE	O.D.	OUTSIDE DIAMETER		
EXH.	EXHAUST	OPNG	OPENING		
EXIST.	EXISTING	OSD	OPEN SIGHT DRAIN		
		O.S.&Y.	OUTSIDE SCREW AND YOKE		
FACP	FIRE ALARM CONTROL PANEL				
FC	FLEXIBLE CONNECTION				
F.D.	FIRE DAMPER OR FLOOR DRAIN				
FL	FLOOR				
FLEX	FLEXIBLE				
FLG	FLANGE OR FLANGED				
FO	FLAT OVAL				

**SYMBOLS**

CWR	CHILLED WATER RETURN
CWS	CHILLED WATER SUPPLY
CTR	COOLING TOWER RETURN
CTS	COOLING TOWER SUPPLY
DTR	DUAL TEMP RETURN
DTSS	DUAL TEMP SUPPLY
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
LR	LOOP WATER RETURN
LS	LOOP WATER SUPPLY
LPR	LOW PRESSURE RETURN
LPS	LOW PRESSURE STEAM
L	REFRIGERANT LIQUID
S	REFRIGERANT SUCTION
HG	REFRIGERANT HOT GAS
N	NATURAL GAS
LPG	PROPANE GAS
PD	PUMP DISCHARGE
A	COMPRESSED AIR
D	DRAIN
V	VENT
CW	COLD WATER
	UNDERGROUND PIPING
	PIPING TO BE REMOVED
	PIPING TO REMAIN
	1 HR RATED WALL
	2 HR RATED WALL
	3 HR RATED WALL
	BACKFLOW PREVENTER
	PIPE TURNING UP
	PIPE TURNING DOWN
	CAPPED PIPE
	VALVE AND CAP FOR FUTURE (TYPE OF VALVE MAY VARY)
	TEE TURNED DOWN
	TEE TURNED UP
	CONCENTRIC REDUCER
	ECCENTRIC REDUCER
	45° OFFSET
	DIRECTION OF FLOW
	BACKFLOW PREVENTER (WITH BALL VALVES)
	BACKFLOW PREVENTER (WITH O.S.&Y. VALVES)
	BUTTERFLY VALVE
	BALL VALVE
	O.S.&Y. GATE VALVE
	CHECK VALVE
	2 WAY FLG ADV
	FLEXIBLE CONNECTOR
	FLOW SWITCH
	MIXING VALVE
	PRESSURE GAUGE
	PRESSURE REDUCING VALVE
	FLG PRESSURE REDUCING VALVE
	RELIEF VALVE (PRES OR T&P)
	SLEEVE
	STRAINER
	FLANGED STRAINER
	THERMOMETER
	TEMPERATURE SENSOR
	UNION
	WATER HAMMER ARRESTOR
	CONNECT TO EXISTING
	REMOVE TO THIS POINT

**SYMBOLS**

ES	EMERGENCY STOP SWITCH
PD	PRESSURE DIFFERENTIAL SENSOR
PS	ANSUL SYSTEM PULL STATION
HS	HUMIDITY SENSOR
HS	HUMIDITY SENSOR WITH GUARD
TS	TEMPERATURE SENSOR, WALL SWITCH OR SPRING TIMER FOR FAN
TS	TEMPERATURE SENSOR WITH GUARD
TS	THERMOSTAT
TS	THERMOSTAT WITH GUARD
TS	BOLLER KILL SWITCH
TS	CARBON MONOXIDE SENSOR
TS	CARBON DIOXIDE SENSOR
TS	FIRE DAMPER (VERTICAL DUCT)
TS	FIRE DAMPER (HORIZONTAL DUCT)
TS	COMBINATION FIRE/SMOKE DAMPER
SD	SMOKE DETECTOR
FS	GRILLE TYPE
FS	GRILLE TYPE
FS	NECK SIZE
FS	CFM
FS	RADIUS DUCT TAP WITH SPLITTER DAMPER
FS	FLEXIBLE DUCT TAP WITH SIDE TAKEOFF FITTING
FS	FLEXIBLE DUCT CONNECTION
FS	FLEXIBLE DUCT
FS	RIGID RECTANGULAR DUCT
FS	RIGID ROUND DUCT
FS	RIGID FLAT OVAL DUCT
FS	RIGID LINED DUCT
FS	RECT. TO RECT. TRANSITION
FS	RECT. TO RD. TRANSITION
FS	RECT. TO FO. TRANSITION
FS	ONE WAY SUPPLY GRILLE
FS	TWO WAY SUPPLY GRILLE
FS	TWO WAY CORNER SUPPLY GRILLE
FS	THREE WAY SUPPLY GRILLE
FS	FOUR WAY SUPPLY GRILLE
FS	RETURN GRILLE
FS	EXHAUST GRILLE OR CEILING EXHAUST FAN
FS	FIRE RATED WALL (REFER TO ARCHITECTURAL FOR RATINGS)
FS	MANUAL BALANCING DAMPER

**MECHANICAL SYSTEMS, SERVICE SYSTEMS AND EQUIPMENT**

**METHOD OF COMPLIANCE:**  
Prescriptive  Energy Cost Budget

Climate Zone 4A

Exterior design conditions  
winter dry bulb 17.1°F  
summer dry bulb 92.4°F  
summer wet bulb 71°F

Interior design conditions  
winter dry bulb 72°F  
summer dry bulb 75°F  
relative humidity 50%

Building heating load 132 MBH  
Building cooling load 179 MBH

**Mechanical Spacing Conditioning System**

Unitary	Refer to drawings and specifications.
description of unit	"
heating efficiency	"
cooling efficiency	"
heat output of unit	"
cooling output of unit	"

Boiler total boiler output. If oversized, state reason. N/A

Chiller total chiller capacity. If oversized, state reason. N/A

List equipment efficiencies Refer to drawings and specifications.

Equipment schedules with motors (mechanical systems)	Refer to drawings and specifications.
motor horsepower	"
number of phases	"
minimum efficiency	"
motor type	"
# of poles	"

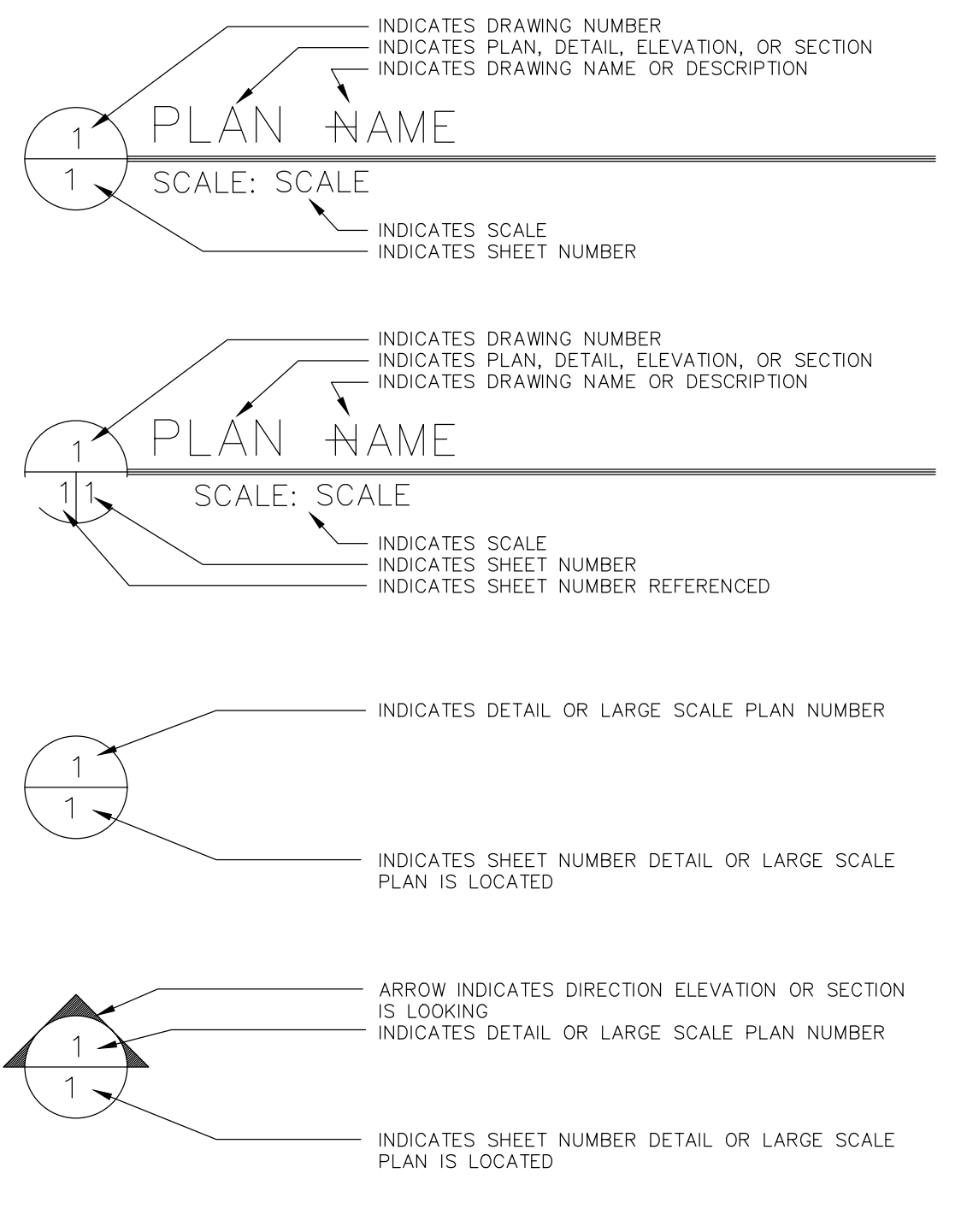
**DESIGNER STATEMENT: 1**

To the best of my knowledge and belief, the design of this building complies with the mechanical systems, service systems and equipment requirements of the North Carolina State Building code, Volume X-Entry.

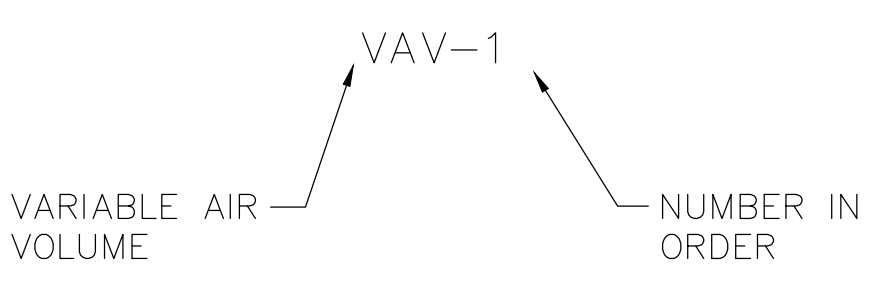
SIGNED: *Chris Stroupe III*  
NAME: Chris Stroupe III, P.E.  
TITLE: Engineer

**MECHANICAL DRAWING INDEX**

1.	MO.1	MECHANICAL COVER SHEET
2.	MD1.1	MECHANICAL DEMOLITION PLAN
3.	M1.1	MECHANICAL REVISED PLAN
4.	M2.1	MECHANICAL DETAILS
5.	M2.2	MECHANICAL DETAILS
6.	M3.1	MECHANICAL SCHEDULES
7.	M4.1	MECHANICAL SPECIFICATIONS



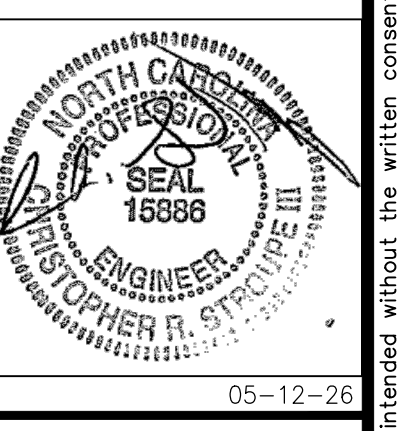
**UNIT TAG INDICATES:**



**GENERAL NOTES**

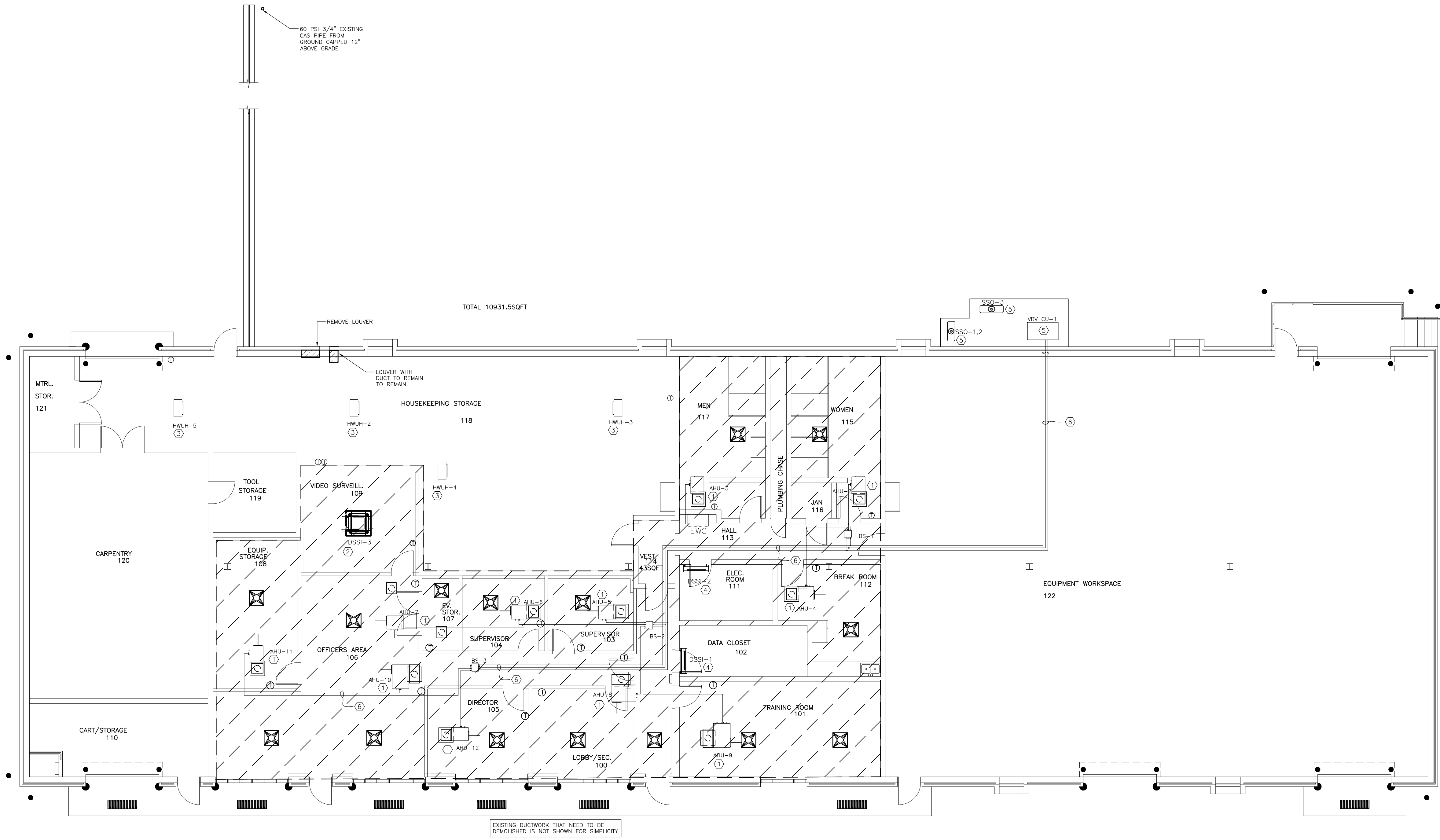
- NOT ALL SYMBOLS AND ABBREVIATIONS SHOWN ON THIS DRAWING MAY BE USED FOR THIS PROJECT.
- UNLESS OTHERWISE NOTED, EACH TRADE CONTRACTOR IS RESPONSIBLE FOR CUTTING, PATCHING TO MATCH, CORE DRILLING, ETC. AS REQUIRED TO INSTALL HIS WORK.
- ALL CONTRACTORS SHALL COORDINATE HIS WORK WITH THE WORK OF OTHER TRADES.
- SLEEVE AND SEAL ALL PIPING PENETRATIONS THRU ALL FIRE RATED ASSEMBLIES IN ACCORDANCE WITH UL LISTED SYSTEMS. ALL CORRIDOR WALLS SHALL BE ASSUMED TO HAVE A ONE HOUR RATING UNLESS NOTED OTHERWISE.
- SLEEVE AND SEAL ALL PIPING PENETRATIONS THRU ALL NON-RATED ASSEMBLIES TO REDUCE SOUND TRANSMISSION.
- CONTRACT DOCUMENT DRAWINGS FOR MECHANICAL WORK ARE DIAGRAMMATIC AND ARE INTENDED TO CONVEY SCOPE AND GENERAL ARRANGEMENT ONLY.
- PROVIDE EMERGENCY STOP SWITCH FOR THE HVAC SYSTEM AS REQUIRED BY LOCAL AUTHORITIES. COORDINATE LOCATION(S) WITH OWNER, LOCAL AUTHORITIES, AND FIRE MARSHAL. SHOW LOCATION ON AS-BUILT DRAWINGS.
- ALL OUTSIDE AIR INTAKES SHALL HAVE MOTORIZED DAMPERS. OUTSIDE AIR DUCTS FROM OAU'S TO WSPH'S SHALL HAVE MANUAL DAMPERS FOR BALANCING.
- M.C. SHALL PROVIDE EXACT LOCATIONS OF ALL OPENINGS IN MASONRY WALLS TO THE G.C. PRIOR TO WALL BEING INSTALLED. ANY OPENINGS MISSED ARE TO BE CUT BY THE MECHANICAL CONTRACTOR IN STRICT ACCORDANCE WITH THE STRUCTURAL ENGINEERS' DIRECTION.
- INSTALL ALL MECHANICAL EQUIPMENT AND APPURTENANCES IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS, CONTRACT DOCUMENTS, AND APPLICABLE CODES AND REGULATIONS.
- PROVIDE VIBRATION ISOLATION FOR ALL MECHANICAL EQUIPMENT TO PREVENT TRANSMISSION OF VIBRATION TO BUILDING STRUCTURE.
- MAINTAIN A MINIMUM OF 6"-8" CLEARANCE TO UNDERSIDE OF PIPES, DUCTS, CONDUITS, SUSPENDED EQUIPMENT, ETC., THROUGHOUT ACCESS ROUTES IN MECHANICAL ROOMS.
- ALL VALVES SHALL BE EASILY ACCESSIBLE FROM LAY-IN CEILINGS. IF NOT ACCESSIBLE FROM LAY-IN CEILING VALVES SHALL BE PROVIDED WITH ACCESS DOORS SIZED AS REQUIRED TO ACCESS VALVES. MINIMUM SIZE OF ACCESS DOORS SHALL BE 18"x18". PROVIDE FIRE RATED ACCESS DOORS AS REQUIRED BY FIRE RATINGS. MARK ALL BALANCING DAMPERS WITH RED SPRAY TAPE TO BE EASILY SEEN FROM FLOOR LEVEL.
- M.C. SHALL COORDINATE ALL FIRE RATINGS WITH THE ARCHITECTURAL DRAWINGS.
- ALL JOINTS, SEAMS AND CONNECTIONS IN DUCTWORK SHALL BE SEALED IN ACCORDANCE WITH THE NORTH CAROLINA MECHANICAL CODE.
- ALL TESTS SHALL BE COMPLETED BEFORE ANY MECHANICAL EQUIPMENT OR PIPING INSULATION IS APPLIED.
- LOCATE ALL TEMPERATURE, PRESSURE, AND FLOW MEASURING DEVICES IN ACCESSIBLE LOCATIONS WITH STRAIGHT SECTION OF PIPE OR DUCT UP AND DOWNSTEAM AS RECOMMENDED BY THE MANUFACTURER FOR GOOD ACCURACY.
- COORDINATE ALL EQUIPMENT CONNECTIONS WITH MANUFACTURERS' OUTSHEETS. COORDINATE AND PROVIDE ALL DUCT AND PIPING TRANSITIONS REQUIRED FOR FINAL EQUIPMENT CONNECTIONS. FIELD VERIFY AND COORDINATE ALL DUCT AND PIPING DIMENSIONS PRIOR TO FABRICATION.
- ALL CONTROL WIRE AND CONDUIT SHALL COMPLY WITH NATIONAL ELECTRIC CODE AND SPECIFICATIONS.
- CONCRETE HOUSEKEEPING PADS FOR MECHANICAL EQUIPMENT SHALL BE SIZED, LOCATED AND FURNISHED BY THE MECHANICAL CONTRACTOR. MINIMUM CONCRETE PAD THICKNESS TO BE 4" UNLESS NOTED OTHERWISE AND EXTEND 4" ON ALL SIDES OF THE EQUIPMENT.
- WHERE JOISTS ARE INDICATED TO BE PENETRATED WITH DUCTWORK OR PIPING, COORDINATE DUCTWORK AND PIPING LAYOUT WITH JOIST OPENING SIZE AND LOCATIONS. COORDINATION SHALL BE DONE PRIOR TO FABRICATION OF DUCTWORK AND CUTTING OF PIPING.
- THE LOCATIONS OF ALL ITEMS SHOWN ON THE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS THAT ARE NOT DEFINITELY FIXED BY DIMENSIONS ARE APPROXIMATE ONLY. THE EXACT LOCATIONS NECESSARY TO SECURE THE BEST CONDITIONS AND RESULTS MUST BE DETERMINED BY THE PROJECT SITE CONDITIONS AND SHALL HAVE THE APPROVAL OF THE ENGINEER BEFORE BEING INSTALLED. DO NOT SCALE DRAWINGS.
- ALL MISCELLANEOUS STEEL REQUIRED TO ENSURE PROPER INSTALLATION AND AS SHOWN IN DETAILS FOR PIPING, DUCTWORK AND EQUIPMENT (UNLESS NOTED OTHERWISE) SHALL BE FURNISHED AND INSTALLED BY THE MECHANICAL CONTRACTOR.
- ALL DUCTWORK, PIPING AND EQUIPMENT SUPPORTED FROM STRUCTURAL STEEL SHALL BE COORDINATED WITH GENERAL CONTRACTOR.
- MECHANICAL EQUIPMENT, DUCTWORK AND PIPING SHALL NOT BE SUPPORTED FROM METAL DECKING.
- ALL ROOF MOUNTED EQUIPMENT CURBS FOR MECHANICAL EQUIPMENT SHALL BE PROVIDED AND INSTALLED BY MECHANICAL CONTRACTOR.
- ALL AIR CONDITIONING CONDENSATE DRAIN LINES FROM EACH AIR HANDLING UNIT AND ROOFTOP UNIT SHALL BE PIPED FULL SIZE OF THE UNIT DRAIN CONNECTION, WITH P-TRAP AND PIPED TO NEAREST DRAIN - BY M.C. INDOOR UNITS LOCATED ABOVE CEILING AND ON MEZZANINES TO BE PIPED TO NEAREST DRAIN AS SHOWN ON PLUMBING PLANS. CONDENSATE DRAIN SYSTEM TO BE PROVIDED BY P.C. REFER TO PLUMBING DRAWINGS FOR CONTINUATION OF CONDENSATE DRAINS IN WALLS. COORDINATE LOCATION OF DRAIN CONNECTIONS WITH PLUMBING CONTRACTOR.
- REFER TO TYPICAL DETAILS FOR DUCTWORK, PIPING AND EQUIPMENT INSTALLATION.
- PROVIDE AIR VENTS AT HIGH POINTS IN LOOP AND HOT WATER PIPING. PROVIDE HOSE END DRAIN VALVES AT BOTTOM OF ALL RISERS AND LOW POINTS. SHOW LOCATIONS OF ALL VENTS AND DRAINS ON AS-BUILT DRAWINGS.
- INSTALL PIPING SO THAT ALL VALVES, STRAINERS, UNIONS, TRAPS, FLANGES AND OTHER APPURTENANCES REQUIRING ACCESS ARE ACCESSIBLE.
- ALL VALVES SHALL BE INSTALLED SO THAT VALVE REMAINS IN SERVICE WHEN EQUIPMENT OR PIPING ON EQUIPMENT SIDE OF VALVE IS REMOVED.
- ALL VALVES (EXCEPT CONTROL VALVES) AND STRAINERS SHALL BE FULL SIZE OF PIPE BEFORE REDUCING SIZE TO MAKE CONNECTIONS TO EQUIPMENT.
- ALL BALANCING VALVES AND BUTTERFLY VALVES SHALL BE PROVIDED WITH POSITION INDICATORS AND MAXIMUM ADJUSTABLE STOPS (MEMORY STOPS).
- PROVIDE FLEXIBLE CONNECTIONS IN ALL PIPING SYSTEMS CONNECTED TO PUMPS, TOWERS AND OTHER EQUIPMENT WHICH REQUIRE VIBRATION ISOLATION EXCEPT WATER COLLS. FLEXIBLE CONNECTIONS SHALL BE INSTALLED AS CLOSE TO THE EQUIPMENT AS POSSIBLE OR AS INDICATED ON THE DRAWINGS.
- ALL PIPING WORK SHALL BE COORDINATED WITH ALL TRADES INVOLVED. OFFSETS IN PIPING AROUND OBSTRUCTIONS SHALL BE PROVIDED AT NO ADDITIONAL COST TO OWNER.
- CERTAIN ITEMS SUCH AS RISERS AND DROPS IN DUCTWORK, ACCESS DOORS, VOLUME DAMPERS, ETC., ARE INDICATED ON THE CONTRACT DOCUMENT DRAWINGS FOR CLARITY FOR A SPECIFIC LOCATION REQUIREMENT AND SHALL NOT BE INTERPRETED AS THE EXTENT OF THE REQUIREMENTS FOR THESE ITEMS.
- ALL DUCTWORK DIMENSIONS, AS SHOWN ON DRAWINGS, ARE INSIDE CLEAR DIMENSIONS. THE FIRST 20 FEET OF DUCTWORK FROM ANY AIR HANDLER, RTU, ERY OR WSPH PROVIDING 3000 CFM OR MORE SHALL BE DOUBLE WALL CONSTRUCTION (PERFORATED INNER WALL) WITH 1.0 INCH THICK DUCT LINER FOR SOUND ATTENUATION.
- COORDINATE DIFFUSER, REGISTER AND GRILLE LOCATIONS WITH ARCHITECTURAL. REFLECTED CEILING PLANS, LIGHTING, AND OTHER CEILING ITEMS AND MAKE MINOR MODIFICATIONS TO SUIT. VERIFY GRILLE TYPES WITH ARCHITECTURAL CEILING AND RATING PRIOR TO BID/SUBMITTAL.
- LOCATE ALL MECHANICAL EQUIPMENT TO PROVIDE UNOBSTRUCTED ACCESS TO UNIT ACCESS PANELS, CONTROLS AND VALVING.
- PROVIDE FLEXIBLE CONNECTIONS IN ALL DUCTWORK SYSTEMS CONNECTED TO AIR HANDLERS, FANS AND OTHER EQUIPMENT WHICH REQUIRE VIBRATION ISOLATION. FLEXIBLE CONNECTIONS SHALL BE PROVIDED AT THE POINT OF CONNECTION TO THE EQUIPMENT UNLESS NOTED OTHERWISE.
- ALL DUCTWORK SHALL BE COORDINATED WITH ALL TRADES INVOLVED. OFFSETS IN DUCTS, INCLUDING DIVIDED DUCTS AND TRANSITIONS AROUND OBSTRUCTIONS, SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
- PROVIDE ACCESS DOORS IN DUCTWORK TO PROVIDE ACCESS FOR ALL SMOKE DETECTORS, FIRE DAMPERS, SMOKE DAMPERS AND OTHER ITEMS LOCATED IN THE DUCTWORK WHICH REQUIRE SERVICE OR INSPECTION.
- ALL THERMOSTATS OR SENSORS LOCATED IN CORRIDORS OR OTHER PUBLIC AREAS ARE TO BE PROVIDED WITH METAL LOOK-ALIKE COVERS OR GUARDS.
- LOCATE ALL AIR HANDLER/WSHP/DDC CONTROLLERS IN ACCESSIBLE LOCATION. PROVISION SHALL BE MADE TO PROVIDE SERVICE CLEARANCE FOR CONTROL BOX IF IT COMES FACTORY INSTALLED ON UNIT. OTHERWISE FIELD INSTALL BOX REMOTELY. REFER TO PIPING PLANS FOR POWER JUNCTION BOXES LOCATION.
- REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES AND ELEVATIONS.
- MECHANICAL CONTRACTOR TO INSTALL SMOKE DETECTORS FURNISHED BY E.C. AND WIRE THEM TO SHUT DOWN UNITS THEY SERVE.
- WHERE COMBO FIRE/SMOKE DAMPER AND SMOKE DETECTOR INSTALLED IN RATED DUCT CHASE CONTRACTOR TO PROVIDE RATED ACCESS DOOR IN CHASE AND STANDARD DOOR IN DUCT. MINIMUM ACCESS DOOR SIZE IS 18"x18".

**CONSULTANT ENGINEERING SERVICE, INC.**  
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FTCC FORSYTH BLDG  
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WINSTON-SALEM, NC 27103  
2100 SILAS CREEK PKWY.

MECHANICAL COVER SHEET  
DATE: 05/12/2026  
CES LICENSE NO. F-0238  
SHEET NO. MO.1



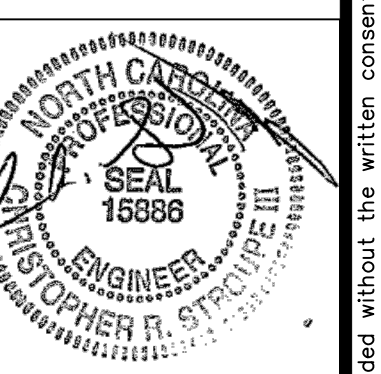
1 PLAN - MECHANICAL DEMOLITION FLOOR PLAN  
MD1.1 SCALE: 1/8"=1'-0"

MECHANICAL DEMOLITION & RENOVATION NOTES	MECHANICAL DEMOLITION & RENOVATION NOTES
<p>1. THESE DEMOLITION DRAWINGS ARE BASED ON EXISTING FACILITY AS-BUILT DRAWINGS AND ENGINEERING SITE VISITS. THEY ARE NOT GUARANTEED TO BE EITHER COMPLETE OR FULLY ACCURATE. THE CONTRACTOR SHOULD VERIFY ALL EXISTING CONDITIONS PRIOR TO BIDDING AND STARTING ANY DEMOLITION WORK.</p> <p>2. REMOVE EXISTING SYSTEMS ENTIRELY. REMOVE EXISTING EQUIPMENT OR DUCTWORK SHOWN OR INDICATED TO BE REMOVED ON THIS DRAWING UNLESS THEY ARE CALLED OR INDICATED TO REMAIN OR ABANDON ON RENOVATION FLOOR PLANS. COORDINATE FOR PATCHING &amp; ROOFING.</p> <p>3. THE OWNER RESERVES THE RIGHT TO RETAIN ANY MATERIALS REMOVED. ALL MATERIALS NOT RETAINED BY THE OWNER MUST BE DISPOSED OF OFF SITE.</p> <p>4. ALL OPENINGS LEFT BY DEMOLITION/CONSTRUCTION SHALL BE PATCHED AS REQUIRED TO RECEIVE NEW FINISHES AFTER DISCONNECTING FROM EXISTING THAT REMAINS AND DEMOLISHING ANY HVAC EQUIPMENT AND PIPES. CAP THE REMAINING DUCTS &amp; PIPES. COORDINATE TO RESTORE (AND PAINT) ROOF, WALLS, FLOOR &amp; PAVEMENT MATCH TO EXISTING OR BETTER. ALL OPENINGS AT EXTERIOR WALLS OR ROOF SHALL RECEIVE POLYISO INSULATION W/ VAPOR BARRIER, ROOFING WORK SHALL BE DONE BY PROFESSIONAL ROOFING SUB-CONTRACTOR, Hired BY M.C. OR COORDINATED WITH G.C. ACCESS DOORS AT RATED WALLS PENETRATIONS.</p> <p>5. PROVIDE FIRE DAMPERS W/ ACCESS DOORS AT RATED WALLS PENETRATIONS.</p> <p>6. THE MECHANICAL CONTRACTOR SHALL VISIT THE SITE AND EXAMINE EXISTING CONDITIONS PRIOR TO BIDDING. EXAMINE PROJECT DRAWINGS, DETAILS, SCHEDULES, AND SPECIFICATIONS TO DEVELOP A FULL UNDERSTANDING OF THE PROJECT SCOPE.</p>	<p>7. REMOVE ALL EXISTING INDICATED UNITS TO BE REMOVED WITH RELATED DUCTWORK, PIPING &amp; CLG. GRILLES, INSULATION, POWER &amp; CONTROL WIRING, THERMOSTATS, REMOVE CONDOLITS, BREAKERS, HANGERS AND SUPPORT.</p> <p>CONDENSATE DRAIN SHALL BE REMOVED TO THE POINT WHERE PIPE DROPS INTO WALL (CHASE) OR CONNECTED TO THE MAIN. CAP REMAINING PIPE MAINS SHALL STAY FUNCTIONAL.</p> <p>CAP HOT WATER PIPING FOR UNIT HEATERS, THAT BEING REMOVED, AND ABANDON IN PLACE. VERIFY DEMOLISHING WORK IN THE FIELD.</p> <p>REMOVE OUTSIDE AIR DUCTWORK FROM INDOOR UNITS BACK TO INTAKE HOODS. REMOVE DAMPERS AND CAP EACH BRANCH, CONNECTED TO INTAKE HOOD.</p> <p>8. REMOVED ALL REFRIGERANT AND CONTAINING EQUIPMENT SHALL BE DECOMMISSIONED IN ACCORDANCE WITH SECTION 609 OF THE EPA CLEAN AIR ACT AND ALL WORK SHALL BE PERFORMED BY AN EPA CERTIFIED REFRIGERANT TECHNICIAN. REFRIGERANT SHALL BE RECLAIMED INTO 125# REFRIGERANT STORAGE CYLINDER(S) AND SHALL BE CLEANED AND CERTIFIED PRIOR TO BEING TURNED OVER TO THE OWNER. DOCUMENT # OF REFRIGERANT REMOVED AND # OF CERTIFIED REFRIGERANT TECHNICIAN. THE MECHANICAL CONTRACTOR SHALL DELIVER THE REFRIGERANT TO THE OWNER AND OBTAIN A SIGNATURE OF THE RECEIVING PERSONNEL TO DOCUMENT IT BEING TURNED OVER TO THE OWNER. A COPY OF THE DOCUMENTATION SHALL BE INCLUDED IN THE PROJECT IOM MANUAL. THE MECHANICAL CONTRACTOR SHALL PROVIDE REFRIGERANT STORAGE CONTAINERS AS NECESSARY.</p>

NOTES APPLY UNLESS OTHERWISE NOTED ON DRAWINGS.

MECHANICAL KEY NOTES FOR ALL DEMOLITION PLANS
① DISCONNECT AND REMOVE ABOVE CLG. DUCTED UNIT.
② DISCONNECT AND REMOVE CLG. CASSETTE.
③ DISCONNECT AND REMOVE HOT WATER UNIT HEATER.
④ DISCONNECT AND REMOVE. REMOVE CONDENSATE DRAIN AND CAP AT THE WALL.
⑤ DISCONNECT AND REMOVE WITH ALL PIPING.
⑥ REFRIGERANT PIPING - REMOVE ENTIRELY.

CEILING NOTES
1. AREAS INDICATED BY HATCH ON DEMO PLAN - IS LAY-IN CEILING. OWNER WILL REMOVE EXISTING LAY-IN CEILING W/ CEILING GRID AS NEEDED TO ALLOW CONTRACTOR TO PERFORM HIS DEMOLISHING AND RENOVATION WORK. CONTRACTOR TO COORDINATE. CONTRACTOR MUST REUSE EXISTING DUCTWORK & CLG. DIFFUSERS - REFER TO NOTE ON REVISED PLANS. BEFORE DEMOLISH CEILING ALL EXISTING CEILING AND ABOVE CEILING EQUIPMENT, LIGHT FIXTURES, CABLES, AND DEVICES (EXIT SIGNS, SECURITY CAMERAS, SPEAKERS, ETC) SHALL BE PROPERLY SUPPORTED FROM THE STRUCTURES AND REMAIN OPERATIONAL - BY OWNER. SECURITY AND FIRE ALARM SYSTEMS SHALL STAY ACTIVE ALL THE TIME DURING RENOVATION.
2. EXISTING CEILING SHALL BE REINSTALLED AFTER ALL EQUIPMENT & DUCTWORK TESTED FOR AIR LEAKAGE AND PROPER PERFORMANCE. DAMAGED GRID & CEILING TILES SHALL MATCH TO EXISTING - BY OWNER.
3. PATCH AND REPAINT ENTIRE WALL SURFACE IF DAMAGED - BY M.C.
4. M.C. TO BALANCE HVAC SYSTEMS AND SUBMIT THE TAB REPORT.



05-12-26

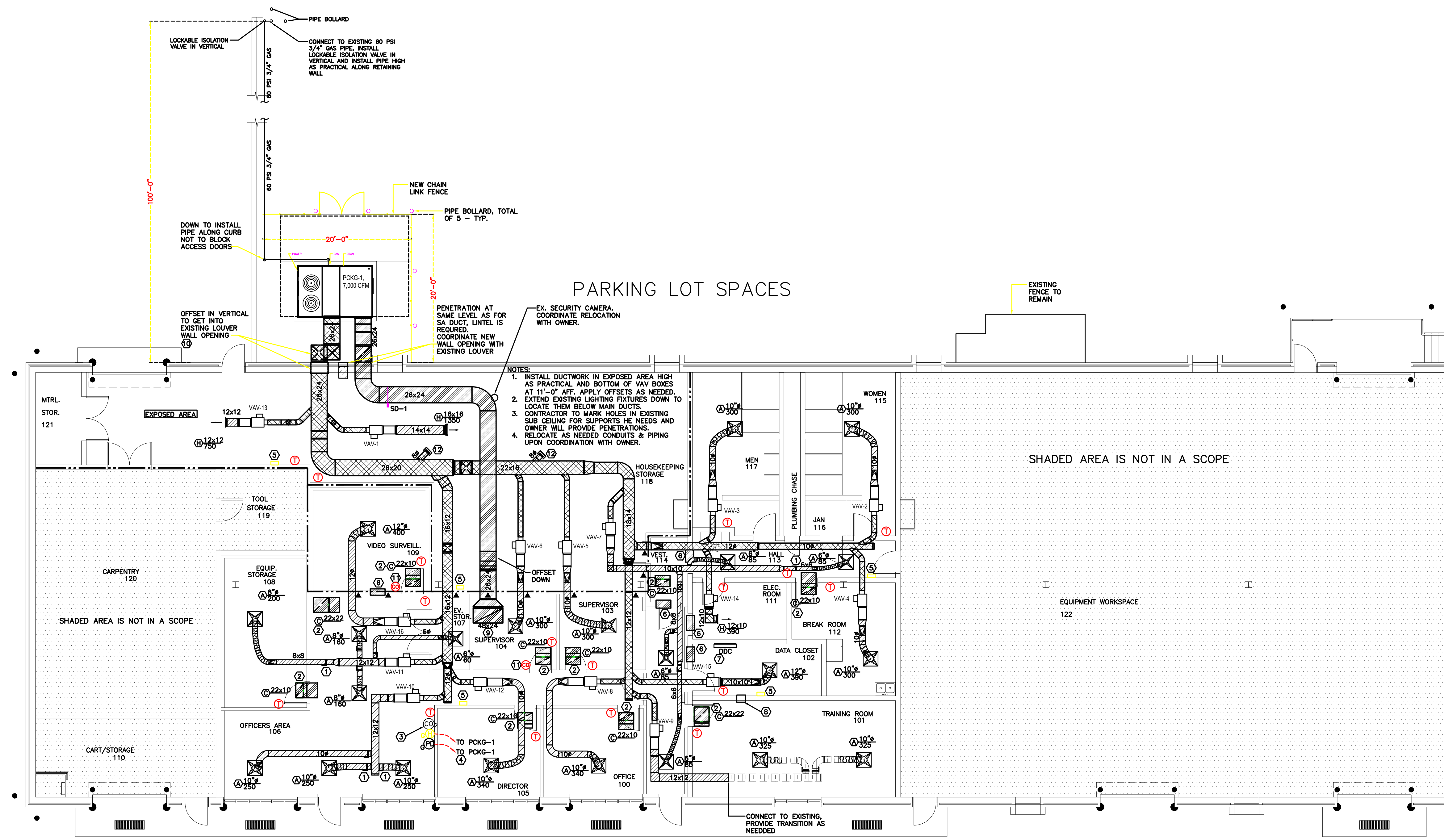
FTCC FORSYTH BLDG  
HVAC RENOVATION  
2100 SILAS CREEK PKWY, WINSTON-SALEM,  
NC 27103

DATE  
05/12/2026  
CES LICENSE NO. F-0238

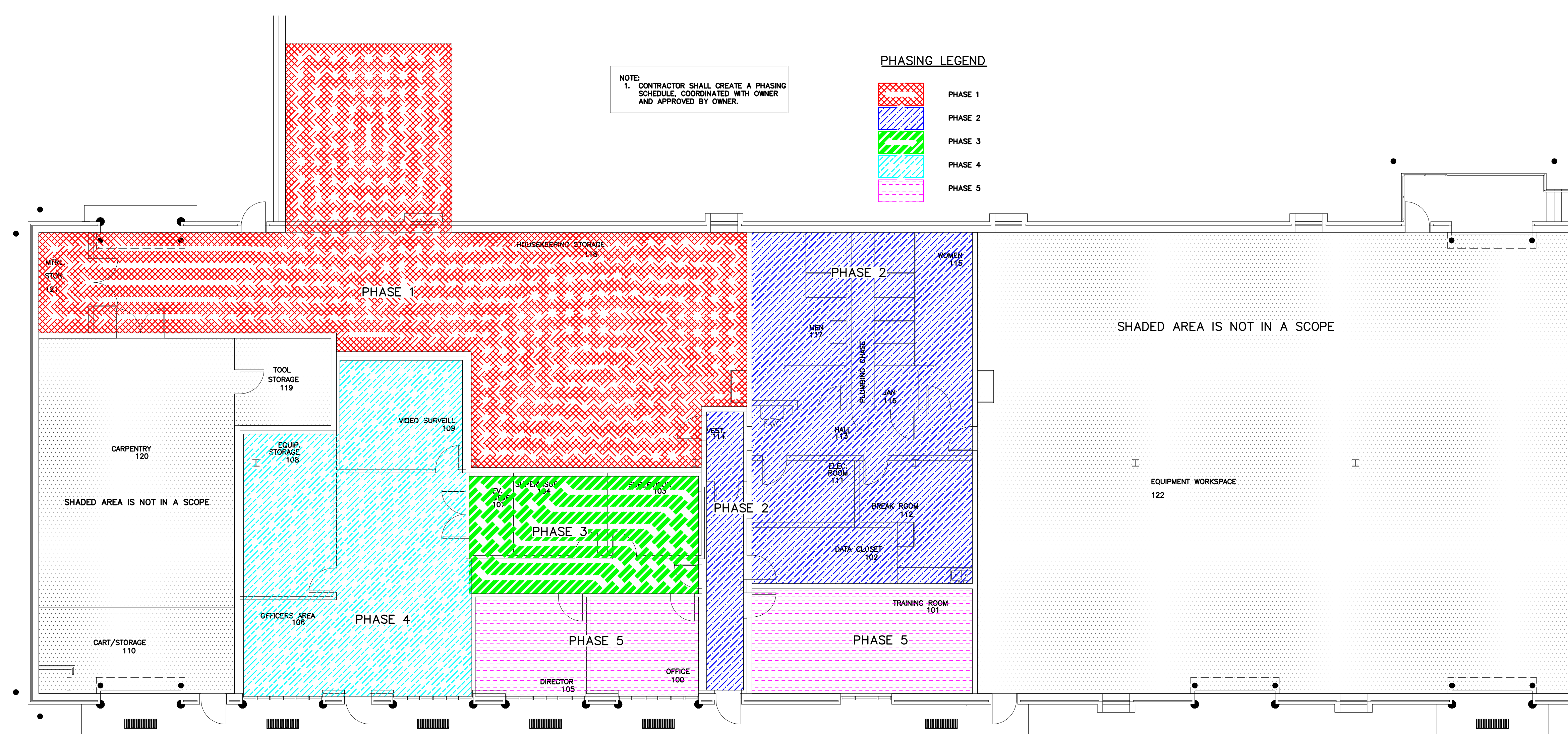
SHEET TITLE	DATE
MECHANICAL DEMOLITION PLAN	05/12/2026
DRAWN BY ED	PROJECT NO. 4611
APPROVED BY CES	REVISION
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SHEET NUMBER  
MD1.1

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1 PLAN - MECHANICAL RENOVATION FLOOR PLAN  
M1.1 SCALE: 1/8"=1'-0"



2 PLAN - PHASING PLAN  
M1.1 SCALE: 1/8"=1'-0"

**NOTES FOR OUTDOOR PACKAGE UNIT:**

1. PROVIDE CURB ON TOP OF CONCRETE PAD AS SHOWN. GUT ASPHALT PAVEMENT AS NEEDED TO INSTALL PAD. LEVEL IT. PAD SHALL BE MIN. 4" HIGHER THAN SURROUNDING SURFACE. CONCRETE FINISH TO BE PERFORMED SO AS TO LEAVE A LEVEL SURFACE WITH SLOPE AWAY FROM BUILDING. SURFACE FINISH IS TO BE PERFORMED WITH A LASER SLOTTED AND FINISHED TO WITHIN 1/8" TOLERANCE. THE REQUIRED CURB HEIGHT SHALL NOT BE LESS THAN 12". PROVIDE EXPANSION JOINTS AND MATERIALS AS PER CONCRETE GUIDELINES.
2. ALL EXTERIOR DUCT SHALL RECEIVE MIN. OF R-8 INSULATION. ALL DUCTWORK (EA & RA) SHALL COMPLY DETAIL FOR EXTERIOR DUCTWORK. SUPPORT DUCT ALONG WALL WITH BRACKETS.
3. OWNER WILL LOCATE THE EXISTING STORM UNDERGROUND PIPE. CONTRACTOR TO EXTEND FULL SIZE OF EQUIPMENT CONNECTION PVC CONDENSATE DRAIN FROM UNIT TO HUB DRAIN PROVIDED BY OWNER. CONTRACTOR TO PROVIDE "TRAP" W/ HEAT TRACE AND INSULATION AND PIPES SUPPORT REFER TO DETAILS.
4. FOR ELECTRICAL: PROVIDE ONE (1) RECEPTACLE AT WALL FOR UNIT.
5. PROVIDE NEW 6 FT HEIGHT CHAIN LINK FENCE WITH GATES AS SHOWN. POLY/W/ CONCRETE FOUNDATION AT THE CORNERS AND EXTERIOR WALLS.
6. RESTORE ALL DISTURBED PAVEMENTS & CURBS MATCH TO EXISTING.
7. GAS & CONDENSATE AS WELL AS POWER & CONTROL WIRING SHALL BE INSTALLED SUCH A WAY NOT TO BLOCK ACCESS DOORS AND PANELS.

**DUCT LEGEND**

[Symbol]	SUPPLY DUCT (LOW PRESSURE). INTERIOR: EXTERNALLY INSULATED WITH 2" INSULATION. EXTERIOR: REFER TO EXTERIOR DUCT INSULATION DETAIL.
[Symbol]	RETURN DUCT (LOW PRESSURE). INTERIOR: EXTERNALLY INSULATED WITH 2" INSULATION. EXTERIOR: REFER TO EXTERIOR DUCT INSULATION DETAIL.
[Symbol]	GENERAL EXHAUST AIR (EA) DUCT. NO INSULATION.
[Symbol]	ERV OR RTU SUPPLY OR MEDIUM PRESSURE AIR DUCT. INTERIOR: EXTERNALLY INSULATED WITH 2" INSULATION. EXTERIOR: REFER TO EXTERIOR DUCT INSULATION DETAIL.
[Symbol]	ERV OR RTU RETURN AIR DUCT. INTERIOR: EXTERNALLY INSULATED WITH 2" INSULATION. EXTERIOR: REFER TO EXTERIOR DUCT INSULATION DETAIL.
[Symbol]	OUTSIDE AIR DUCT. INTERIOR: EXTERNALLY INSULATED WITH 2" INSULATION. EXTERIOR: REFER TO EXTERIOR DUCT INSULATION DETAIL.
[Symbol]	ERV EXHAUST AIR DUCT. INTERIOR: EXTERNALLY INSULATED WITH 2" INSULATION.
[Symbol]	EXISTING DUCT
[Symbol]	FLEXIBLE DUCT TO DIFFUSERS, (MAX LENGTH 10'-0"). EXTERNALLY INSULATED WITH 2" INSULATION.

**NOTES:**

1. RECTANGULAR & ROUND DUCTS: DIMENSIONS LISTED ARE ACTUAL DUCT SIZES. ADD INSULATION PER SPECS.
2. DOUBLE WALL SPIRAL DUCTS: DIAMETER LISTED IS INNER WALL SIZE. OUTER DIAMETER SHALL BE 2" LARGER TO ACCOMMODATE THE 1" WALL THICKNESS.
3. ALL DUCTWORK SHALL FOLLOW THIS CHART BY DEFAULT UNLESS SPECIFICALLY NOTED OTHERWISE IN PLAN KEYNOTES. IF THIS OCCURS, IT APPLIES ONLY TO THE DUCT NOTED.

**DEFINITION OF DUCTWORK TYPES**

EXTERIOR DUCT	- INSTALLED OUTSIDE OF BUILDING THERMAL ENVELOPE ABOVE ROOF LINE, IN THE ATTIC, ON SERVICE PLATFORM OR IN CRAWL SPACE
INTERIOR CONCEALED DUCT	- INSTALLED WITHIN BUILDING THERMAL ENVELOPE ABOVE CEILING, IN SERVICE PLATFORM OR IN CHASES
INTERIOR EXPOSED DUCT	- INSTALLED WITHIN BUILDING THERMAL ENVELOPE BELOW CEILING OR IN SPACES WITH OPEN STRUCTURES

**GENERAL NOTES (TYPICAL FOR ALL MECHANICAL SHEETS)**

1. PROVIDE BALANCING DAMPERS FOR SUPPLY & RETURN (SOME NOT SHOWN FOR CLARITY). DO NOT USE OPPOSED BLADE DAMPERS IN GRILLE FROM BALANCING.
2. PROVIDE BALANCING DAMPERS FOR ALL EXHAUST DUCT GRILLES AND RUNOUTS.
3. ALL EXTERIOR REFRIGERANT PIPES SHALL BE INSULATED W/ 1" FOAM AND COVERED W/ 0.032 EMERGENCY STOP SWITCH FOR EACH HVAC IN READY ACCESSIBLE LOCATION AS DETERMINED BY LOCAL CODE OFFICIALS.
11. PROVIDE ACCESS DOOR IN DUCT AS WELL AS IN INACCESSIBLE CEILING OR WALLS FOR ALL BALANCING, FIRE SMOKE OR COMBINATION FIRE/SMOKE DAMPERS, SMOKE DETECTORS, ELECTRIC DUCT HEATERS, VALVES, ACCESS DOOR SHALL BE 18" X 18" OR AS LARGE AS THE DUCT PERMITS. ACCESS DOORS SHALL BE PROVIDED FOR EQUIPMENT INSTALLED ABOVE CEILING (OR IN THE ATTIC) IN ALL INACCESSIBLE CEILING.
12. ALL EXTERIOR REFRIGERANT PIPES WITH LIMITED USER OVERSIDE SPACE THERMOSTAT INSTALL AS PER DRAWING.
13. FIELD COORDINATE ALL DUCTWORK OPENINGS, LINETS WITH STRUCTURE AND OTHER TRADES. WALL PENETRATIONS COORDINATE WITH G.C. MECHANICAL. M.C. IS RESPONSIBLE FOR ALL LINETS. M.C. IS RESPONSIBLE IF MISSED. PROVIDE FIRE STOPPING FOR ALL PENETRATIONS PROVIDED BY E.C. MINIMUM 3 FT DISTANCE REQUIRED FROM THE EDGE OF DIFFUSER TO THE SMOKE DETECTOR.
14. PROVIDE EMERGENCY STOP SWITCH FOR EACH HVAC IN READY ACCESSIBLE LOCATION AS DETERMINED BY LOCAL CODE OFFICIALS.
15. EXTERIOR AIR (UNLESS OTHERWISE NOTED) NO FLEX DUCT ALLOWED. RECTANGULAR AND ROUND SPIRAL DUCTWORK SHALL BE 1" INSULATED DOUBLE WALL GALVANIZED METAL FULL PIPE INSULATION (INCLUDING CONDENSATE AND REFRIGERANT) SHALL BE COVERED WITH STICK LINELINE. ALL DUCTWORK SHALL BE COVERED WITH STICK LINELINE. ALL DUCTWORK SHALL BE COVERED WITH STICK LINELINE. ALL DUCTWORK SHALL BE COVERED WITH STICK LINELINE. ALL DUCTWORK SHALL BE COVERED WITH STICK LINELINE.
16. COORDINATE AIR DIFFUSERS LOCATION WITH LIGHT FIXTURES AND AREA SMOKE DETECTORS PROVIDED BY E.C. MINIMUM 3 FT DISTANCE REQUIRED FROM THE EDGE OF DIFFUSER TO THE SMOKE DETECTOR.
17. ABOVE CEILING SPACE ON ALL LEVELS IS EMPLOYED BY MECHANICAL SYSTEM AS A RETURN AIR PLENUM. ALL MATERIALS SHALL BE NON-COMBUSTIBLE. ALL MATERIALS SHALL BE NON-COMBUSTIBLE. ALL MATERIALS SHALL BE NON-COMBUSTIBLE. ALL MATERIALS SHALL BE NON-COMBUSTIBLE.
18. ALL HVAC EQUIPMENT ABOVE CEILING SHALL BE INSTALLED (BOTTOM) MAX. 24" ABOVE CEILING AND DUCTWORK HIGH AS PRACTICAL.
19. PROVIDE TURN VANES FOR ALL ELBOWS IN RECTANGULAR DUCTWORK.

**NOTE:** DISCONNECTS, MOTOR CONTROLLERS, MOTOR RATED AND MOTOR SENTINEL SWITCHES, ETC. FOR HVAC EQUIPMENT SHALL BE FURNISHED BY THE MECHANICAL CONTRACTOR AND INSTALLED BY THE ELECTRICAL CONTRACTOR. THE ELECTRICAL CONTRACTOR SHALL PROVIDE POWER WIRING TO THE LINE SIDE ONLY. THE MECHANICAL CONTRACTOR SHALL PROVIDE WIRING FROM THE LOAD SIDE OF THE DISCONNECTS, CONTROLLERS, ETC. INTO THE EQUIPMENT. THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONTROL WIRING TO MECHANICAL EQUIPMENT. ALL DISCONNECTS SHALL BE RATED AS "HEAVY DUTY" AND FUSED OR NON-FUSED AS REQUIRED.

**NOTE:** MECHANICAL CONTRACTOR SHALL PROVIDE THE EQUIPMENT (START UP), TECHNICIAN AND MANUFACTURER CONTROLS. TECHNICIAN SHALL BE PRESENT ON SITE FOR 1 WEEK AFTER OCCUPANCY AND 1 WEEK AT THE BEGINNING OF THE FOLLOWING SEASON TO PROVIDE SUPPORT, TROUBLESHOOT AND REPAIR MECHANICAL MALFUNCTIONS.

**MECHANICAL KEY NOTES FOR ALL MECHANICAL PLANS**

1. MANUAL BALANCING DAMPER - TYPICAL AT EACH SUPPLY, RETURN & EXHAUST BRANCH.
2. PLENUM RETURN AIR GRILLE WITH ELBOW FULL SIZE OF GRILLE - TYPICAL PER DETAIL.
3. SHALL MODULATE 0-100% PACKAGE UNIT OR DAMPER FROM MIN. TO MAX. WHEN CO2 PPM AT LOW 1000 (ADA) AND HIGH 2000 (ADA) PPM.
4. SPACE PRESSURE DIFFERENTIAL SENSOR SHALL CONTROL PACKAGE UNIT OUTSIDE AIR DAMPER TO MAINTAIN +/-0.05(ADA) W.C. PRESSURE.
5. LOCATION OF JUNCTION BOX ABOVE CEILING FOR DDC CONTROLS (DO NOT PROVIDE BY E.C. POWER CONNECTIONS AT OTHER LOCATIONS WILL BE THE RESPONSIBILITY OF THE CONTROLS SUBCONTRACTOR. CONTROL WIRING BY CONTROLS CONTRACTOR. FOR SERVICE PLATFORMS (IF NO WALL) INSTALL BOX ON UNISTRUT ACCESSIBLE FROM FLOOR.
6. 24X16 (OR PER PLANS) AIR TRANSFER "SOUND BOOTH" ABOVE CEILING THRU CONTINUOUS WALL. INSTALL HIGH AS PRACTICAL. REFER TO DETAIL. PROVIDE FIRE DAMPER AT RATED WALL. PROVIDE SIDEWALL GRILLE IN EXPOSED AREAS.
7. DDC SHALL CONTROL ALL HVAC SYSTEMS, INCLUDING, BUT NOT LIMITED, VAV PACKAGE WITH ALL BOXES. COORDINATE LOCATION W/ OWNER.
8. REMOVE EXISTING DUCT THRU WALL AND LEAVE WALL OPENING FOR AIR TRANSFER.
9. TERMINATE RETURN AIR DUCT W/ ELBOW UP AND SCREEN W/ STAINLESS STEEL BIRD SCREEN.
10. REUSE WALL OPENING FOR REMOVED EXISTING LOUVER. ADJUST AS NEEDED. ALL GAPS SHALL BE SEALED AT NOT MORE THAN 10'-0" O.C. TOP AND BOTTOM RAILS PIPE SECTIONS SHALL BE NOT LESS THAN 18" LONG AND SHALL BE FITTED WITH COMPOUND FOR CONNECTED LENGTHS INTO CONTINUOUS RUN. COUPLINGS SHALL BE NOT LESS THAN 6" LONG WITH 1/2" WALL THICKNESS AND SHALL ALLOW FOR EXPANSION AND CONTRACTION OF THE TOP RAIL. THE TOP RAIL SHALL PASS THROUGH THE LINE POSTS. THE RAIL SHALL BE SECURELY CONNECTED TO END AND CORNER POSTS WITH GALVANIZED STEEL CONNECTORS. GATES SHALL HAVE A FRAME FABRICATED FROM 1-7/8" OD GALVANIZED STEEL PIPE WITH EITHER WELDED JOINTS OR SECURELY CONNECTED WITH GALVANIZED STEEL CONNECTORS. THE COMPLETE INSTALLATION SHALL BE IN ACCORDANCE WITH THE FENCE SYSTEMS MANUFACTURER'S WRITTEN INSTRUCTIONS. FENCE POSTS SHALL BE SET IN PLACE PRIOR TO CONCRETE PADS BEING POURED. PROVIDE DECORATIVE SLATS IN FENCE. COLOR SELECTION BY TYPICAL.
11. CARBON MONOXIDE SHALL BE WIRE TO FIRE ALARM SYSTEM W/ AUDIO ALARM INSTALLED IN THE SPACE. PROVIDED, INSTALLED AND WIRED BY E.C. TO WIRE IT TO SHUT DOWN CORRESPONDING GAS FRED UNIT.
12. CAP FOR FUTURE.

**IMPORTANT:**

1. CONTRACTOR HAS A RIGHT TO REUSE EXISTING DUCTWORK & DIFFUSERS IF THEY ARE IN APPROPRIATE CONDITION AND NOT SMALLER IN SIZE AS INDICATED ON REVISED PLANS. IF EXISTING DIFFUSERS REUSED, THEY HAVE TO BE CLEANED, AND NEW DIFFUSERS MODEL PROVIDED SHALL MATCH TO EXISTING REGARDLESS AS IT SPECIFIED IN THE SCHEDULES.

**SPECIFIC NOTES FOR VAV SYSTEMS**

1. THE MEDIUM PRESSURE SUPPLY & RETURN AIR DUCTS FROM RTU'S OR PACKAGE UNIT SHALL BE SINGLE WALL INSULATED RECTANGULAR OR ROUND.
2. ALL MEDIUM-PRESSURE DUCTS (SUPPLY & RETURN) SHALL BE SEALED IN ACCORDANCE WITH NC MECHANICAL CODE AND SHALL BE LEAK TESTED IN ACCORDANCE WITH THE SMACNA HVAC AIR DUCT LEAKAGE TEST MANUAL.
3. SHALL MODULATE 0-100% PACKAGE UNIT OR DAMPER FROM MIN. TO MAX. WHEN CO2 PPM AT LOW 1000 (ADA) AND HIGH 2000 (ADA) PPM.
4. SPACE PRESSURE DIFFERENTIAL SENSOR SHALL CONTROL PACKAGE UNIT OUTSIDE AIR DAMPER TO MAINTAIN +/-0.05(ADA) W.C. PRESSURE.
5. IN AREAS SURROUNDED WITH 1-HR FIRE BARRIER WALLS NO FLEX DUCT ALLOWED, RIGID ONLY.
6. PRIMARY INLET DUCT SHALL BE SAME SIZE AS VAV BOX INLET IS, UNLESS OTHERWISE NOTED ON THE DRAWING, AND HAVE MINIMUM TWO DIAMETERS OF STRAIGHT DUCT REQUIRED FOR PROPER FLOW READING. DUCT TAPS SHALL BE MADE USING LOW LOSS FITTINGS: Y-TEES, BEVELED OR BELLOWSH TAPS AND SMOOTH 1.5 RADIUS ELBOWS.
7. ALL VAV BOXES SHALL BE FIELD CONVERTIBLE FROM LEFT-HAND TO RIGHT AND HAVE COIL PIPE OR ELECTRIC HEATER CONNECTIONS ON THE SAME SIDE WITH CONTROL BOX IF POSSIBLE. SOME BOXES SHALL HAVE A FIELD INSTALLED REMOTE CONTROLLER IN ORDER TO PROVIDE ADEQUATE SERVICE CLEARANCE.
8. LOCATE ALL VAV BOXES (BOTTOM) MAXIMUM 2 FT ABOVE CEILING BETWEEN BEAMS (WHERE APPLICABLE) AND INSTALL DUCTWORK WITH OFFSETS HIGH AS PRACTICAL - TYPICAL.

**WHERE CALLED FOR NEW CHAIN LINK FENCES AND GATE:**

CHAIN LINK FENCES SHALL BE 6 FEET HIGH 9 GAUGE, 2" MESH, GALVANIZED STEEL FABRICATED IN ONE PIECE WIDTHS. END, GATE, AND PULL POSTS SHALL BE 2-3/8" OD GALVANIZED STEEL PIPE. LINE POSTS SHALL BE 2-3/8" OD GALVANIZED STEEL PIPE. LINE POSTS SHALL BE SPACED AT NOT MORE THAN 10'-0" O.C. TOP AND BOTTOM RAILS PIPE SECTIONS SHALL BE NOT LESS THAN 18" LONG AND SHALL BE FITTED WITH COMPOUND FOR CONNECTED LENGTHS INTO CONTINUOUS RUN. COUPLINGS SHALL BE NOT LESS THAN 6" LONG WITH 1/2" WALL THICKNESS AND SHALL ALLOW FOR EXPANSION AND CONTRACTION OF THE TOP RAIL. THE TOP RAIL SHALL PASS THROUGH THE LINE POSTS. THE RAIL SHALL BE SECURELY CONNECTED TO END AND CORNER POSTS WITH GALVANIZED STEEL CONNECTORS. GATES SHALL HAVE A FRAME FABRICATED FROM 1-7/8" OD GALVANIZED STEEL PIPE WITH EITHER WELDED JOINTS OR SECURELY CONNECTED WITH GALVANIZED STEEL CONNECTORS. THE COMPLETE INSTALLATION SHALL BE IN ACCORDANCE WITH THE FENCE SYSTEMS MANUFACTURER'S WRITTEN INSTRUCTIONS. FENCE POSTS SHALL BE SET IN PLACE PRIOR TO CONCRETE PADS BEING POURED. PROVIDE DECORATIVE SLATS IN FENCE. COLOR SELECTION BY TYPICAL.

**WALL LEGEND**

[Symbol]	2-HR FIRE RATED WALL
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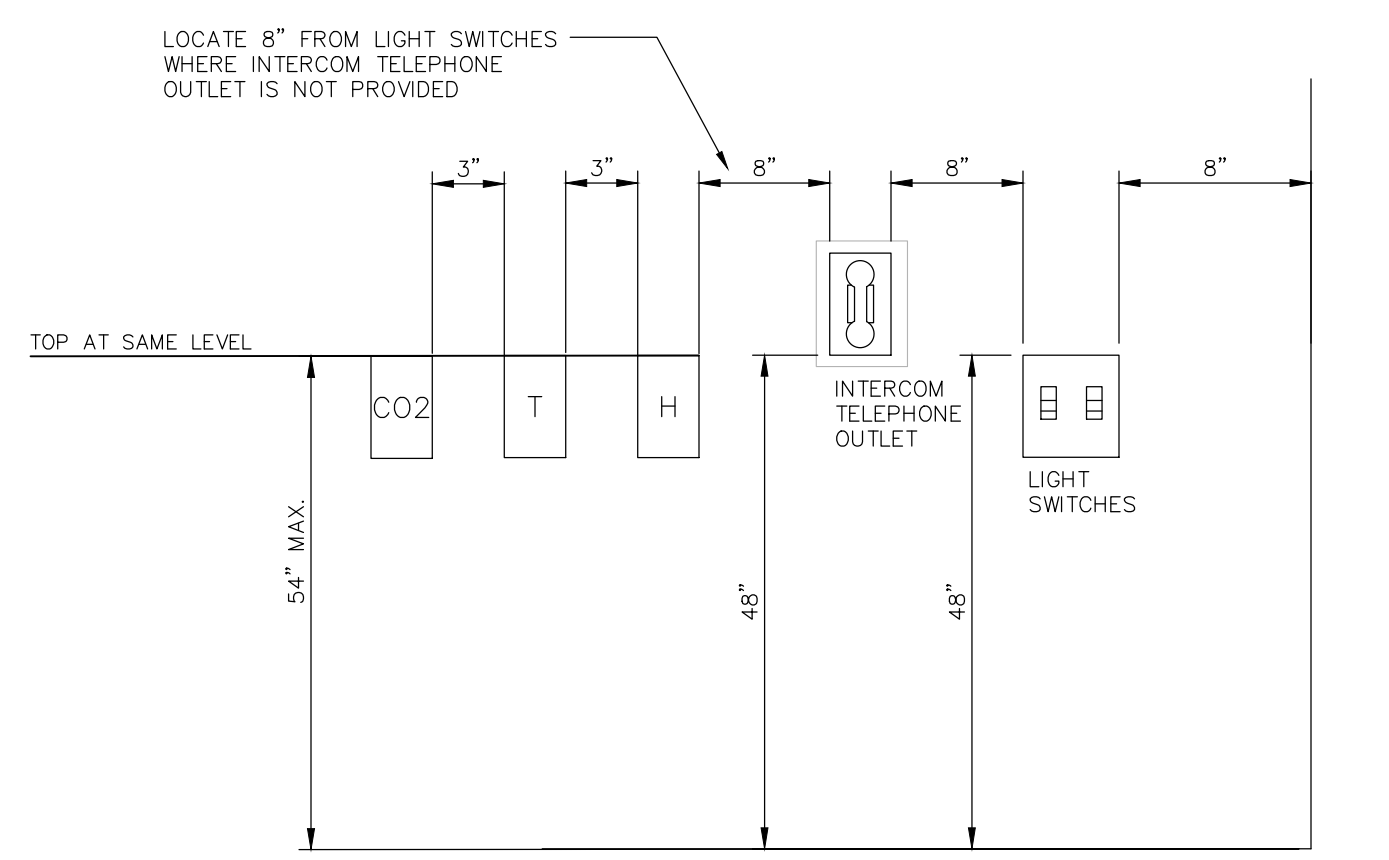
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05-12-26

**FTCC FORSYTH BLDG**  
HVAC RENOVATION

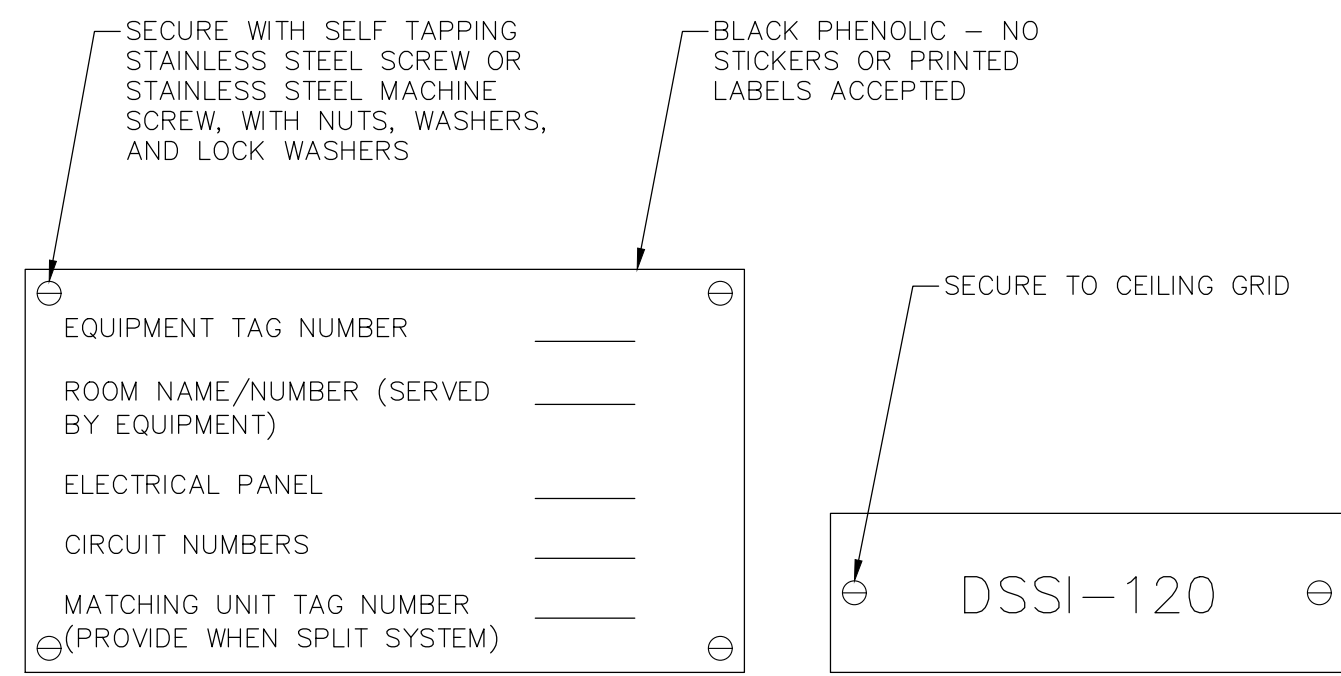
2100 SILAS CREEK PKWY., WINSTON-SALEM, NC 27103

SHEET TITLE	MECHANICAL REVISED PLAN
DATE	05/12/2026
DESIGNED BY	ED
CHECKED BY	ED
APPROVED	



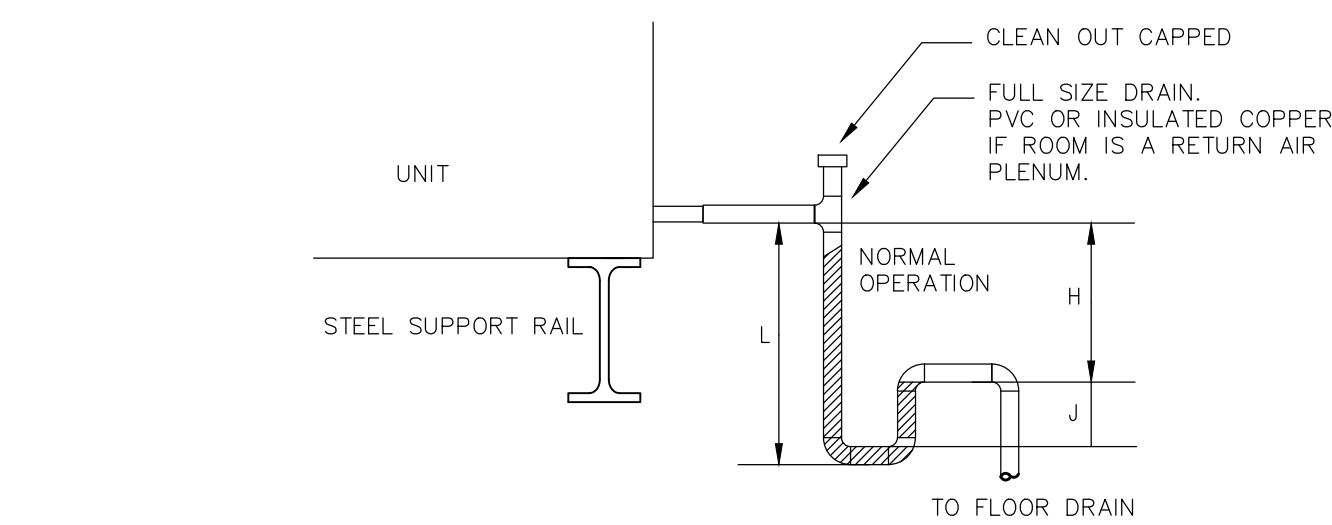
- NOTES:**
1. SENSOR SHALL BE THE SAME DISTANCE OFF DOOR FRAME IN ALL CLASSROOMS.
  2. NOT ALL SENSORS SHALL BE LOCATED BESIDE DOORS.
  3. WHEN SENSORS ARE INSTALLED IN MASONRY WALLS THE TOP OR BOTTOM OF BOX SHALL BE ALIGNED WITH THE MASONRY UNIT.
- NOTES CONTINUED:**
4. SENSORS SHALL BE MOUNTED TO 2x4 STEEL BOX ANCHORED IN WALL WITH 3/4" CONDUIT STUBBED 8" MIN. ABOVE CEILING TERMINATED WITH NYLON BUSHING.
  5. REFER TO PLANS FOR LOCATIONS OF SENSORS.

**1** **DETAIL - HVAC SENSORS MOUNTING**  
M2.1 SCALE: N.T.S.



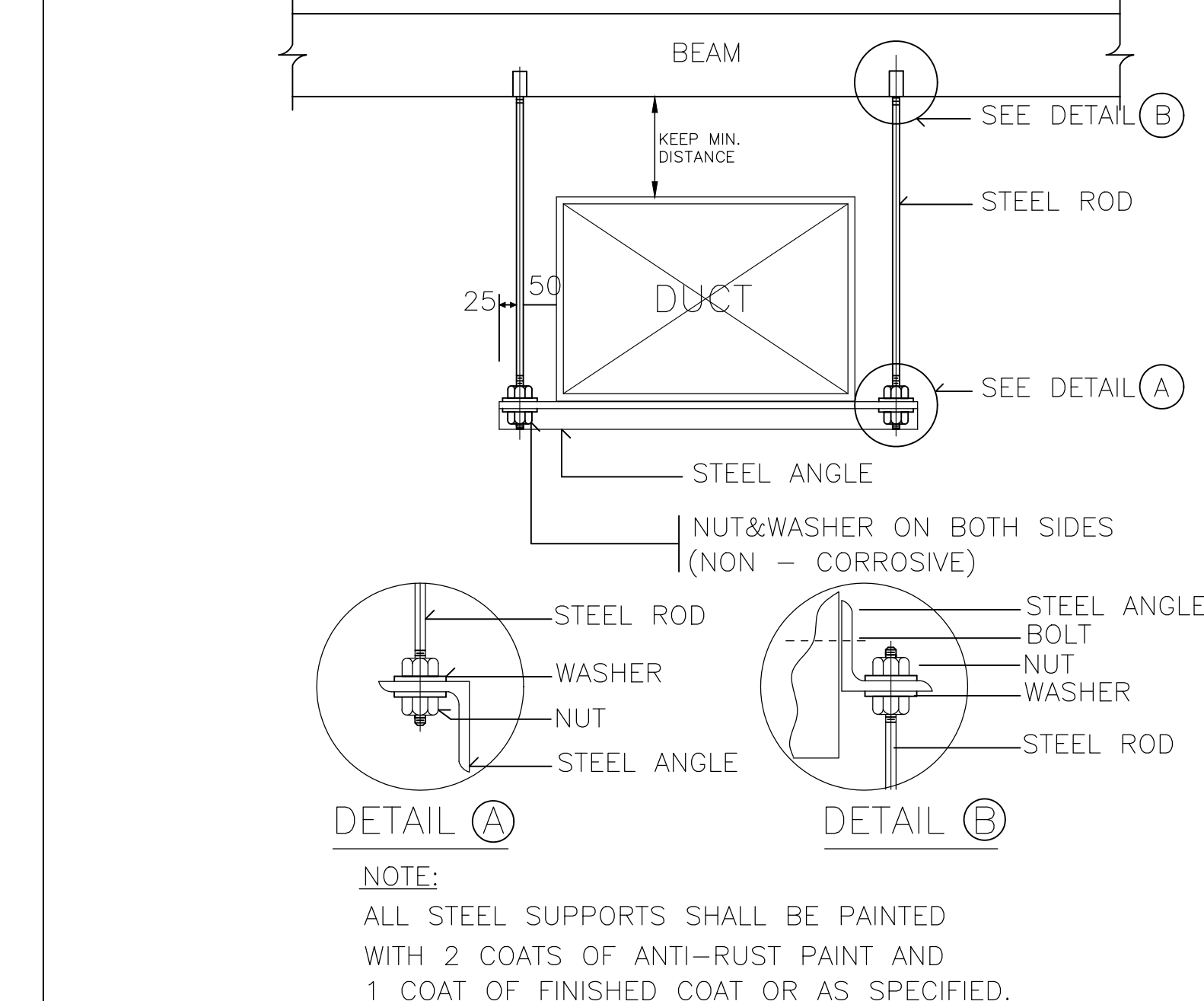
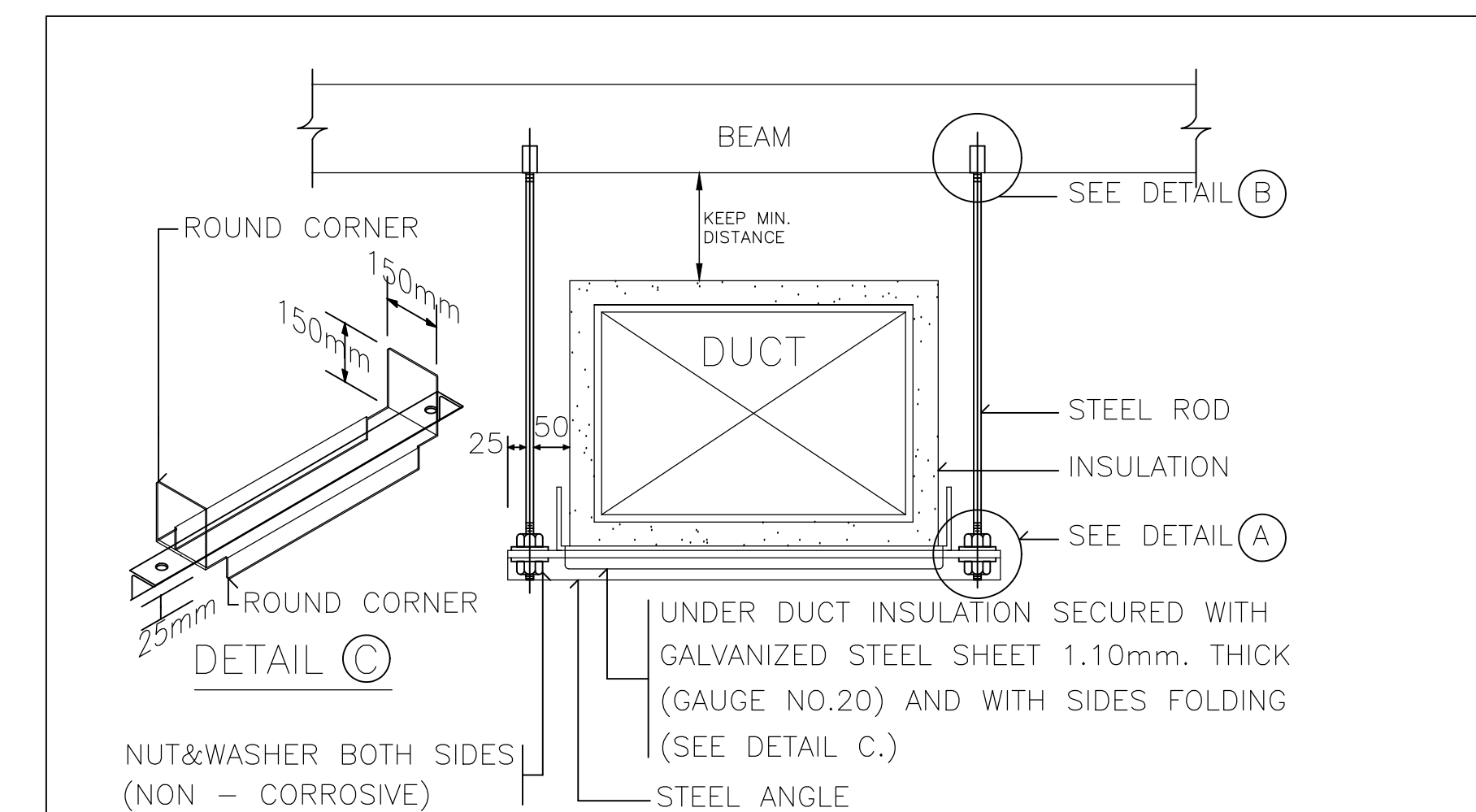
- NOTES:**
1. EQUIPMENT TAG SHALL BE PROVIDED FOR ALL EQUIPMENT HAVING ELECTRICAL CONNECTIONS.
  2. SCHEDULE OF EQUIPMENT TAGS SHALL BE SUBMITTED TO ENGINEER FOR APPROVAL.
  3. SIGN SHALL BE PERMANENTLY ATTACHED TO EQUIPMENT.
  4. ROOM NUMBERS ON TAGS SHALL MATCH ROOM NUMBERS USED FOR BUILDING SIGNAGE.
- NOTES:**
1. THIS EQUIPMENT TAG SHALL BE PROVIDED FOR ALL EQUIPMENT INSTALLED ABOVE CEILING.
  2. FOR ISOLATION VALVES TAG LOCATION REFER TO PIPING PLANS.

**2** **DETAIL - TYPICAL EQUIPMENT TAG**  
M2.1 SCALE: N.T.S.

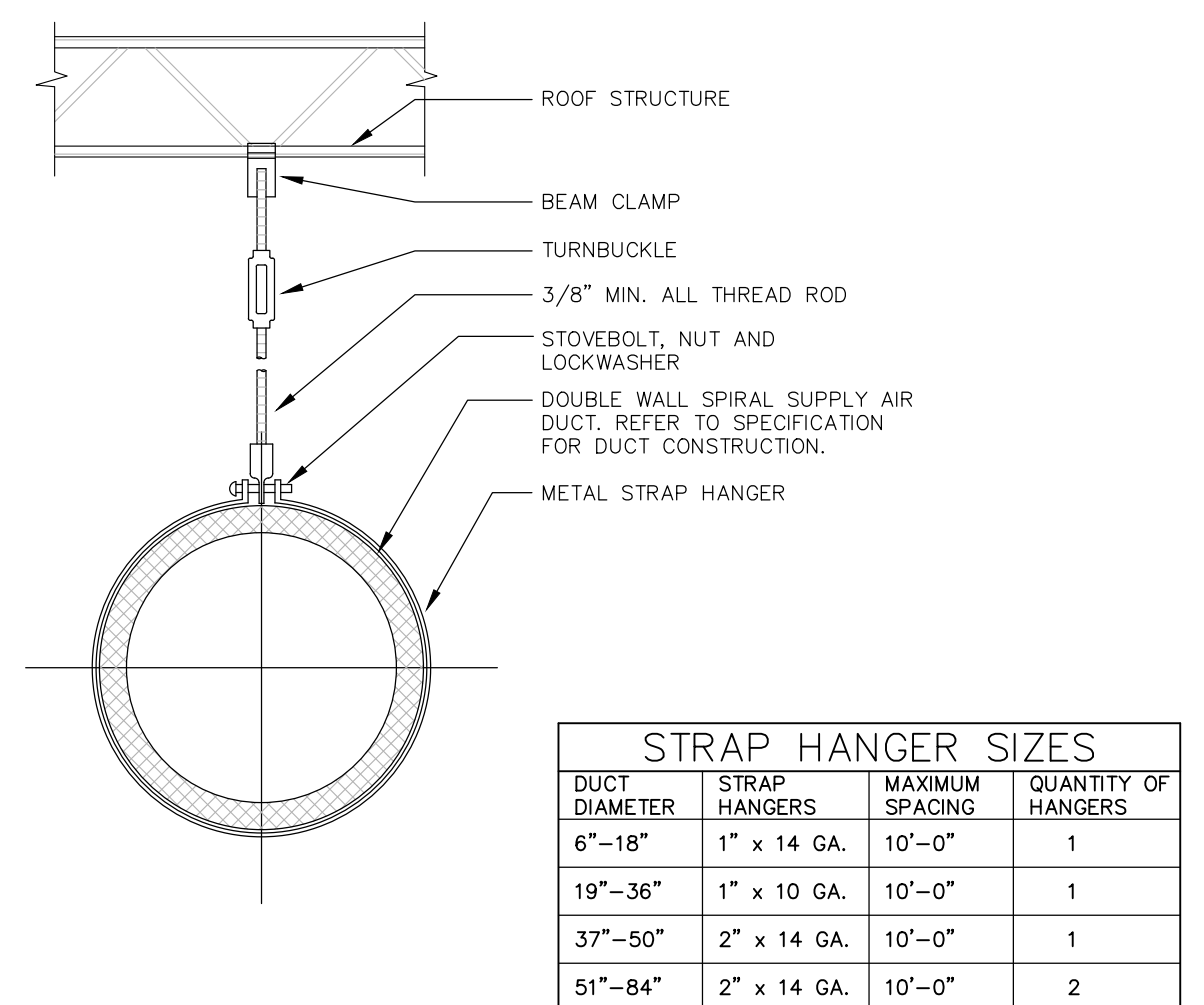


- DRAIN PAN TRAPPING FOR SECTION UNDER NEGATIVE PRESSURE**
- $$L = H + J + \text{PIPE } \phi$$
- $$H = 1 \text{ INCH FOR EACH INCH OF NEGATIVE PRESSURE PLUS } 1 \text{ INCH}$$
- $$J = 1/2 \text{ H}$$
- NEGATIVE PRESSURE = INTERNAL AND EXTERNAL STATIC PRESSURE LOSSES AT THE INLET OF THE FAN (LOADED FILTERS).**
- INSTALL AS PER MANUFACTURER'S INSTRUCTIONS.
- DRAIN PAN TRAPPING FOR SECTION UNDER POSITIVE PRESSURE**
- $$L = H + J + \text{PIPE } \phi$$
- $$H = 1/2" \text{ (MINIMUM)}$$
- $$J = 1/2" \text{ PLUS THE INTERNAL AND EXTERNAL STATIC PRESSURE LOSSES AT THE DISCHARGE OF THE COIL (LOADED FILTERS).}$$
- POSITIVE PRESSURE = INTERNAL AND EXTERNAL STATIC PRESSURE LOSSES AT THE DISCHARGE OF THE COIL OR SECTION CONTAINING THE DRAIN (LOADED FILTERS).**
- INSTALL AS PER MANUFACTURER'S INSTRUCTIONS.

**3** **DETAIL - AHU & PACKAGE UNIT DRAIN TRAP**  
M2.1 SCALE: N.T.S.

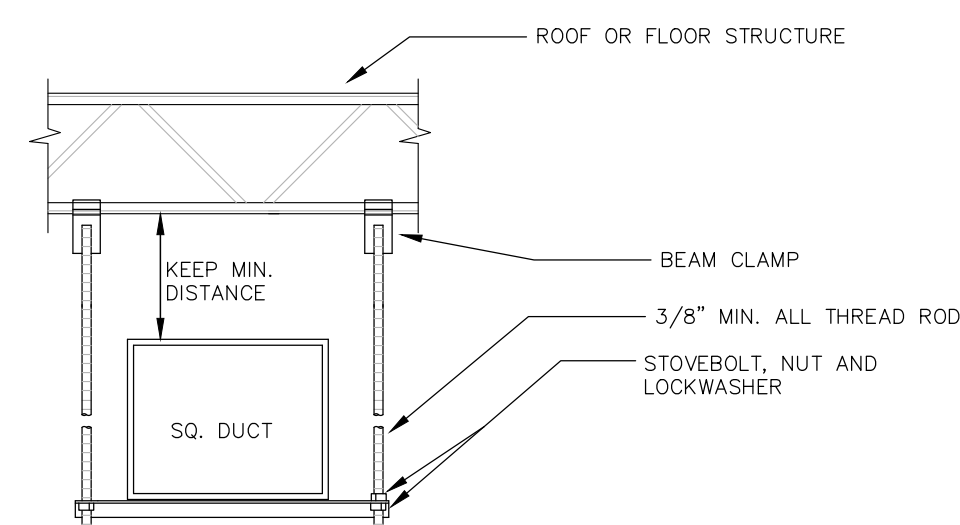


**7** **DETAIL - DUCT HANGER & SUPPORTS**  
M2.1 SCALE: N.T.S.



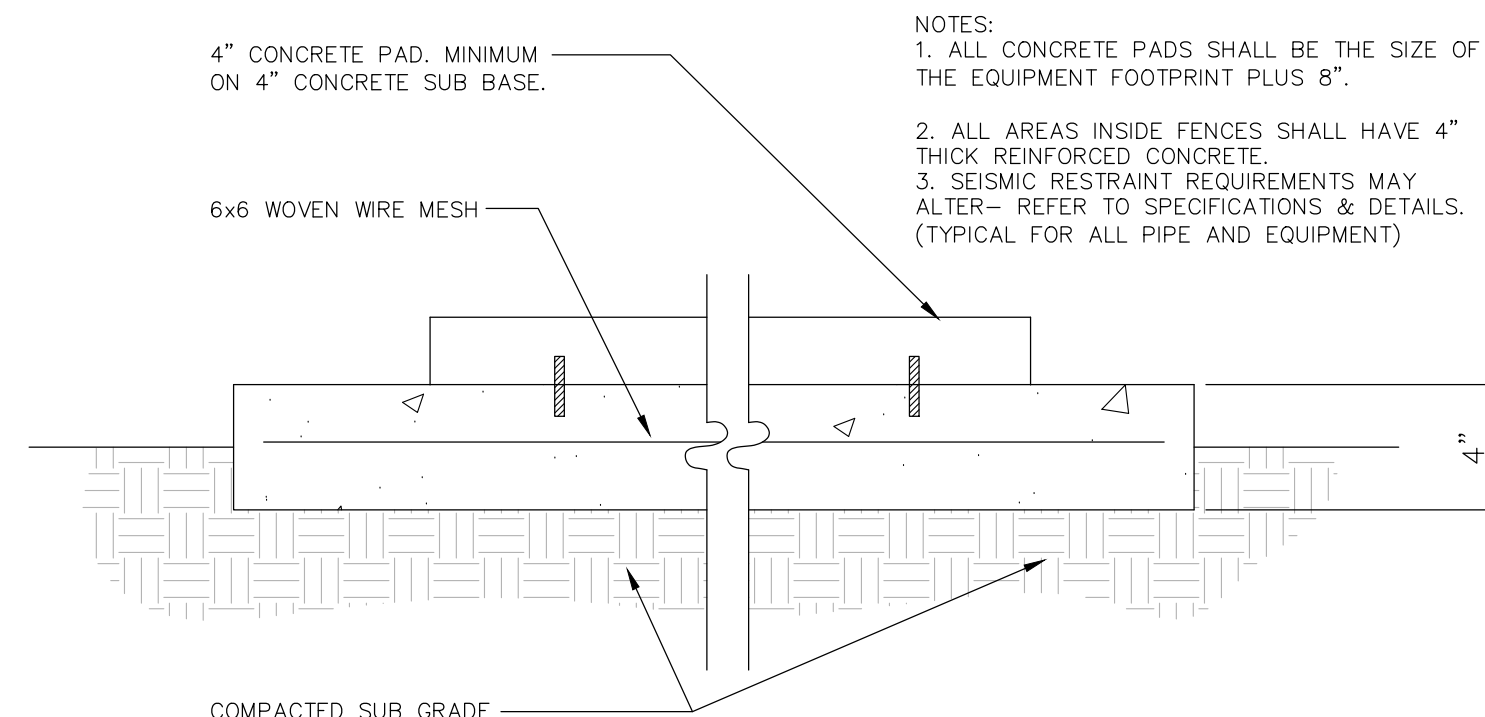
STRAP HANGER SIZES			
DUCT DIAMETER	STRAP HANGERS	MAXIMUM SPACING	QUANTITY OF HANGERS
6"-18"	1" x 14 GA.	10'-0"	1
19"-36"	1" x 10 GA.	10'-0"	1
37"-50"	2" x 14 GA.	10'-0"	1
51"-84"	2" x 14 GA.	10'-0"	2

**4** **DETAIL - EXPOSED DUCT HANGER**  
M2.1 SCALE: N.T.S.

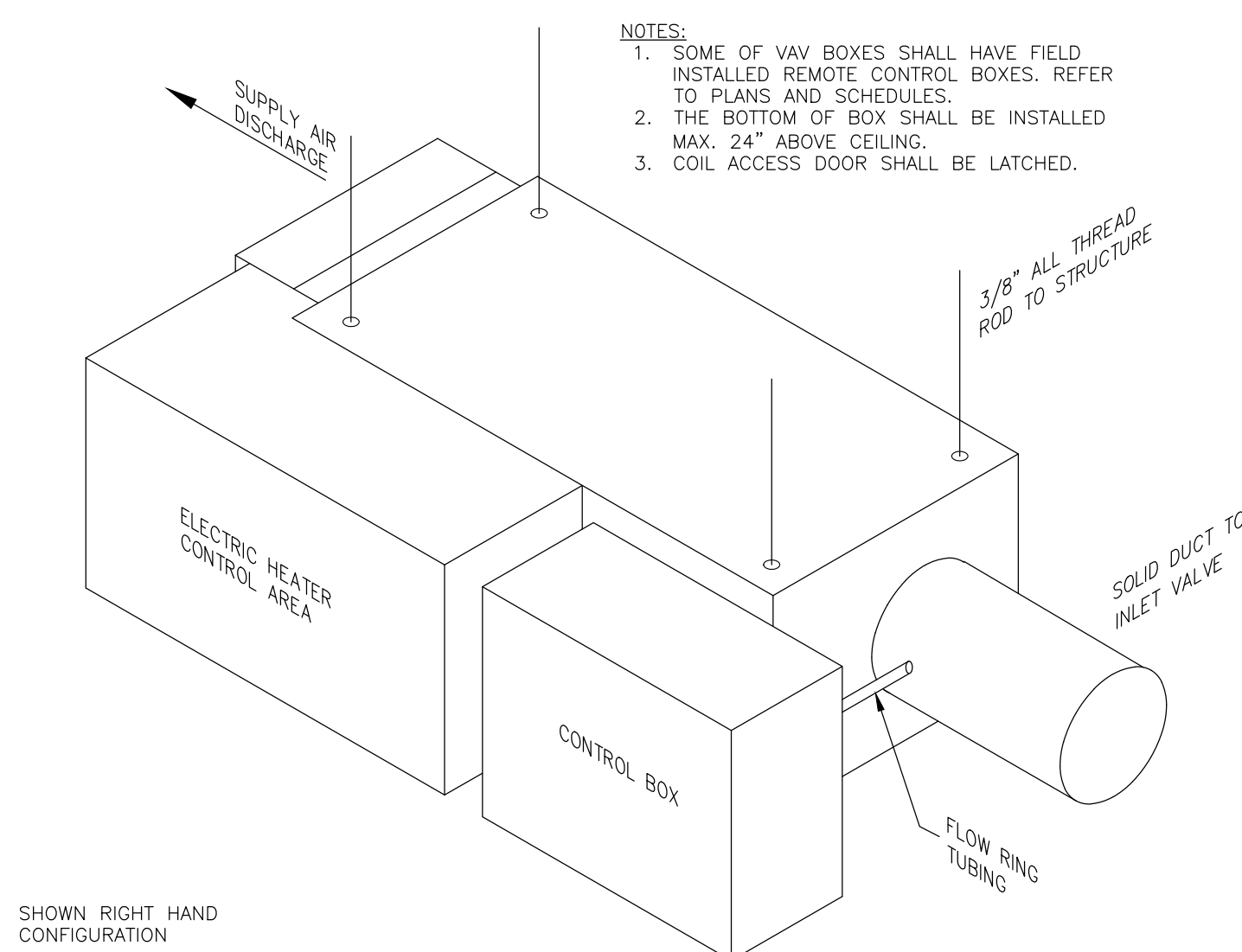


STRAP HANGER SIZES			
DUCT WIDTH	ANGLE HANGERS	MAXIMUM SPACING	QUANTITY OF HANGERS
6"-18"	1-1/2" x 1/8"	10'-0"	1
19"-36"	2" x 3/16"	10'-0"	1
37"-50"	2" x 1/4"	10'-0"	1

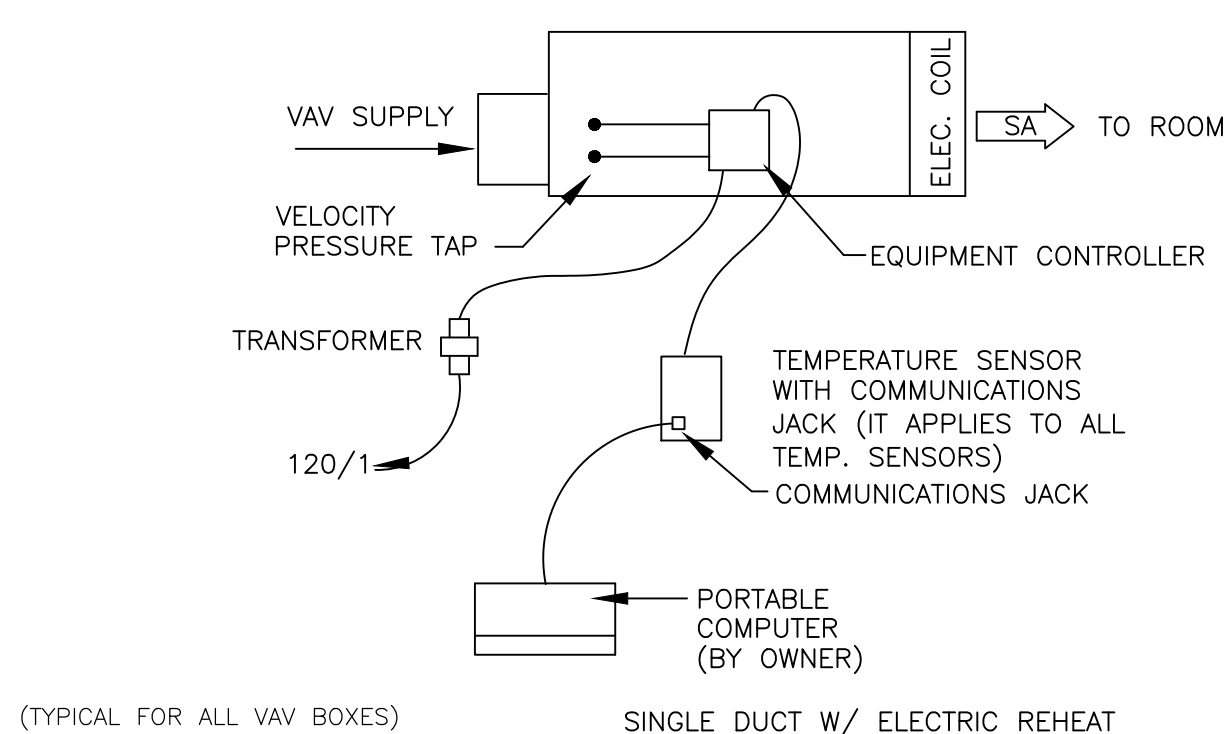
**5** **DETAIL - RECTANGULAR DUCT HANGER**  
M2.1 SCALE: N.T.S.



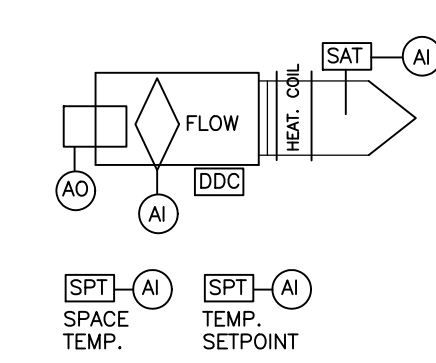
**6** **DETAIL - OUTDOOR EQUIPMENT PAD - TYP.**  
M2.1 SCALE: N.T.S.



**8** **DETAIL - SINGLE DUCT VAV W/ ELECTRIC HEAT**  
M2.1 SCALE: N.T.S.

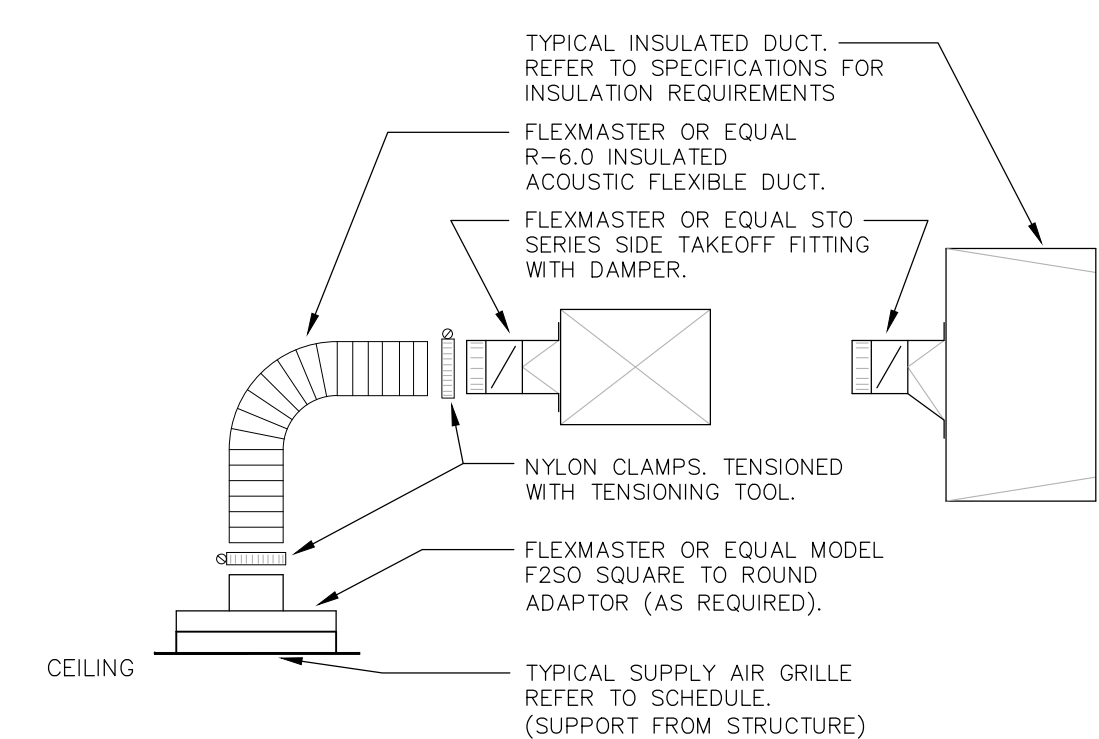


**9** **DETAIL - VAV BOXES CONTROL DIAGRAM**  
M2.1 SCALE: N.T.S.



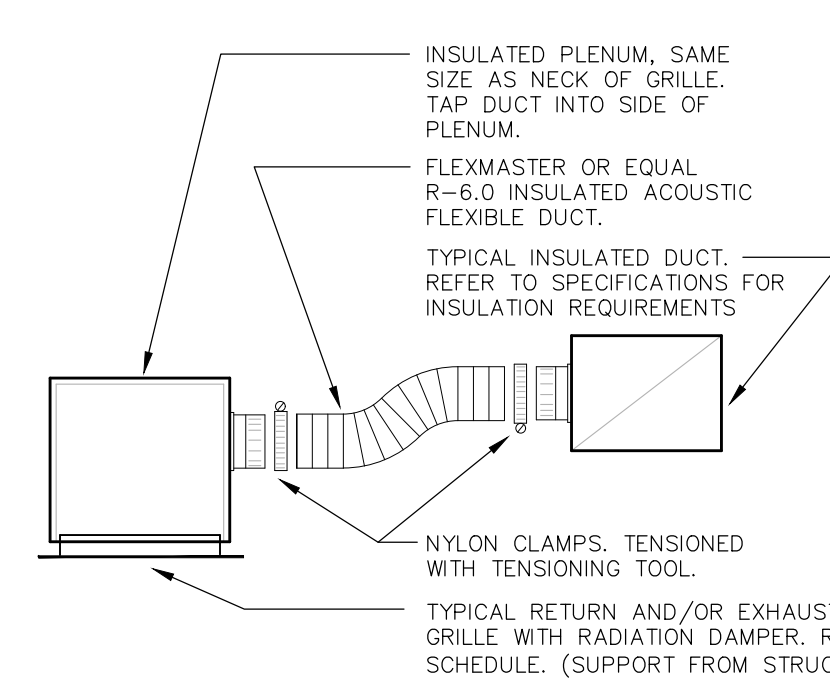
- SINGLE DUCT W/ REHEAT COIL**
- NOTE:** THE DDC SYSTEM SHALL SHUT DOWN THE VAV FAN POWERED BOXES ANYTIME THE FIRE ALARM SYSTEM SENDS A SHUTDOWN SIGNAL THROUGH A LOCALLY MOUNTED FIRE ALARM RELAY. CONTROL CONTRACTOR SHALL PROVIDE WIRING FROM FIRE ALARM PANEL TO DDC PANEL (FIELD VERIFY EXACT LOCATION). CONTROL CONTRACTOR SHALL MAKE FINAL CONNECTION TO DDC PANEL. COORDINATE WITH EC.

**10** **DETAIL - VAV BOXES CONTROL SCHEMATIC**  
M2.1 SCALE: N.T.S.



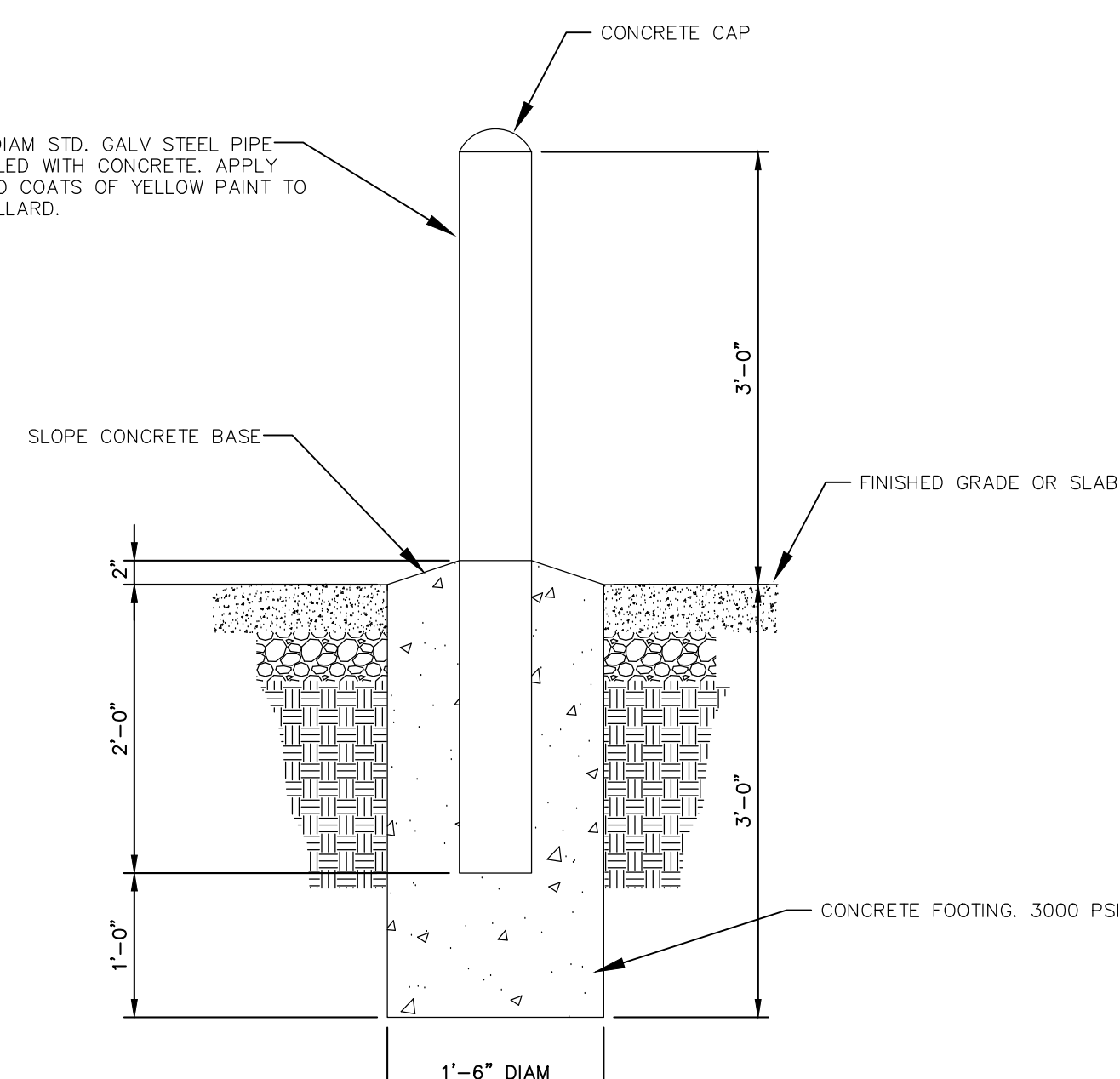
- NOTES:**
1. FLEXIBLE DUCT RUNOUTS SHALL BE SIZED PER FLEX DUCT SCHEDULE.
  2. ALL DUCT CONNECTIONS SHALL BE MADE AND SEALED IN ACCORDANCE WITH MECHANICAL CODE AND MANUFACTURER'S INSTRUCTIONS.
  3. SURFACES VISIBLE THRU AIR DISTRIBUTION DEVICES SHALL BE PAINTED FLAT BLACK.
  4. FLEXIBLE DUCT LENGTH SHALL BE 10'-0" MAX. ON SUPPLY.
- NOTES CONTINUED:**
5. PROVIDE STEEL GRILLES, RADIATION DAMPER AND BLANKET IN ALL RATED CEILINGS. INSTALL IN STRICK ACCORDANCE WITH THE UL LISTING.
  6. TIE ~10" LONG BRIGHT COLORED RIBBON TO EACH DAMPER HANDLE TO ALLOW EASY LOCATION.
  7. DAMPER HANDLES SHALL BE EASILY ACCESSIBLE THRU INSULATION MATERIAL.
  8. PROVIDE 2.2" 0.75 LB. DENSITY FOIL FACE WRAP ON SQUARE TO ROUND AND BACK PAN OF DIFFUSER.

**11** **DETAIL - TYPICAL SUPPLY DIFFUSER**  
M2.1 SCALE: N.T.S.

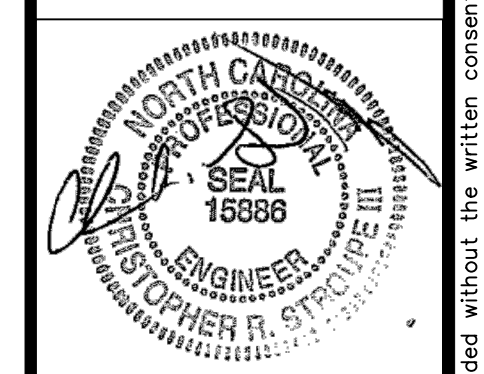


- NOTES:**
1. FLEXIBLE DUCT RUNOUTS SHALL BE SIZED PER FLEX DUCT SCHEDULE.
  2. ALL DUCT CONNECTIONS SHALL BE MADE AND SEALED IN ACCORDANCE WITH MECHANICAL CODE AND MANUFACTURER'S INSTRUCTIONS.
  3. SURFACES VISIBLE THRU AIR DISTRIBUTION DEVICES SHALL BE PAINTED FLAT BLACK.
  4. PLENUM SHALL BE 4" TALLER THAN CONNECTING FLEX DUCT (12" MINIMUM), COORDINATE WITH THE STRUCTURE.
  5. PLENUM INSULATION SHALL 2" THICK 0.75 PCF DUCT WRAP UNLESS NOTED OTHERWISE.
- NOTES CONTINUED:**
5. FLEXIBLE DUCT LENGTH SHALL BE 5'-0" ON RETURN OR EXHAUST.
  6. FOR UNITS WITH ONE RETURN CONTRACTOR CAN SUBSTITUTE SQUARE TO ROUND ON END OF RETURN INSTEAD OF SIDE TAP FITTING.
  7. PROVIDE STEEL GRILLES, RADIATION DAMPER AND BLANKET IN ALL RATED CEILINGS. INSTALL IN STRICK ACCORDANCE WITH THE UL LISTING.
  8. TIE ~10" LONG BRIGHT COLORED RIBBON TO EACH DAMPER HANDLE TO ALLOW EASY LOCATION.
  9. DAMPER HANDLES SHALL BE EASILY ACCESSIBLE THRU INSULATION MATERIAL.

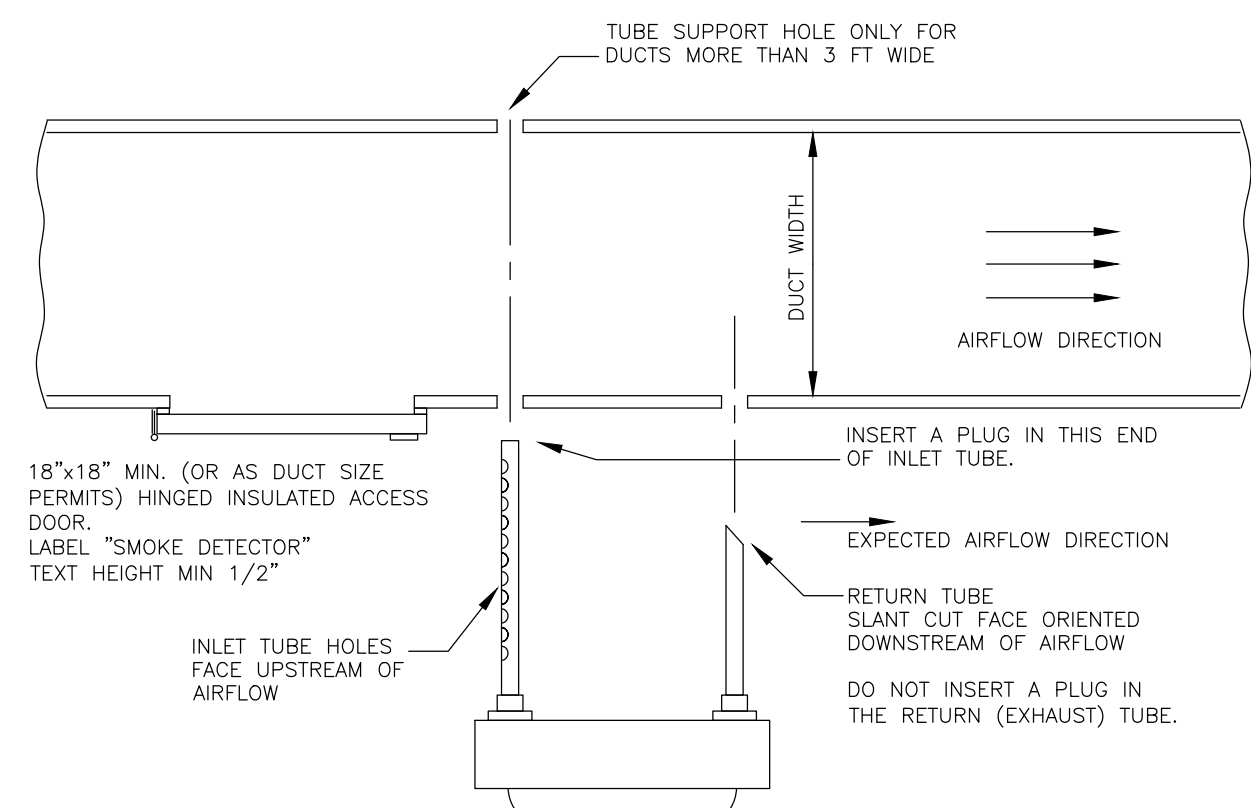
**12** **DETAIL - TYPICAL RETURN GRILLE**  
M2.1 SCALE: N.T.S.



**13** **DETAIL - PIPE BOLLARD**  
M2.1 SCALE: N.T.S.

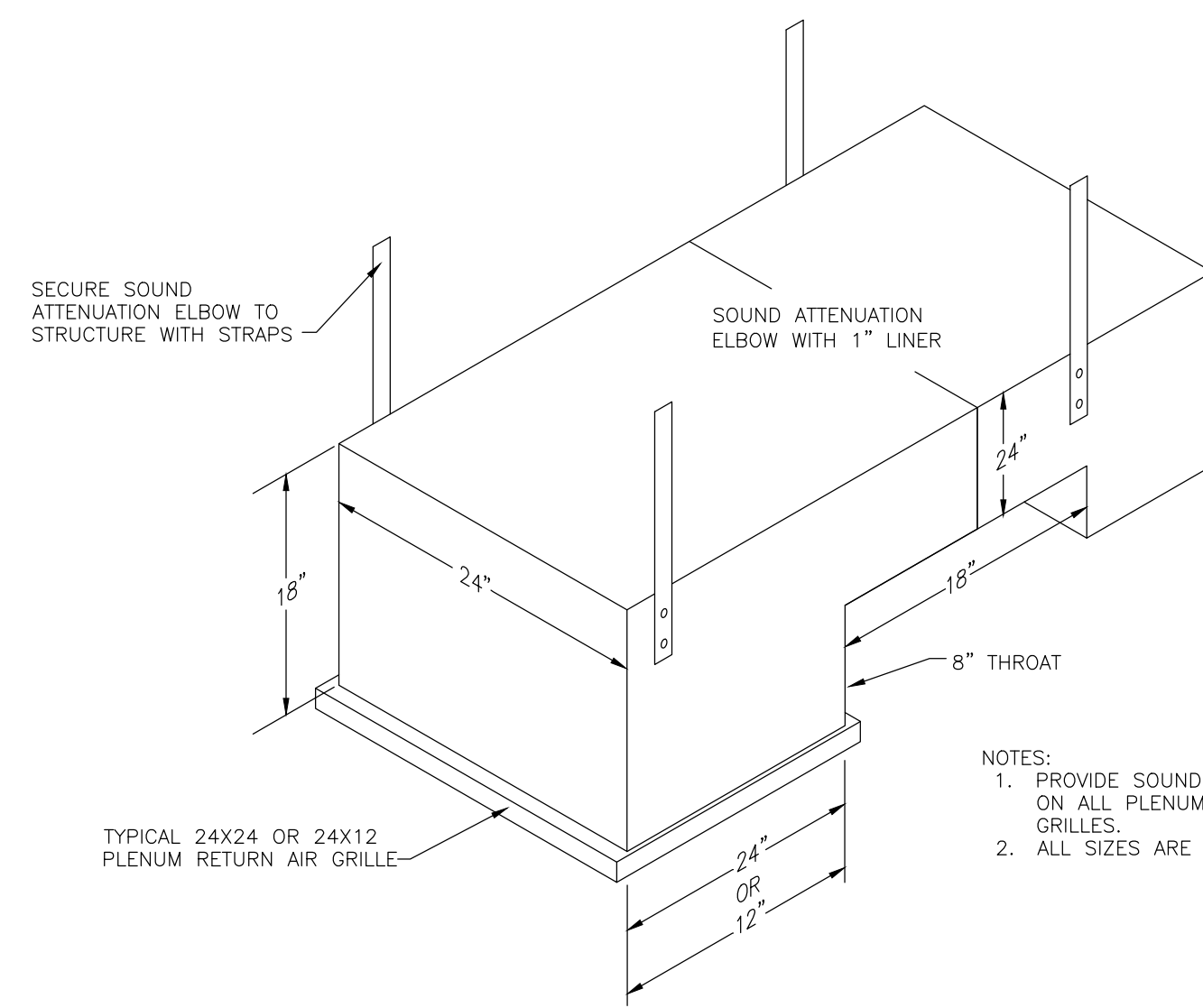


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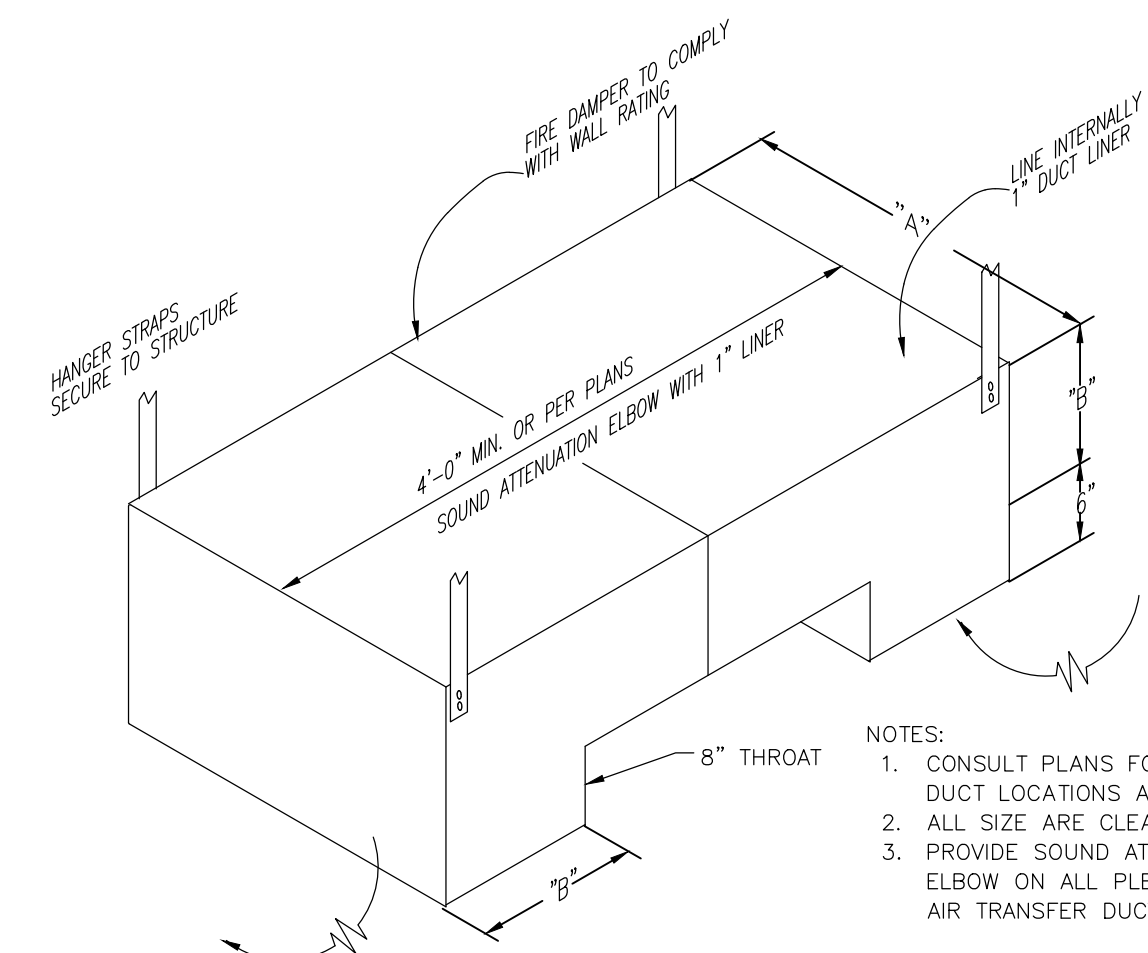
1  
M2.2  
DETAIL - DUCT SMOKE DETECTOR  
SCALE: N.T.S.

- NOTES:
1. INSTALL DUCT SMOKE DETECTOR AS PER MANUFACTURER'S INSTRUCTIONS.
  2. ELECTRICAL CONTRACTOR SHALL FURNISH SMOKE DETECTOR AND M.C. SHALL INSTALL IT. E.C. TO WIRE DETECTOR TO FIRE ALARM SYSTEM AND M.C. SHALL WIRE DETECTOR TO SHUT DOWN UNIT IT SERVES AND SMOKE DAMPER IT CONTROLS. PROVIDE ALL NECESSARY WIRING AND TRANSFORMER WHEN SMOKE DETECTOR CONTROLS SMOKE DAMPER.
  3. THIS SMOKE DETECTOR SHALL BE PROVIDED FOR ALL UNITS 2,000 CFM OR GREATER AND PER FLOOR PLANS.



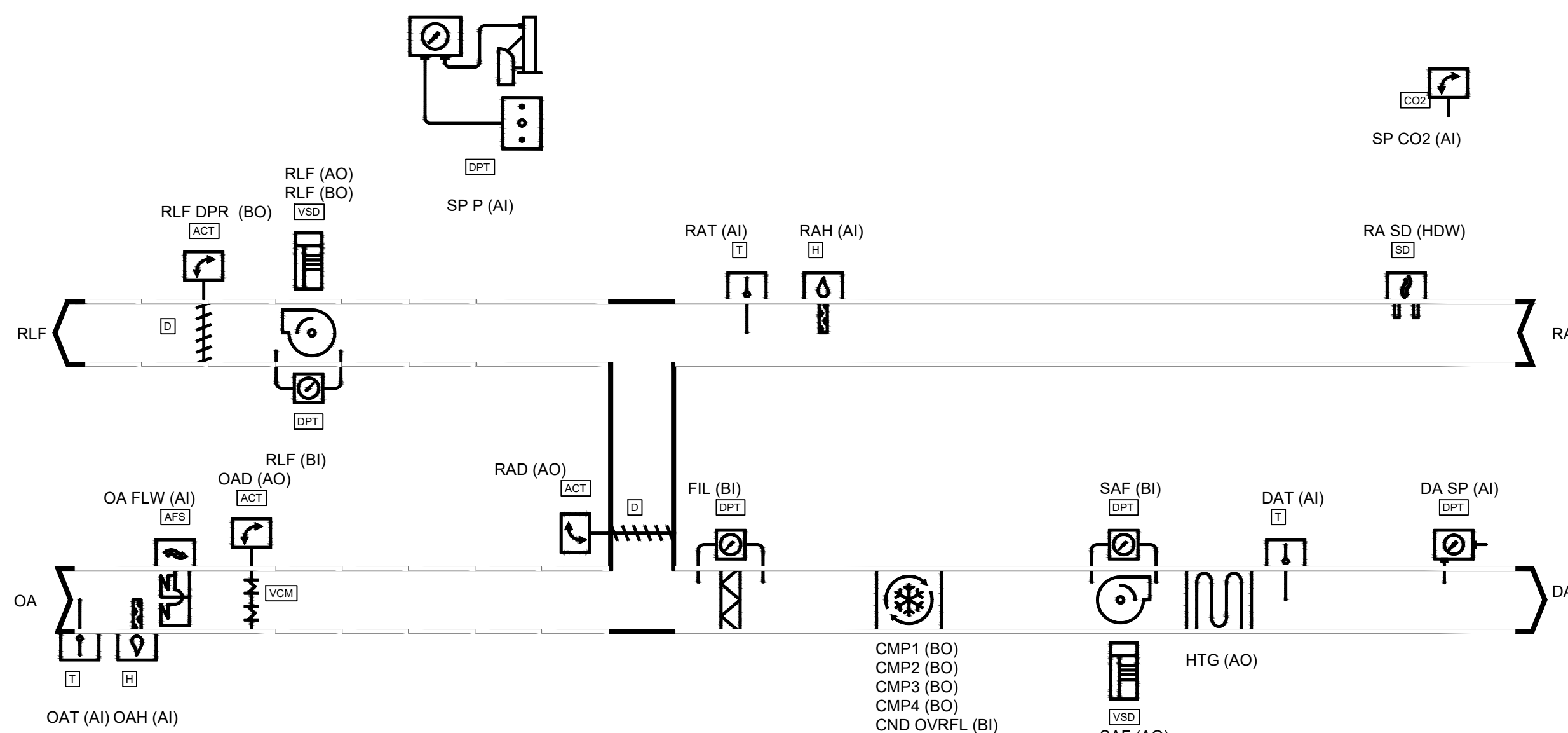
2  
M2.2  
DETAIL - W/ SOUND ATTENUATION BOOT  
SCALE: N.T.S.

- NOTES:
1. PROVIDE SOUND ATTENUATION ELBOW ON ALL PLENUM RETURN AIR GRILLES.
  2. ALL SIZES ARE CLEAR INSIDE.



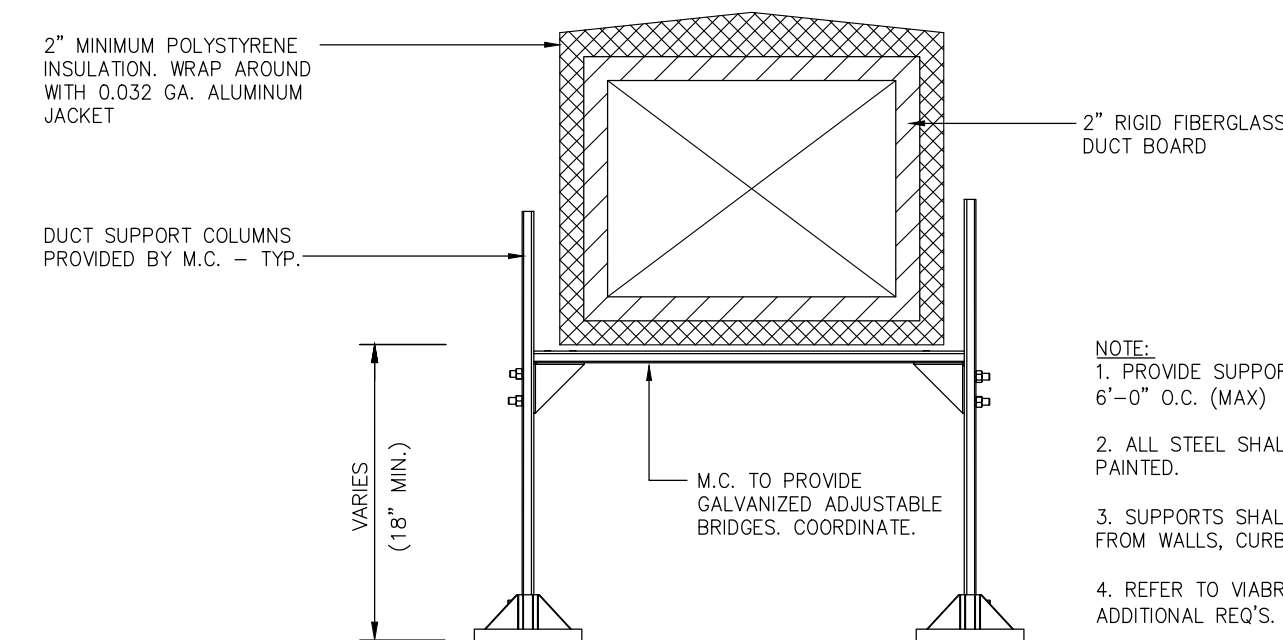
3  
M2.2  
DETAIL - TYPICAL AIR TRANSFER DUCT THRU WALL  
SCALE: N.T.S.

- NOTES:
1. CONSULT PLANS FOR TRANSFER DUCT LOCATIONS AND SIZES.
  2. ALL SIZES ARE CLEAR INSIDE.
  3. PROVIDE SOUND ATTENUATION ELBOW ON ALL PLENUM RETURN AIR TRANSFER DUCTS.



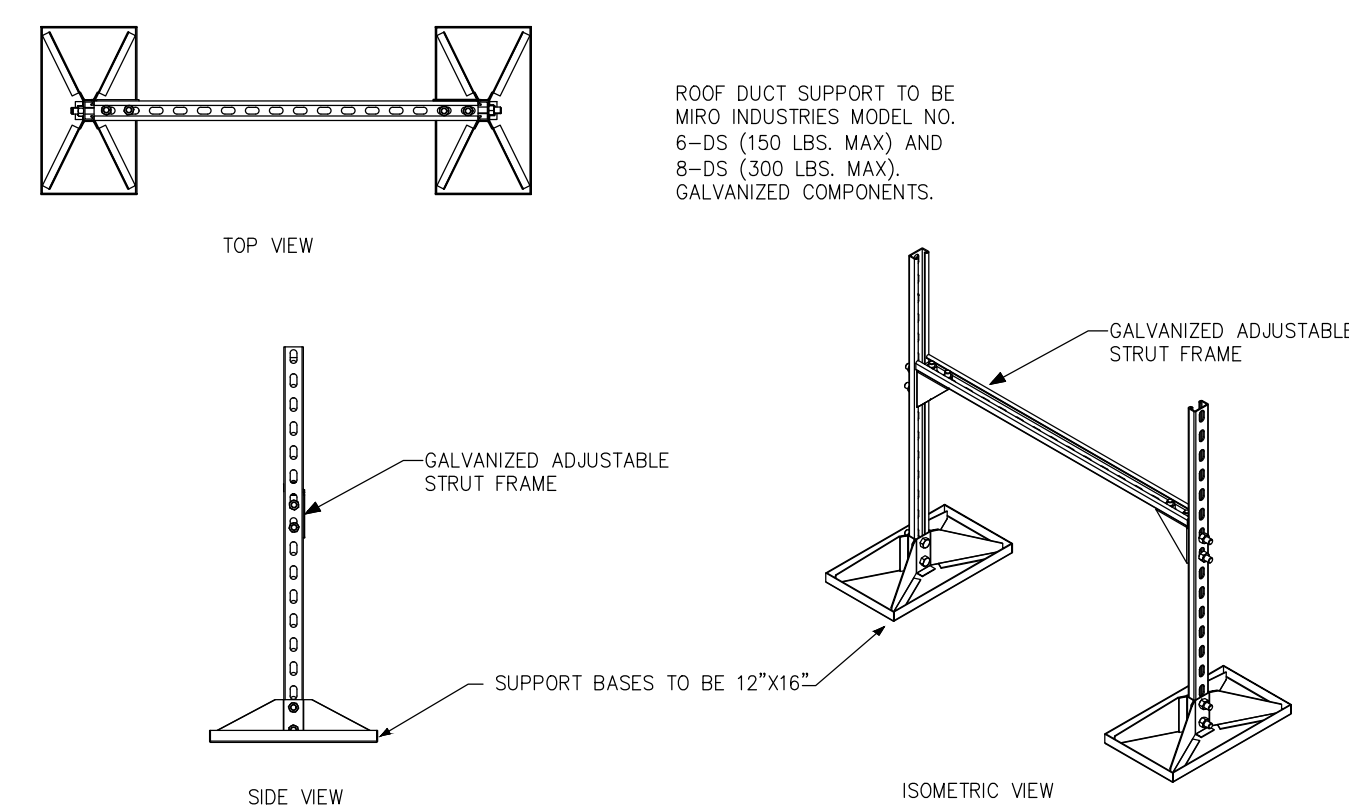
4  
M2.2  
DETAIL - VAV SYSTEM CONTROLS SCHEMATIC  
SCALE: N.T.S.

NOTE: THE DDC SYSTEM SHALL SHUT DOWN THE VAV FAN POWERED BOXES ANYTIME THE FIRE ALARM SYSTEM SENDS A SHUTDOWN SIGNAL THROUGH A LOCALLY MOUNTED FIRE ALARM RELAY. EC SHALL PROVIDE WIRING FROM FIRE ALARM PANEL TO DDC PANEL (FIELD VERIFY EXACT LOCATION). CONTROL CONTRACTOR SHALL MAKE FINAL CONNECTION IN DDC PANEL. EC SHALL MAKE FINAL TERMINATIONS IN FIRE ALARM PANEL. COORDINATE THIS WORK WITH EC.



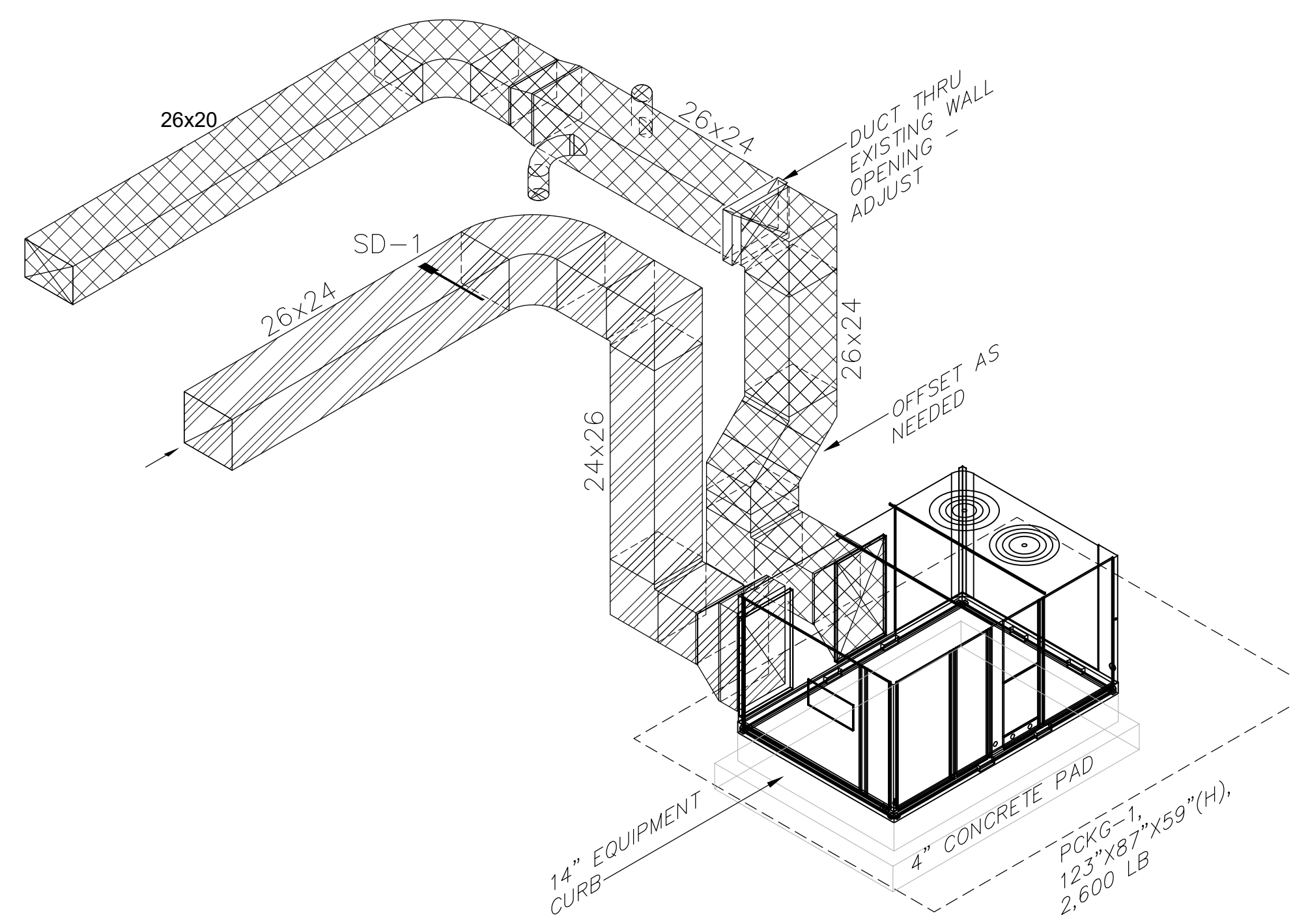
6  
M2.2  
DETAIL - EXTERIOR DUCT INSTALLATION & DUCT SUPPORT  
SCALE: N.T.S.

- NOTE:
1. PROVIDE SUPPORT AT ALL ELBOWS AND 6'-0" O.C. (MAX).
  2. ALL STEEL SHALL BE GALVANIZED AND PAINTED.
  3. SUPPORTS SHALL BE A MINIMUM OF 8" FROM WALLS, CURBS OR OTHER SUPPORTS.
  4. REFER TO VIBRATION SPECS FOR ADDITIONAL REQ'S.

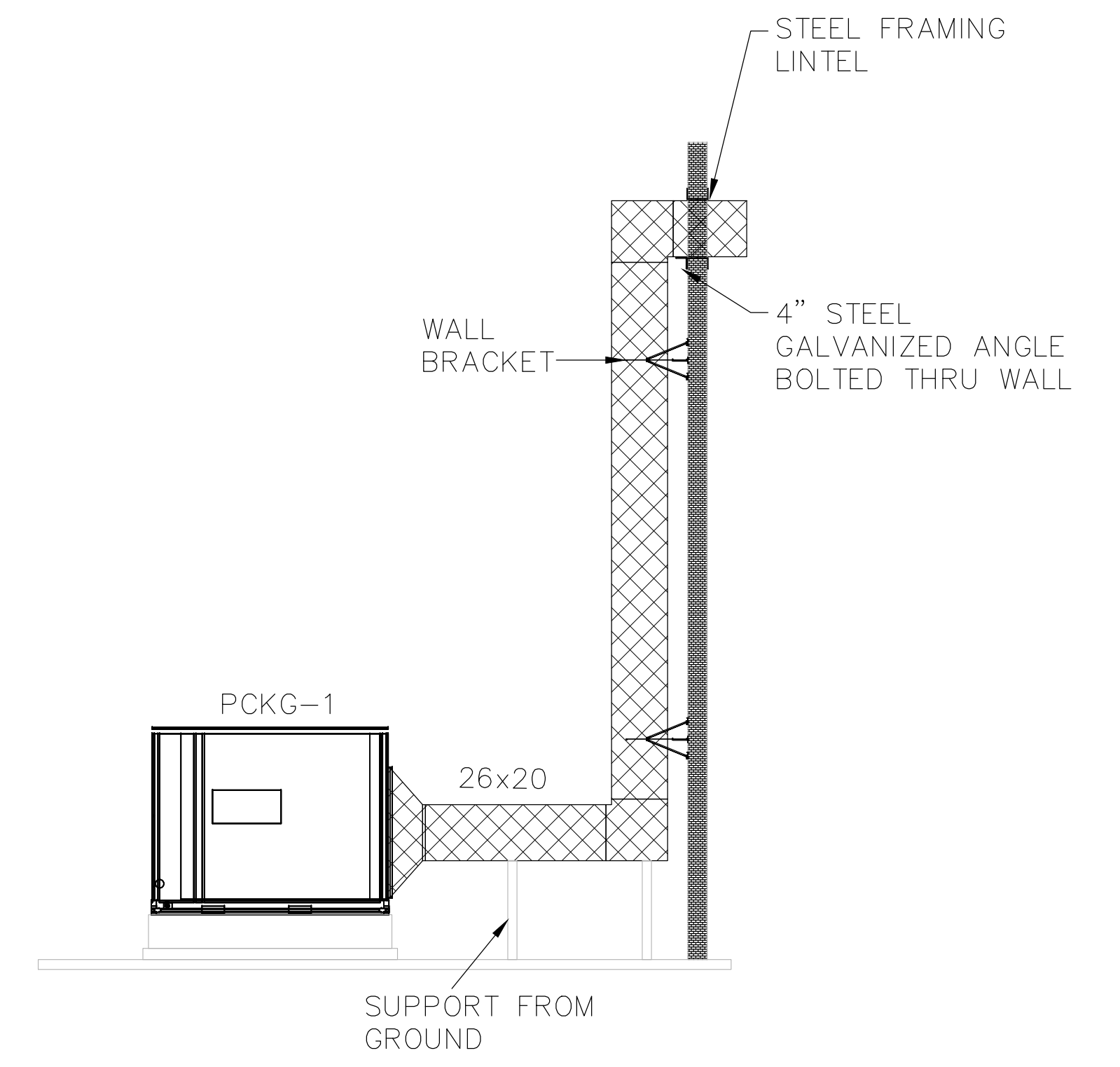


7  
M2.2  
DETAIL - UNIT CONDENSATE TRAP  
SCALE: N.T.S.

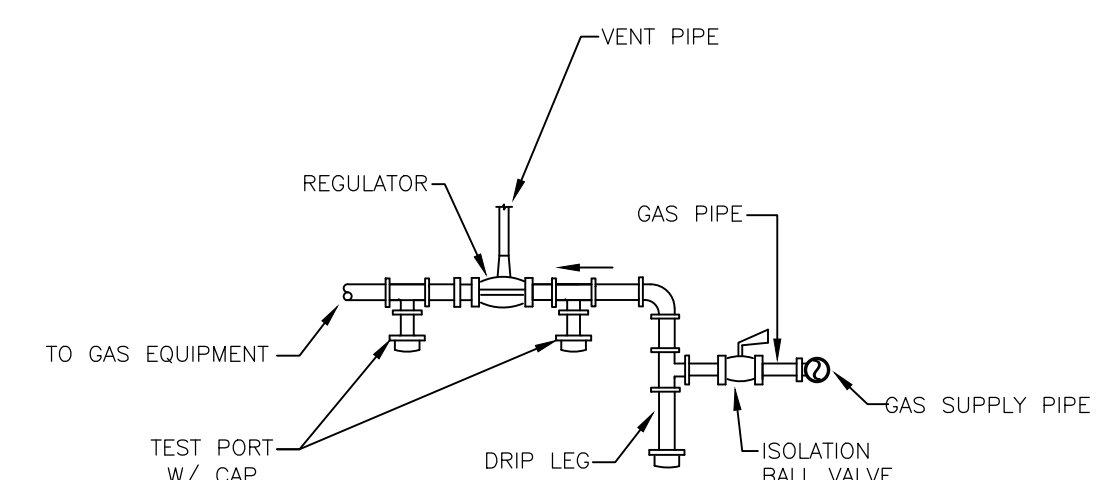
- NOTES:
1. UNIT CONDENSATE TRAP SHALL BE FULL SIZE OF UNIT CONNECTION 3/4" MINIMUM.
  2. TRAP ASSEMBLY SHALL BE EZ TRAP INC. EZT-113 OR APPROVED EQUAL.
  3. FOR UNITS REQUIRING TRAP SIZES OUTSIDE THE AVAILABLE SIZES TRAPS SHALL BE FABRICATED WITH SCHEDULE 40 PVC PIPE AND FITTINGS.
  4. WHEN PLASTIC CAP AND LEASH IS NOT AVAILABLE SUBSTITUTE PVC FEMALE ADAPTER AND PLUG.
- NOTES CONTINUED:
5. TRAP AND DRAIN PIPING SHALL BE ROUTED TO NOT BLOCK ACCESS TO UNITS AND FILTERS.
  6. TRAPS AND CONDENSATE PIPING IN RETURN AIR PLENUMS SHALL BE FABRICATED WITH TYPE 1" COPPER PIPE AND FITTINGS. INSULATE WITH 3/4" THICK ARMAFLEX.
  7. PROVIDE CLEANOUTS ON CONDENSATE PIPING AT EACH 90° CHANGE IN DIRECTION AND AFTER TWO 45° CHANGES IN DIRECTION IN SERIES.



5  
M2.2  
DETAIL - PACKAGE UNIT DUCTING AND SUPPORT  
SCALE: N.T.S.



8  
M2.2  
DETAIL - GAS REGULATOR ASSEMBLY  
SCALE: NONE



- NOTES:
1. PAINT ALL GAS PIPING YELLOW AND LABEL ALL PIPING SHOWING PRESSURE AND DIRECTION OF FLOW.
  2. LOCATE REGULATOR ASSEMBLY IN AN EASILY ACCESSIBLE LOCATION (NOT BLOCKING ACCESS TO OTHER EQUIPMENT).
  3. TEST PORTS SHALL BE TEE WITH 3/4" BRANCH, NIPPLE AND CAP.
- NOTES CONTINUED:
4. COORDINATE ROUTING OF GAS PIPING TO NOT OBSTRUCT ACCESS TO EQUIPMENT.
  5. COORDINATE CAPACITY AND OUTLET PRESSURE OF REGULATOR WITH EQUIPMENT MANUFACTURER.
  6. GAS PRESSURE REGULATOR LOOKUP TYPE SHALL BE PROVIDED WITH OVER PRESSURE PROTECTION DEVICES AS REQUIRED BY THE FUEL GAS CODE. OPD MAY BE INCLUDED WITH THE REGULATOR OR MAY BE A SEPARATE DEVICE.



MECHANICAL SPECIFICATIONS

1. GENERAL REQUIREMENTS: MECHANICAL CONTRACTOR SHALL INCLUDE ALL LABOR, EQUIPMENT, MATERIALS, FEES, AND PERMITS REQUIRED FOR AND REASONABLE INDEMNITY TO THE EXECUTION OF THE MECHANICAL WORK. INCLUDE SUB-CONTRACTING AS DIRECTED WORK THAT THE CONTRACTOR DOES NOT HOLD THE REQUIRED LICENSE.

THE WORD "PROVIDE" AS USED ON THESE DRAWINGS AND IN THESE SPECIFICATIONS SHALL MEAN TO FURNISH AND INSTALL. THE WORD "CONTRACTOR" AS USED ON THESE DRAWINGS AND IN THESE SPECIFICATIONS SHALL MEAN THE MECHANICAL CONTRACTOR. THE WORD ENGINEER AS USED ON THESE DRAWINGS AND IN THESE SPECIFICATIONS SHALL MEAN CONSULTANT ENGINEERING SERVICE, INC.

2. ENGINEERS: WHENEVER THE TERM ENGINEER IS USED IN THIS SPECIFICATION, IT REFERS TO CONSULTANT ENGINEERING SERVICE, INC., WINSTON-SALEM, NORTH CAROLINA.

3. WORK INCLUDED: ALL LABOR AND MATERIALS TO PROVIDE COMPLETE HEATING AND AIR CONDITIONING SYSTEM AS SHOWN ON THE DRAWINGS. PROVIDE ALL ACCESSORY AND INCIDENTAL ITEMS, CONTINGENCIES, LIGHT, ELECTRICAL ENERGY, TEMPORARY WIRING, SCAFFOLDING, FIXTURES, TOOLS, TRANSPORTATION, ETC. NECESSARY FOR THE PROPER INSTALLATION OF ALL WORK DESCRIBED IN THIS SECTION OF THE SPECIFICATIONS. POWER AND CONTROL WIRING FOR SYSTEM SHALL ALSO BE INCLUDED IN THIS CONTRACT.

4. MEASUREMENTS: BEFORE ORDERING ANY MATERIAL OR DOING ANY WORK, CONTRACTOR SHALL VERIFY ALL MEASUREMENTS AT THE SITE AND SHALL BE RESPONSIBLE FOR THE CORRECTNESS OF SAME. NO EXTRA CHARGE FOR COMPLETION WILL BE ALLOWED ON ACCOUNT OF DIFFERENCE BETWEEN ACTUAL DIMENSIONS AND THE MEASUREMENTS INDICATED ON THE DRAWINGS. ANY DIFFERENCE WHICH MAY BE FOUND SHALL BE SUBMITTED TO THE ENGINEER, FOR CONSIDERATION BEFORE PROCEEDING WITH THE WORK.

5. CONFORMANCE TO SPECIFICATIONS AND SUBMITTAL OF MATERIALS: THE DRAWINGS ARE BASED ON THE FIRST MANUFACTURE LISTED IN THE SCHEDULE AND/OR SPECIFICATIONS. CONTRACTOR SHALL BEAR ANY COSTS FOR ALTERNATIONS REQUIRED TO ANY OTHER CONTRACT OR SUB-CONTRACT RESULTING FROM A SUBSTITUTION OF MATERIAL AND/OR EQUIPMENT FOR THAT SPECIFIED OR ON WHICH THE DRAWINGS AND/OR SPECIFICATIONS ARE BASED.

6. REGULATIONS AND CODES: ALL WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH NORTH CAROLINA STATE BUILDING CODE MECHANICAL, PLUMBING, ENERGY, FUEL GAS AND BUILDING CODES. ALL ELECTRICAL WORK SHALL COMPLY WITH THE NEC NATIONAL ELECTRIC CODE.

7. FEES AND PERMITS: MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL FEES, PERMITS, AND TESTS AS REQUIRED TO COMPLETE THE JOB AND MEET APPROVAL OF THE LOCAL MECHANICAL INSPECTOR.

8. EXAMINATION OF SITE: BEFORE SUBMITTING A PROPOSAL, THE CONTRACTOR SHALL EXAMINE THE SITE, FAMILIARIZE HIMSELF WITH THE DRAWINGS AND OBTAIN SUCH INFORMATION AS IS NECESSARY TO ENABLE HIM TO CARRY OUT INSTALLATION. THE CONTRACTORS FAILURE TO COMPLY WITH THIS REQUIREMENT WILL NOT RELIEVE HIM OF THE RESPONSIBILITY OF ANY ERRORS WHICH MIGHT HAVE BEEN AVOIDED BY HIS COMPLIANCE.

9. STANDARDS OF MATERIALS: ALL MATERIALS USED SHALL BE NEW UNLESS OTHERWISE SHOWN OR CALLED FOR, AND SHALL BE FURNISHED IN ACCORDANCE WITH STANDARD SPECIFICATION OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS, THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS, THE AMERICAN CONCRETE INSTITUTE, AND OTHER GUIDE SPECIFICATIONS.

10. APPROVAL: WHENEVER THE WORDS "OR EQUAL" OR "APPROVED" OR "APPROVAL" ARE USED, THEY SHALL MEAN "OR EQUAL" APPROVED BY THE ARCHITECTS AND ENGINEERS" OR "APPROVED BY THE ARCHITECTS AND ENGINEERS" OR "APPROVED BY THE ARCHITECTS AND ENGINEERS". ALL MAJOR EQUIPMENT AND MATERIAL MUST BE PRE-APPROVED DURING THE BID PROCESS. ALL ITEMS MUST BE SUBMITTED AT LEAST TWO (2) WEEKS PRIOR TO BID OPENING SO THAT THEY MAY BE INCLUDED IN AN ADDENDUM WHICH IS NOT PUBLISHED IN AN ADDENDUM. THEY WILL BE CONSIDERED DURING THE SUBMITTAL PROCESS. SUBMITTALS MUST BE PROVIDED BY A BONA FIDE BIDDER, NOT A VENDOR.

11. DIAGRAMS AND COORDINATION: THE DRAWINGS ARE DIAGRAMMATIC AND SHALL BE FOLLOWED AS CLOSELY AS POSSIBLE. HOWEVER, THE CONTRACTORS SHALL BE RESPONSIBLE TO COORDINATE THEIR INSTALLATION AND WORK OUT INTERFERENCES THAT MIGHT OCCUR AMONG THEMSELVES. SHOULD INTERFERENCES OCCUR, THE ENGINEERS WILL ASSIST IN WORKING THEM OUT IN THE BEST INTERESTS OF ALL CONTRACTORS AND OWNERS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER COORDINATION OF ALL WORK. IF ANY INTERFERENCE IS NOT PLANNED, ONE PRINTED COPY OF THE DRAWINGS AND SPECIFICATIONS SHALL BE KEPT ON SITE AT ALL TIMES.

THE DRAWINGS INDICATE OFFSETS REQUIRED, BUT BY NO MEANS INDICATE ALL SUCH SITUATIONS. SHOULD CONTRACTOR ELECT TO PREFABRICATE PIPING, DUCTS, AND HE SHALL DO SO AT THE RISK OF HAVING TO MAKE FIELD CHANGES TO AVOID STRUCTURE, OR OTHER TRADES, AT HIS OWN EXPENSE. OWNERS AND ENGINEERS SHALL NOT BE LIABLE FOR EXTRA EXPENSES INVOLVED BECAUSE OF THE CONTRACTORS FAILURE TO CONSIDER SUCH SITUATIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING ALL NECESSARY SERVICE CLEARANCES ARE MAINTAINED. LAYOUT ALL WORK PRIOR TO CONSTRUCTION TO VERIFY. THE MECHANICAL CONTRACTOR SHALL DO "X" SCALE DUCT DRAWINGS TO VERIFY ALL WILL FIT.

12. EQUIPMENT SUBMITTALS AND SHOP DRAWINGS: SHOP DRAWINGS OF ALL EQUIPMENT, MATERIALS, OR FABRICATED WORK SHALL BE SUBMITTED ELECTRONICALLY IN PDF FORMAT FOR APPROVAL. NO WORK SHALL BE DONE UNTIL SUCH APPROVAL HAS BEEN OBTAINED. ONE PRINTED COPY OF ALL APPROVED EQUIPMENT SHOP DRAWINGS SHALL BE KEPT ON SITE AT ALL TIMES. THE APPROVAL OF SHOP DRAWINGS WILL BE GENERAL AND SHALL NOT RELIEVE THE CONTRACTOR FROM THE RESPONSIBILITY FOR ANY ERROR WHICH MAY EXIST. MANY EXISTING ITEMS WILL REQUIRE FIELD MEASUREMENT. ENGINEER WILL NOT BE RESPONSIBLE FOR DIMENSIONS.

13. PROJECT PHASING AND SCHEDULING: THE CONTRACTOR MUST DEVELOP A WORK PLAN TO ALLOW THE PHASING SCHEDULE TO BE MET WITH MINIMAL INTERRUPTION TO THE NORMAL OPERATION OF THE FACILITY AS POSSIBLE. CLOSELY COORDINATE SEQUENCE WITH THE OWNER. PROVIDE TEMPORARY SHIELDING, VALVES, SYSTEMS, ETC. AS NECESSARY TO ALLOW THE UNIT TO MAINTAIN USE OF ALL AREAS THAT THEY DESIGNATE. PROVIDE ADDITIONAL MANPOWER AS REQUIRED TO MEET THE SCHEDULE MILESTONES.

14. EQUIPMENT VARIATIONS: SHOULD CONTRACTOR SUBMIT SUBSTITUTES WHICH VARY IN HORSEPOWER, EFFICIENCY, CHARACTERISTICS, PHYSICAL SIZE, NUMBER OF MOTORS, ETC. FROM THOSE SPECIFIED, CONTRACTOR SHALL BEAR ANY AND ALL EXPENSES THAT MAY ARISE IN THEIR CONTRACTOR'S WORK THAT MUST BE ALTERED TO ALLOW USE OF SUCH SUBSTITUTE EQUIPMENT. APPROVAL OF ANY SUCH EQUIPMENT SHALL BE VOIDED SHOULD CONTRACTOR FAIL TO BEAR ANY SUCH EXPENSES.

15. PROTECTION OF EQUIPMENT: THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL WORK DAMAGED BY HIM IN EXECUTING CONTRACT. ALL WORK DAMAGED BY THE CONTRACTOR SHALL BE REPAIRED OR REPLACED BY HIM UNDER ORIGINAL WORKING CONDITIONS WITHOUT EXTRA COST. ANY CONSTRUCTION WORK DAMAGED SHALL BE MADE ACCEPTABLE TO ENGINEERS AND OWNERS. THE CONTRACTOR SHALL AT ALL TIMES BE RESPONSIBLE FOR ANY DAMAGED EQUIPMENT OR WORK IN CONSTRUCTION TO PROTECT. ALL EQUIPMENT THAT WAS WORKING PRIOR TO CONSTRUCTION SHALL BE MADE OPERABLE BY THE CONTRACTOR UNLESS THE ENGINEER IS NOTIFIED IN WRITING PRIOR TO THE START OF CONSTRUCTION.

16. PROTECTION OF PEOPLE: THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING WITH THE OWNER AND PROVIDING TEMPORARY FENCING, WALLING, TAPES, CONTAINING BARRICADES, FLAG PERSONS, ETC. AS REQUIRED TO ENSURE THE SAFETY OF THE VISITORS. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR IDENTIFYING AND INSTALLING ALL NECESSARY SAFETY MEASURES.

17. CLEANING-UP: THE CONTRACTOR SHALL KEEP THE PREMISES AND POINTS AT THE BUILDING FREE OF RUBBISH AND WASTE MATERIAL DUE TO THE INSTALLATION OF WORK INCLUDED IN THIS SPECIFICATION AND SHOWN ON THE PLANS. AFTER COMPLETION OF THE WORK AND ALL TESTS HAVE BEEN MADE, THE CONTRACTOR SHALL REMOVE ALL RUBBISH INCIDENTAL TO CONTRACT AND SHALL LEAVE ALL PORTIONS OF THE WORK IN A CLEAN CONDITION.

18. INSPECTIONS: THE CONTRACTOR MUST AT ALL TIMES LEAD ANY ASSISTANCE NECESSARY FOR ENGINEERS OR THEIR AUTHORIZED REPRESENTATIVE TO MAKE TESTS, INSPECTIONS, ETC.

19. WORKMANSHIP: ALL MATERIALS AND EQUIPMENT SHALL BE INSTALLED AND COMPLETED IN A FIRST CLASS WORKMANLIKE MANNER. THE ENGINEER RESERVE THE RIGHT TO REJECT ANY DAMAGED EQUIPMENT, AND TO DIRECT THE REMOVAL AND REPLACEMENT OF ANY ITEM, WHICH IN THEIR OPINION SHALL NOT REPRESENT ACCEPTABLE WORKMANSHIP. SUCH REMOVAL AND REPLACEMENT SHALL BE DONE WITHIN THE TIME PERIODS BY THE ENGINEERS AT THE CONTRACTOR'S EXPENSE AND WITHOUT ADDITIONAL COST TO THE OWNERS.

20. COORDINATION: THE MECHANICAL CONTRACTOR SHALL COORDINATE HIS WORK WITH THAT OF ALL OTHER TRADES PRIOR TO THE INSTALLATION OF ANY OF HIS EQUIPMENT, DUCT, CONDUITS, CONTROLS, ETC.

21. OPENINGS, CUTTING AND PATCHING: VARIOUS OPENINGS, CUTTING AND PATCHING WILL BE REQUIRED FOR THE INSTALLATION OF THE MECHANICAL WORK, AND THE MECHANICAL CONTRACTOR SHALL INCLUDE THIS WORK IN HIS BID. RESTORE AREAS AFFECTED BY SUCH WORK TO MATCH ADJACENT OR SURROUNDING SURFACES.

THE CUTTING OF OPENINGS OR HOLES IN WALLS AND CUTTING OF HOLES IN FLOORS AND CEILINGS SHALL BE DONE IN A MANNER AS NOT TO ENDANGER THE STABILITY OF THE STRUCTURE OR ANY PART THEREOF, AND ANY SUCH WORK SHALL BE COORDINATED WITH OTHER CONTRACTORS.

ALL NEW HANGERS IN THE MECHANICAL ROOM SHALL BE ATTACHED TO THE BUILDING STRUCTURE, ATTACHING TO THE CEILING SHALL NOT BE ALLOWED. CEILING DUCT TO ATTACH HANGER SHALL BE REPAIRED BY THE MECHANICAL CONTRACTOR.

22. OPERATING INSTRUCTIONS: AT THE COMPLETION OF THE WORK THE CONTRACTOR SHALL FURNISH OWNER (3) COMPLETE BOOKLETS CONTAINING ENGINEERING DATA AND CUTS OF ALL EQUIPMENT ALONG WITH TYPED OR PRINTED OPERATING INSTRUCTIONS. ALSO INCLUDE APPROVED SUBMITTAL DATA. PROVIDE BOOKLETS TO THE ALIANT ENERGY SERVICES WITH THE EQUIPMENT. ALL WORK SHALL BE SUBJECT TO APPROVAL. THE CONTRACTOR SHALL PROVIDE A COMPETENT INSTRUCTOR TO ADVISE THE OWNER OR HIS REPRESENTATIVE OF THE PROPER OPERATION AND SERVICING OF EQUIPMENT INSTALLED.

23. WARRANTY: CONTRACTOR SHALL GUARANTEE ALL MATERIAL, EQUIPMENT AND WORKMANSHIP FOR A PERIOD OF 12 MONTHS AFTER DATE OF FINAL ACCEPTANCE OF BUILDING BY ENGINEERS AND OWNERS. AIR CONDITIONING COMPRESSORS SHALL HAVE FULL EXTENDED 5-YEAR TOTAL WARRANTY FOR PARTS, LABOR, AND REFRIGERANT. ALL GUARANTEE FAILURE SHALL BE CORRECTED OR REPLACED BY CONTRACTOR AS SOON AS POSSIBLE AFTER NOTIFICATION OF SUCH FAILURE. REFER TO EQUIPMENT SCHEDULES FOR ADDITIONAL WARRANTIES TO BE INCLUDED.

MECHANICAL SPECIFICATIONS CONTINUED

24. LABELING AND IDENTIFYING: ALL CONCEALED PIPING AND/OR ALL EXPOSED BARE PIPING SHALL BE LABELED WITH FACTORY MADE STENCILS INCLUDING DIRECTION OF FLOW ARROWS ON LABELS. PAINT COLOR SHALL BE AN EASILY READ CONTRASTING COLOR.

ALL EXPOSED JACKETED PIPING SHALL BE LABELED WITH PREFAB COILED PLASTIC LABELS SECURED WITH A SELF ADHESIVE STRIP FOR 5" AND SMALLER PIPING INCLUDING DIRECTION OF FLOW ARROWS AND "HYVAC DUCT CONSTRUCTION STANDARDS", WHERE DUCTWORK SHALL BE EXPOSED, PROVIDE FLAT SEAM JOINTS WITH NO SHARP EDGES AND NO DUCT TAPE WILL BE PERMITTED. UNSIGHTLY DUCTWORK WILL BE REPLACED AT DIRECTION OF ENGINEER. ALL WORK SHALL BE SUBJECT TO APPROVAL. THE CONTRACTOR SHALL PROVIDE A COMPETENT INSTRUCTOR TO ADVISE THE OWNER OR HIS REPRESENTATIVE OF THE PROPER OPERATION AND SERVICING OF EQUIPMENT INSTALLED.

25. PATCHING AND PAINTING: ALL PAINTING, UNLESS SPECIFICALLY NOTED OTHERWISE, SHALL BE IN GENERAL CONTRACT, FACTORY-FINISHED EQUIPMENT OR MATERIAL PROVIDED IN THIS DIVISION THAT HAS BEEN SCRATCHED OR BLEMSHED SHALL BE TOUCHED UP OR REPAINTED AS REQUIRED, BY THE MECHANICAL CONTRACTOR. ALL EXPOSED AND/OR EXTERIOR SUPPORTS, UNISTRUT, HANGERS, ETC. SHALL BE PAINTED WITH 2 COATS OF PAINT TO MATCH SURFACE ON WHICH THEY ARE MOUNTED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSPECTING THE FACILITY AND PROVIDING DOCUMENTATION INCLUDING DATED PHOTOS OF DAMAGE IN THE FACILITY PRIOR TO STARTING WORK.

26. FILTERS: CONTRACTOR SHALL FURNISH ALL RETURN AIR FILTER GRILLES AND/OR FILTER RACKS AS INDICATED ON THE DRAWING AND/OR IN THE EQUIPMENT SCHEDULES. FILTERS FOR ALL VAV BOXES EQUIPMENT SHALL BE 1" DISPOSABLE FILTERS AS PROVIDED BY MANUFACTURER. ALL AIR (RETURN AND OUTSIDE AIR) MUST BE FILTERED PRIOR TO PASSING THROUGH THE UNIT COILS. ALL FILTERS SHALL BE A STANDARD SIZE (NO EXCEPTIONS). PROVIDE ADDITIONAL FILTER MEDIA OVER GRILLES DURING CONSTRUCTION TO AVOID STOPPING UP THE UNIT COILS. UNITS WILL NOT BE ALLOWED TO OPERATE UNTIL APPROVED BY THE ENGINEER BASED ON THE CLEANLINESS OF THE BUILDING. AT FINAL INSPECTION, CONTRACTOR SHALL HAVE CLEAN MEDIA IN ALL GRILLES AND/OR FILTER RACKS. CONSULT PLANS FOR FILTER GRID LOCATIONS. CONTRACTOR SHALL FURNISH ONE (1) SPARE SET OF FILTERS. WRAP IN PLASTIC SHEETING AND STORE ON PREMISES WHERE DIRECTED. THE MECHANICAL CONTRACTOR SHALL INCLUDE IN THE OPERATING INSTRUCTION MANUALS A COMPLETE FILTER LIST INDICATING THE EQUIPMENT TAG, THE QUANTITY AND SIZE OF FILTERS CONTAINED IN EACH PIECE OF EQUIPMENT AND EACH FILTER GRILLE.

27. ACCESS DOORS: WHERE VALVES OR DAMPERS OCCUR IN PLASTER OR SHEET ROCK CEILINGS, OR MASONRY WALLS, MECHANICAL CONTRACTOR SHALL PROVIDE ACCESS DOORS TO SERVICE AND OPERATE. ACCESS DOORS SHALL BE SIZE SUFFICIENT FOR EASY SERVICE AND EQUIPMENT REMOVAL HINGED ON ONE SIDE WITH 3/4" CAM-TYPE HEAVY DUTY SEWEROVERWER OPERATED LOCK ON OPPOSITE SIDE. ACCESS DOORS SHALL BE PERFORMED BY FIELD PAINTER BY THE GENERAL CONTRACTOR PAINTING SUB-CONTRACTOR. GENERAL CONTRACTOR SHALL MOUNT DOORS.

28. FIRE RATINGS: COORDINATE FIRE RATINGS WITH ARCHITECTURAL DRAWINGS AND/OR GENERAL CONTRACTOR. PROVIDE FIRE STOPPING AND/OR FIRE DAMPERS FOR ALL FIRE RATED PENETRATIONS. SUBMIT UL ASSEMBLIES TO INSPECTIONS DEPARTMENT AND FIRE MARSHAL AS REQUIRED.

29. SOUND ATTENUATION: ALL COMPRESSORS SHALL BE PROVIDED WITH SOUND ATTENUATING BLANKETS MANUFACTURED FOR ATTENUATING COMPRESSOR SOUND. CHILLERS SHALL BE PROVIDED WITH VIBRATION ISOLATORS AND LOW SOUND CONDENSER FANS.

30. PIPE AND FITTINGS: PROVIDE VARIOUS SYSTEMS OF PIPING AS SHOWN ON THE DRAWINGS, DETAILS AND AS CALLED FOR IN THIS SPECIFICATION. ALL PIPING SHALL BE INSTALLED PARALLEL OR PERPENDICULAR TO THE BUILDING WALLS, FLOORS AND/OR CEILING UNLESS OTHERWISE SHOWN ON THE DRAWINGS. SUSPENDED PIPING SHALL BE RUN AS HIGH AS POSSIBLE AND SHALL BE NECESSARY TO AVOID OTHER TRADES. SHEET METAL WORK SHALL TAKE PRECEDENCE OVER OTHER SYSTEMS WHEN ROUTING PIPING.

31. DRAIN PIPING: SCHEDULE 40 PVC WITH MATCHING PVC DRAINAGE FITTINGS. THE DRAIN SIZE SHALL MATCH THE DRAIN PAN OPENING. IN ANY CASE OF DRAIN PIPING SHALL BE NOT SMALLER THAN 3/4". PROVIDE PIPE TRAP AND CLEANOUT PLUG AT EQUIPMENT DRAIN PAN. LINE LEAVING TRAP MUST BE AT LEAST 1" LOWER THAN UNIT DRAIN. EXTEND TO APPROVED JANITOR SINK OR HUB DRAIN. PROVIDE TYPE 1 COPPER DRAINS WHEN IN A RETURN AIR PLenum. PROVIDE 1/2" WATER TIGHT WELDED JOINTS TO ALL APPLIED OR WELDED JOINTS. CANNOT BE IDENTIFIED, CONTRACTOR SHALL PROVIDE (AND WIRE ELECTRICITY) AT NO ADDITIONAL CHARGE A CONDENSATE PUMP WITH FLOAT WIRING TO SHUT DOWN UNIT IN CASE OF FAILURE.

32. REFRIGERANT PIPING: SHALL BE TYPE "ACR" OR REFRIGERATION GRADE, DEOXYDIZED AND SEALED REFRIGERANT COPPER TUBING WITH WROUGHT COPPER FITTINGS. IT SHALL CONFORM TO ASTM-B-88-33 AND SHALL BE FREE FROM SCALE AND DIRT. SIZE ALL REFRIGERANT PIPING IN STRICT ACCORDANCE WITH THE MANUFACTURER'S WRITING. ALL REFRIGERANT FITTINGS SHALL BE OF DOMESTIC MANUFACTURE BY CHASE, MUELLER, BRIDGEPORT, READING, OR ANCONADA. SOLDER SHALL BE SIL-PHOS, EXCEPT SUTOP PIPING, WHICH MAY BE 95-5 OR SIL-PHOS. AT CONTRACTOR'S OPTION, CLEANING OF TUBING ENDS, REMOVAL OF BURRS AND OXIDATION PREVENTION OF NEW EQUIPMENT, DISCONNECTING AND REMOVAL OF EXISTING PIPING AND EXHAUST DUCT AS NEEDED TO FACILITATE THE REMOVAL OF THE EQUIPMENT AS WELL AS THE INSTALLATION OF THE NEW EQUIPMENT, DISCONNECTING AND REMOVING EXISTING PIPING SYSTEMS FROM THE COIL/UNIT CONNECTION BACK TO POINT AS NEEDED TO FACILITATE THE REMOVAL OF THE EQUIPMENT AS WELL AS THE INSTALLATION OF THE NEW EQUIPMENT. ALL OF THE ABOVE ITEMS MAY NOT APPLY TO EACH PIECE OF EQUIPMENT SHOWN TO BE REMOVED.

33. BLOWING OUT, CLEANING AND ADJUSTING SYSTEMS: ALL PIPING AND EQUIPMENT SHALL BE BLOWN OUT UNDER PRESSURE AND CLEANED OF FOREIGN MATTER BEFORE THE SYSTEM IS PUT INTO OPERATION. MECHANICAL EQUIPMENT SHALL NOT BE CONNECTED TO PIPING UNTIL IT IS CLEAN, DRY, AND FREE OF FOREIGN MATTER. WHEN THE SYSTEMS ARE COMPLETE, THE CONTRACTOR SHALL PLACE THEM IN OPERATION IN THE PRESENCE OF THE OWNERS OR THEIR REPRESENTATIVES AND SHALL THOROUGHLY ACQUANT THEM WITH THE PROPER OPERATION OF THE EQUIPMENT.

34. TESTS: UPON COMPLETION OF THE INSTALLATION OF THE VARIOUS PARTS OR SECTIONS OF THESE SPECIFICATIONS, ALL SYSTEMS SHALL BE PROPERLY ADJUSTED AND TESTED BY THE CONTRACTOR AND PLACED IN PERFECT OPERATING CONDITION. SUBSISTANCES OF THE ARCHITECTS AND ENGINEERS. PROVIDE ALL LABOR AND EQUIPMENT TO PERFORM THIS WORK. ALL INSULATED SYSTEMS SHALL BE TESTED PRIOR TO INSULATION SYSTEMS BEING INSTALLED.

35. HANGERS AND SUPPORTS - PIPING: CONTRACTOR SHALL PROVIDE HANGERS AND SUPPORTS FOR ALL PIPING AND EQUIPMENT. HANGERS FOR INSULATION SHALL BE INSTALLED WITH PIPE AND INSULATION. HANGERS SHALL BE MANUFACTURED BY B-LINE, MICHIGAN, PHD OR PRIGR APPROVED EQUAL. ALL HANGER SPACING SHALL BE PER THE NORTH CAROLINA MECHANICAL CODE. HANGERS FOR INSULATED PIPING SHALL BE SIZED TO PASS BOTH PIPING AND INSULATION. PROVIDE INTERMEDIATE STEEL ANGLES OR CLIPPED OR BOLTED TO JOISTS, OR RODS. BEAM CLAMPS MAY ALSO BE USED. ALL HANGER RODS SHALL BE 1/2" TO CONFORM TO HANGER USED AND SIZE OF PIPE SUPPORTED. STEEL SUPPORTS, ANCHORS, FRAMES, BRACING PLATES, BOLTS, NUTS, WASHERS, ETC., INCIDENTAL TO THE INSTALLATION OF THE HANGERS PROVIDED BY CONTRACTOR. ARRANGEMENT SHALL BE SUBJECT TO OWNERS' AND ENGINEERS' APPROVAL. THE SIZE OF STEEL MEMBERS SHALL BE AS SHOWN ON PLANS. WHERE NOT SHOWN, USE CORRESPONDING SIZES.

36. HORIZONTAL BARE COPPER PIPING: B-LINE B3174C02 COPPER PLATED WITH PLASTIC COATING. HORIZONTAL BARE STEEL AND PVC PIPING: B-LINE B3100 ADJUSTABLE CLEVIS HANGER. VERTICAL PIPING: STRUT WITH CLAMPS, SPLIT RINGS HANGERS, OR RISER CLAMPS. HORIZONTAL REFRIGERANT PIPING: STRUT WITH B-LINE BVT SERIES VIBRA CLAMPS. VERTICAL REFRIGERANT PIPING: STRUT WITH B-LINE BVT SERIES VIBRA CLAMPS. EXTERIOR HORIZONTAL REFRIGERANT PIPING: B-LINE C-SERIES SUPPORT BLOCKS WITH INTEGRAL STRUT WITH B-LINE BVT SERIES VIBRA CLAMPS.

37. PIPING SHALL BE SUPPORTED FROM THE STRUCTURE AND/OR CEILING JOISTS, BEAMS. NO PIPING SHALL BE SUPPORTED DIRECTLY FROM METAL DECK AND/OR ROOF DECKING.

38. SUPPORTS BETWEEN JOISTS: PROVIDE INTERMEDIATE STEEL ANGLES, CLIPPED AND/OR BOLTED TO JOISTS, DRILLED FOR RODS. PROVIDE AS NEEDED FOR PIPING, DUCT AND/OR EQUIPMENT.

39. METAL DUCTWORK: DUCTWORK SHALL BE BEST QUALITY GALVANIZED IRON AND SHALL BE FURNISHED AND INSTALLED IN STRICT ACCORDANCE WITH LATEST EDITION OF ASHRAE GUIDE AND SMACNA "HYVAC DUCT CONSTRUCTION STANDARDS", WHERE DUCTWORK SHALL BE EXPOSED, PROVIDE FLAT SEAM JOINTS WITH NO SHARP EDGES AND NO DUCT TAPE WILL BE PERMITTED. UNSIGHTLY DUCTWORK WILL BE REPLACED AT DIRECTION OF ENGINEER. ALL WORK SHALL BE SUBJECT TO APPROVAL. THE CONTRACTOR SHALL PROVIDE A COMPETENT INSTRUCTOR TO ADVISE THE OWNER OR HIS REPRESENTATIVE OF THE PROPER OPERATION AND SERVICING OF EQUIPMENT INSTALLED.

40. ALL DUCT SIZES SHOWN ARE NET FREE AREA SIZE. CONTRACTOR CAN ADJUST DUCT DIMENSIONS TO BETTER FIT THE AVAILABLE SPACE. WHEN USING DIFFERENT DUCT SIZES USE AN EQUIVALENT CROSS SECTIONAL AREA.

41. PROVIDE FIRE DAMPERS AND ACCESS DOORS FOR ALL RATED WALL AND/OR FLOOR ASSEMBLIES. PROVIDE RADIATION DAMPERS AND BLANKETS FOR ALL DIFFUSERS IN RATED CEILING ASSEMBLIES. COORDINATE FIRE RATINGS WITH THE ARCHITECTURAL DRAWINGS AND/OR GENERAL CONTRACTOR.

42. PROVIDE FLEXIBLE CONNECTION AT ALL DUCT CONNECTIONS TO AIR HANDLING EQUIPMENT. FLEXIBLE CONNECTION SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS AND SHALL NOT BE USED AS AN OFFSET, TRANSITION, AND/OR OTHER SIMILAR FITTING.

43. FLEXIBLE DUCT: SHALL COMPLY WITH THE PROVISIONS OF UL-181 CLASS 1 AIR DUCT MATERIAL. DUCTS SHALL BE FACTORY MADE AND COMPOSED OF, AN ACoustical TRANSPARENT SPUNBOND NYLON INNER FABRIC, HELIX COIL FORMED AND MECHANICALLY LOCKED TO INNER FABRIC, A FIBERGLASS INSULATING BLANKET (R-6) AND OUTER VAPOR BARRIER OF FIBERGLASS REINFORCED METALIZED FILM LAMINATE. PROVIDE FLEXIMARK TYPE 6M ACoustical INSULATED FLEXIBLE DUCT OR APPROVED EQUAL, (MINIMUM R-8.0 WHEN INSTALLED IN AN UNCONDITIONED ATTIC OR CRAWL SPACE). ALL FLEXIBLE DUCT CONNECTIONS TO HAVE MANUFACTURED SIDE ADJUSTABLE FITTING WITH 45' THROAT AND MANUAL BALANCING DAMPER. MAXIMUM LENGTH OF FLEXIBLE DUCT SHALL BE 10'-0" ON SUPPLY, 5'-0" ON RETURN (UNLESS OTHERWISE NOTED), AND 3'-0" ON EXHAUST.

44. LABELING AND IDENTIFYING: ALL CONCEALED PIPING AND/OR ALL EXPOSED BARE PIPING SHALL BE LABELED WITH FACTORY MADE STENCILS INCLUDING DIRECTION OF FLOW ARROWS ON LABELS. PAINT COLOR SHALL BE AN EASILY READ CONTRASTING COLOR.

45. PATCHING AND PAINTING: ALL PAINTING, UNLESS SPECIFICALLY NOTED OTHERWISE, SHALL BE IN GENERAL CONTRACT, FACTORY-FINISHED EQUIPMENT OR MATERIAL PROVIDED IN THIS DIVISION THAT HAS BEEN SCRATCHED OR BLEMSHED SHALL BE TOUCHED UP OR REPAINTED AS REQUIRED, BY THE MECHANICAL CONTRACTOR. ALL EXPOSED AND/OR EXTERIOR SUPPORTS, UNISTRUT, HANGERS, ETC. SHALL BE PAINTED WITH 2 COATS OF PAINT TO MATCH SURFACE ON WHICH THEY ARE MOUNTED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSPECTING THE FACILITY AND PROVIDING DOCUMENTATION INCLUDING DATED PHOTOS OF DAMAGE IN THE FACILITY PRIOR TO STARTING WORK.

46. FILTERS: CONTRACTOR SHALL FURNISH ALL RETURN AIR FILTER GRILLES AND/OR FILTER RACKS AS INDICATED ON THE DRAWING AND/OR IN THE EQUIPMENT SCHEDULES. FILTERS FOR ALL VAV BOXES EQUIPMENT SHALL BE 1" DISPOSABLE FILTERS AS PROVIDED BY MANUFACTURER. ALL AIR (RETURN AND OUTSIDE AIR) MUST BE FILTERED PRIOR TO PASSING THROUGH THE UNIT COILS. ALL FILTERS SHALL BE A STANDARD SIZE (NO EXCEPTIONS). PROVIDE ADDITIONAL FILTER MEDIA OVER GRILLES DURING CONSTRUCTION TO AVOID STOPPING UP THE UNIT COILS. UNITS WILL NOT BE ALLOWED TO OPERATE UNTIL APPROVED BY THE ENGINEER BASED ON THE CLEANLINESS OF THE BUILDING. AT FINAL INSPECTION, CONTRACTOR SHALL HAVE CLEAN MEDIA IN ALL GRILLES AND/OR FILTER RACKS. CONSULT PLANS FOR FILTER GRID LOCATIONS. CONTRACTOR SHALL FURNISH ONE (1) SPARE SET OF FILTERS. WRAP IN PLASTIC SHEETING AND STORE ON PREMISES WHERE DIRECTED. THE MECHANICAL CONTRACTOR SHALL INCLUDE IN THE OPERATING INSTRUCTION MANUALS A COMPLETE FILTER LIST INDICATING THE EQUIPMENT TAG, THE QUANTITY AND SIZE OF FILTERS CONTAINED IN EACH PIECE OF EQUIPMENT AND EACH FILTER GRILLE.

47. ACCESS DOORS: WHERE VALVES OR DAMPERS OCCUR IN PLASTER OR SHEET ROCK CEILINGS, OR MASONRY WALLS, MECHANICAL CONTRACTOR SHALL PROVIDE ACCESS DOORS TO SERVICE AND OPERATE. ACCESS DOORS SHALL BE SIZE SUFFICIENT FOR EASY SERVICE AND EQUIPMENT REMOVAL HINGED ON ONE SIDE WITH 3/4" CAM-TYPE HEAVY DUTY SEWEROVERWER OPERATED LOCK ON OPPOSITE SIDE. ACCESS DOORS SHALL BE PERFORMED BY FIELD PAINTER BY THE GENERAL CONTRACTOR PAINTING SUB-CONTRACTOR. GENERAL CONTRACTOR SHALL MOUNT DOORS.

48. FIRE RATINGS: COORDINATE FIRE RATINGS WITH ARCHITECTURAL DRAWINGS AND/OR GENERAL CONTRACTOR. PROVIDE FIRE STOPPING AND/OR FIRE DAMPERS FOR ALL FIRE RATED PENETRATIONS. SUBMIT UL ASSEMBLIES TO INSPECTIONS DEPARTMENT AND FIRE MARSHAL AS REQUIRED.

49. SOUND ATTENUATION: ALL COMPRESSORS SHALL BE PROVIDED WITH SOUND ATTENUATING BLANKETS MANUFACTURED FOR ATTENUATING COMPRESSOR SOUND. CHILLERS SHALL BE PROVIDED WITH VIBRATION ISOLATORS AND LOW SOUND CONDENSER FANS.

50. PIPE AND FITTINGS: PROVIDE VARIOUS SYSTEMS OF PIPING AS SHOWN ON THE DRAWINGS, DETAILS AND AS CALLED FOR IN THIS SPECIFICATION. ALL PIPING SHALL BE INSTALLED PARALLEL OR PERPENDICULAR TO THE BUILDING WALLS, FLOORS AND/OR CEILING UNLESS OTHERWISE SHOWN ON THE DRAWINGS. SUSPENDED PIPING SHALL BE RUN AS HIGH AS POSSIBLE AND SHALL BE NECESSARY TO AVOID OTHER TRADES. SHEET METAL WORK SHALL TAKE PRECEDENCE OVER OTHER SYSTEMS WHEN ROUTING PIPING.

51. DRAIN PIPING: SCHEDULE 40 PVC WITH MATCHING PVC DRAINAGE FITTINGS. THE DRAIN SIZE SHALL MATCH THE DRAIN PAN OPENING. IN ANY CASE OF DRAIN PIPING SHALL BE NOT SMALLER THAN 3/4". PROVIDE PIPE TRAP AND CLEANOUT PLUG AT EQUIPMENT DRAIN PAN. LINE LEAVING TRAP MUST BE AT LEAST 1" LOWER THAN UNIT DRAIN. EXTEND TO APPROVED JANITOR SINK OR HUB DRAIN. PROVIDE TYPE 1 COPPER DRAINS WHEN IN A RETURN AIR PLenum. PROVIDE 1/2" WATER TIGHT WELDED JOINTS TO ALL APPLIED OR WELDED JOINTS. CANNOT BE IDENTIFIED, CONTRACTOR SHALL PROVIDE (AND WIRE ELECTRICITY) AT NO ADDITIONAL CHARGE A CONDENSATE PUMP WITH FLOAT WIRING TO SHUT DOWN UNIT IN CASE OF FAILURE.

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53. BLOWING OUT, CLEANING AND ADJUSTING SYSTEMS: ALL PIPING AND EQUIPMENT SHALL BE BLOWN OUT UNDER PRESSURE AND CLEANED OF FOREIGN MATTER BEFORE THE SYSTEM IS PUT INTO OPERATION. MECHANICAL EQUIPMENT SHALL NOT BE CONNECTED TO PIPING UNTIL IT IS CLEAN, DRY, AND FREE OF FOREIGN MATTER. WHEN THE SYSTEMS ARE COMPLETE, THE CONTRACTOR SHALL PLACE THEM IN OPERATION IN THE PRESENCE OF THE OWNERS OR THEIR REPRESENTATIVES AND SHALL THOROUGHLY ACQUANT THEM WITH THE PROPER OPERATION OF THE EQUIPMENT.

54. TESTS: UPON COMPLETION OF THE INSTALLATION OF THE VARIOUS PARTS OR SECTIONS OF THESE SPECIFICATIONS, ALL SYSTEMS SHALL BE PROPERLY ADJUSTED AND TESTED BY THE CONTRACTOR AND PLACED IN PERFECT OPERATING CONDITION. SUBSISTANCES OF THE ARCHITECTS AND ENGINEERS. PROVIDE ALL LABOR AND EQUIPMENT TO PERFORM THIS WORK. ALL INSULATED SYSTEMS SHALL BE TESTED PRIOR TO INSULATION SYSTEMS BEING INSTALLED.

55. HANGERS AND SUPPORTS - PIPING: CONTRACTOR SHALL PROVIDE HANGERS AND SUPPORTS FOR ALL PIPING AND EQUIPMENT. HANGERS FOR INSULATION SHALL BE INSTALLED WITH PIPE AND INSULATION. HANGERS SHALL BE MANUFACTURED BY B-LINE, MICHIGAN, PHD OR PRIGR APPROVED EQUAL. ALL HANGER SPACING SHALL BE PER THE NORTH CAROLINA MECHANICAL CODE. HANGERS FOR INSULATED PIPING SHALL BE SIZED TO PASS BOTH PIPING AND INSULATION. PROVIDE INTERMEDIATE STEEL ANGLES OR CLIPPED OR BOLTED TO JOISTS, OR RODS. BEAM CLAMPS MAY ALSO BE USED. ALL HANGER RODS SHALL BE 1/2" TO CONFORM TO HANGER USED AND SIZE OF PIPE SUPPORTED. STEEL SUPPORTS, ANCHORS, FRAMES, BRACING PLATES, BOLTS, NUTS, WASHERS, ETC., INCIDENTAL TO THE INSTALLATION OF THE HANGERS PROVIDED BY CONTRACTOR. ARRANGEMENT SHALL BE SUBJECT TO OWNERS' AND ENGINEERS' APPROVAL. THE SIZE OF STEEL MEMBERS SHALL BE AS SHOWN ON PLANS. WHERE NOT SHOWN, USE CORRESPONDING SIZES.

MECHANICAL SPECIFICATIONS CONTINUED

36. SPIN-IN FITTINGS: ALL FLEXIBLE DUCT TAKE-OFFS FROM RECTANGULAR VARIABLE AIR VOLUME DUCTWORK SHALL BE MADE WITH SLENEX OR APPROVED EQUAL. "SPIN-IN" TYPE FITTING TYPE MS-DIOL COMPLETE WITH AIR EXTRACTOR, BALANCING DAMPER WITH SPRING LOADED RETRACTABLE BEARING AND LOCKING WING NUT. "HOMEMADE" COLLARS NOT ACCEPTABLE.

37. DUCT HANGERS & SUPPORTS: CONTRACTOR SHALL PROVIDE HANGERS AND SUPPORTS FOR ALL ROUND AND RECTANGULAR DUCTS WITH SUPPORT SYSTEMS INDICATED IN SMACNA "HYVAC DUCT CONSTRUCTION STANDARDS". ALL HANGERS AND SUPPORTS SHALL BE SPACED IN ACCORDANCE WITH THE NORTH CAROLINA MECHANICAL CODE. PROVIDE INTERMEDIATE STEEL ANGLES AND/OR STRUTS, CLIPPED OR BOLTED TO JOISTS, DRILLED FOR RODS. BEAM CLAMPS MAY ALSO BE USED. STEEL SUPPORTS, ANCHORS, FRAMES, BRACING PLATES, BOLTS, NUTS, WASHERS, ETC., INCIDENTAL TO THE INSTALLATION OF THE WORK SHALL BE PROVIDED BY CONTRACTOR. ARRANGEMENT SHALL BE SUBJECT TO OWNERS' AND ENGINEER'S APPROVAL. THE SIZE OF STEEL MEMBERS SHALL BE AS SHOWN ON PLANS. WHERE NOT SHOWN, USE CORRESPONDING SIZES. (NOTE: RADIATION DAMPERS MUST BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S WRITING. ALL DAMPERS SHALL BE INSTALLED WITH AN OFFSET, TRANSITION, AND/OR OTHER SIMILAR FITTING. PROVIDE INTERMEDIATE STEEL ANGLES, CLIPPED OR BOLTED TO JOISTS, DRILLED FOR RODS. BEAM CLAMPS MAY ALSO BE USED. STEEL SUPPORTS, ANCHORS, FRAMES, BRACING PLATES, BOLTS, NUTS, WASHERS, ETC., INCIDENTAL TO THE INSTALLATION OF THE WORK SHALL BE PROVIDED BY CONTRACTOR. ARRANGEMENT SHALL BE SUBJECT TO OWNERS' AND ENGINEER'S APPROVAL. THE SIZE OF STEEL MEMBERS SHALL BE AS SHOWN ON PLANS. WHERE NOT SHOWN, USE CORRESPONDING SIZES. (NOTE: RADIATION DAMPERS MUST BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S WRITING. ALL DAMPERS SHALL BE INSTALLED WITH AN OFFSET, TRANSITION, AND/OR OTHER SIMILAR FITTING. PROVIDE INTERMEDIATE STEEL ANGLES, CLIPPED OR BOLTED TO JOISTS, DRILLED FOR RODS. BEAM CLAMPS MAY ALSO BE USED. STEEL SUPPORTS, ANCHORS, FRAMES, BRACING PLATES, BOLTS, NUTS, WASHERS, ETC., INCIDENTAL TO THE INSTALLATION OF THE WORK SHALL BE PROVIDED BY CONTRACTOR. ARRANGEMENT SHALL BE SUBJECT TO OWNERS' AND ENGINEER'S APPROVAL. THE SIZE OF STEEL MEMBERS SHALL BE AS SHOWN ON PLANS. WHERE NOT SHOWN, USE CORRESPONDING SIZES. 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