

## MISCELLANEOUS ABBREVIATIONS

ABV	ABOVE	ME	INSULATED METAL ENCLOSURE
APPROX	APPROXIMATELY	INCH	INCHES
AUTO	AUTOMATIC	INCL	INCLUDED
AAV	AUTOMATIC AIR VENT	INSUL	INSULATION
AD	ACCESS DOOR	INTERL	INTERLOCK
AF	ABOVE FINISHED FLOOR	INVERT	INVERT
AFMD	AIR FLOW MEASURING DEVICE	IER	INVERTED ECCENTRIC REDUCER
AP	ACCESS PANEL	IVS	ISOLATION VALVE STATION
ATC	AUTOMATIC TEMPERATURE CONTROL		
AWT	AVERAGE WATER TEMPERATURE	LTG	LIGHTING
		LAT	LEAVING AIR TEMPERATURE
BLDG	BUILDING	LDB	LEAVING DRY BULB
BLW	BELOW	LDF	LINEAR FEET
BC	BALANCING COCK	LSDC	LINEAR SUPPLY DIFFUSER CEILING
BDD	BACKDRAFT DAMPER	LWB	LEAVING WET BULB
		LWT	LEAVING WATER TEMPERATURE
CAP	CAPACITY	MAX	MAXIMUM
CFH	CUBIC FEET/HOUR	MECH	MECHANICAL
CHK V	CHECK VALVE	MFR	MANUFACTURER
CHWS	CHILLED WATER SUPPLY	MIN	MINIMUM
CHWR	CHILLED WATER RETURN	MTD	MOUNTED
CHWSR	CHILLED WATER SUPPLY/RETURN	MTR	MOTOR
CLG	CEILING	MTL	METAL
CLG MTD	CEILING MOUNTED	MAT	MIXED AIR TEMPERATURE
COL	COLUMN	MAV	MANUAL AIR VENT
CONC	CONCRETE	MBH	ONE THOUSAND BTU/HOUR
CONN	CONNECTOR	MOD	MOTOR OR OPERATED DAMPER
CONTR	CONTRACTOR	MH	MANHOLE
CONT	CONTINUE	MER	MECHANICAL EQUIPMENT ROOM
CONV	CONVECTOR	NTS	NOT TO SCALE
CORR	CORROSION	NA	NOT APPLICABLE
CFM	CUBIC FEET PER MINUTE	OPER	OPERATED
CO	CLEANOUT	OPNG	OPENING
CV	CONTROL VALVE	OA	OUTSIDE AIR
DB	DRY BULB	OSB	OPPOSED BLADE DAMPER
DHW	DOMESTIC HOT WATER	OSBY	OUTSIDE SCREW AND YOKE
DOW	DOMESTIC COLD WATER		
DIFF	DIFFUSER	PC	PLUMBING CONTRACTOR
DISCH	DISCHARGE	PRD	PRESSURE DIFFERENTIAL VALVE
DN	DOWN	PD	PUMP DISCHARGE
DO	DITTO	PG	PRESSURE GAUGE WITH COCK
DPR	DAMPER	PRV	PRESSURE REDUCING VALVE
DR	DRAIN	PT	PRESSURE TAP
DWG	DRAWING		
DX	DIRECT EXPANSION		
		REQD	REQUIRED
EA	EXHAUST AIR	RET	RETURN
EMER	EMERGENCY	REX	REMOVE EXISTING
EQUIP	EQUIPMENT	RM	ROOM
EXH	EXHAUST	RA	RETURN AIR/RELIEF AIR
ETR	EXISTING TO REMAIN	RV	RELIEF VALVE
EAT	ENTERING AIR TEMPERATURE		
EC	ELECTRICAL CONTRACTOR	SCH	SCHEDULE
EDB	ENTERING DRY BULB	SA	SHEET
EWB	ENTERING WET BULB	SHT	SHEET METAL
EWT	ENTERING WATER TEMPERATURE	STL	STEEL
EX	EXISTING	STR	STRANER
		SD	SMOKE DAMPER
FLG C	FLANGE CONNECTION	SP	STATIC PRESSURE
FLR	FLOOR	SPS	STATIC PRESSURE SENSOR
FLR DR	FLOOR DRAIN		
GA	GAUGE	TA	THROWAWAY
GV	GATE VALVE	TDV	TRIPLE DUTY VALVE
GRAV	GRAVITY	TEMP	TEMPERATURE
GC	GENERAL CONTRACTOR	TH	THERMOMETER
GPM	GALLONS PER MINUTE	TRANS	TRANSITION
GV	GATE VALVE	TYP	TYPICAL
		TSTAT	THERMOSTAT
HC	HEATING CONTRACTOR	TCV	TEMPERATURE CONTROL VALVE
HP	HORSE POWER	TR	TEMPERATURE RISE
HPD	HIGH PRESSURE DRIP	TV	TURNING VANES
HTG	HEATING	UC	UNDERCUT
HVS	HOT WATER RETURN	V	VALVE
HWSR	HOT WATER SUPPLY AND RETURN	VD	VOLUME CONTROL DAMPER
		VFS	VENTURI FLOW STATION
		WB	WET BULB
		WFMD	WATER FLOW MEASURING DEVICE
		WG	WATER GAUGE
		WTD	WATER TEMPERATURE DROP
		WTH	WITH
		WV	WITH OUT

## EQUIPMENT TAG ABBREVIATIONS

ACC	AIR COOLED CHILLER	FT	FINNED TUBE RADIATION
ACCJ	AIR COOLED CONDENSING UNIT	FCU	FAN COIL UNIT
ACCUM	ACCUMULATOR	FPB	FAN POWERED BOX
AHU	AIR HANDLING UNIT	FV	FURNACE
ASHP	AIR SOURCE HEAT PUMP		
		GV	GRAVITY INTAKE VENTILATOR
B	BOILER	GRV	GRAVITY ROOF VENTILATOR
BB	BASEBOARD HEATER		
BD	BAROMETRIC DAMPER	H	HUMIDIFIER
BDD	BACK DRAFT DAMPER	HC	HOT WATER HEATING COIL
		HJH	HORIZONTAL UNIT HEATER
CC	CHILLED WATER COOLING COIL		
CD	CONDENSATE DRAIN	RG	RETURN GRILLE
CIRC	CIRCULATOR	RR	RETURN REGISTER
CMPR	COMPRESSOR	RAQ	RETURN AIR GRILLE
CONV	CONVECTOR	ROP	RADIANT CEILING PANEL
CP	CONDENSATE PUMP	RTU	ROOF TOP UNIT
CUH	CABINET UNIT HEATER		
		SF	SUPPLY FAN
DC	DRY COOLER	SSAC	SPLIT SYSTEM AIR CONDITIONING UNIT
		SSDC	SECURITY SUPPLY DIFFUSER CEILING
EF	EXHAUST FANS	SSSF	SECURITY SMOKE EXHAUST FAN
ER	EXHAUST REGISTER	SSSC	SECURITY SUPPLY GRILLE CEILING
ERW	EXHAUST REGISTER WALL	SSGW	SECURITY SUPPLY GRILLE WALL
ET	EXPANSION TANK	P	PUMP
ECUH	ELECTRIC CABINET UNIT HEATER	PTAC	PACKAGED TERMINAL AIR CONDITIONING UNIT
EUH	ELECTRIC UNIT HEATER		
EVH	ELECTRIC WALL HEATER	UH	UNIT HEATER
EVAP	EVAPORATOR	UV	UNIT VENTILATOR
		USD	UNDER DOOR
		VAV	VARIABLE AIR VOLUME

## DRAWING SYMBOLS

	POWERED EQUIPMENT		CONNECT TO EXISTING AT THIS POINT
	NON-POWERED EQUIPMENT		DEMOLISH TO THIS POINT
	DETAIL NUMBER		DIFFUSER/REGISTERS/GRILLE TYPE
	DRAWING NUMBER WHERE DRAWN		AIRFLOW QUANTITY
	SECTION LETTER		KEYNOTE (DEMO SCOPE)
	DRAWING NUMBER WHERE DRAWN		KEYNOTE (NEW WORK SCOPE)

## PIPELINE ABBREVIATIONS

SYMBOLS	DESCRIPTION
	CONDENSATE DRAIN LINE
	COOLING TOWER DRAIN LINE
	CHILLED WATER SUPPLY
	CHILLED WATER RETURN
	CONDENSER WATER SUPPLY
	CONDENSER WATER RETURN
	HOT WATER HEATING SUPPLY
	HOT WATER HEATING RETURN
	LOW PRESSURE STEAM SUPPLY
	LOW PRESSURE CONDENSATE RETURN
	MEDIUM PRESSURE STEAM SUPPLY
	MEDIUM PRESSURE CONDENSATE RETURN
	HIGH PRESSURE STEAM SUPPLY
	HIGH PRESSURE CONDENSATE RETURN
	PUMPED CONDENSATE
	ENERGY (HEAT) RECOVERY SUPPLY
	ENERGY (HEAT) RECOVERY RETURN
	REFRIGERANT LINE
	REFRIGERANT SUCTION
	PIPE TO BE REMOVED
	EXISTING PIPING TO REMAIN

## PIPELINE SYMBOLS

	BALL VALVE
	BUTTERFLY VALVE
	RELIEF VALVE
	ECCENTRIC REDUCER
	INVERTED ECCENTRIC REDUCER
	STRAINER
	UNION
	THERMOMETER
	PRESSURE GAUGE
	WATER FLOW MEASURING DEVICE
	VENTURI FLOW STATION
	PRESSURE TAP
	PRESSURE REDUCING VALVE
	TWO-WAY MODULATING CONTROL VALVE
	THREE-WAY MODULATING CONTROL VALVE
	SAFETY VALVE OR PRESSURE RELIEF
	AUTOMATIC AIR VENT
	MANUAL AIR VENT
	TWO-WAY CONTROL VALVE (TWO POSITION TYPE)
	MOTORIZED VALVE
	AQUASTAT
	FUNNEL DRAIN
	PIPING TURNED UP
	PIPING TURNED DOWN
	TEE - OUTLET UP
	TEE - OUTLET
	SIDE CONNECTION
	CAPPED OUTLET
	DIRECTION OF FLOW
	PIPE BREAK (SINGLE LINE)
	FLEXIBLE CONNECTION
	BACKFLOW PREVENTION DEVICE

## HVAC SYMBOLS

### DOUBLE LINE SHEETMETAL SYMBOLS

	RECTANGULAR SUPPLY, RETURN OR RELIEF DUCT (WIDTH X DEPTH)
	OVAL SUPPLY, RETURN OR RELIEF DUCT (WIDTH X DEPTH)
	ROUND SUPPLY, RETURN OR DUCT (WIDTH OVER 18")
	DUCT WITH TURNING VANES
	DUCT WITH TWO TURNING VANES
	RADIUS ELBOW (DUCT WIDTH 17" AND LOWER)
	LOW LOSS TAKE OFF (ARROW INDICATES DIRECTION OF AIR FLOW)
	CONICAL SPIN-IN FITTING
	BOOT CONNECTION WITH MANUAL V/D (ARROW INDICATES AIR FLOW DIRECTION)
	RETURN AIR DUCT UP
	SUPPLY DUCT UP
	EXHAUST AIR DUCT UP
	RETURN AIR DUCT DN
	SUPPLY DUCT DN
	EXHAUST AIR DUCT DN
	MANUAL VOLUME CONTROL DAMPER (V/D)
	RISE/DROP IN DUCTWORK (ARROW SHOWS DIRECTION OF DROP)
	DUCT/SPACE STATIC PRESSURE SENSOR
	WALL SWITCH
	DUCT/FALL TEMPERATURE SENSOR, ELECTRIC
	DUCT MOUNTED SMOKE DETECTOR PROVIDED BY EC, INSTALLED BY HC
	MOTORIZED DAMPER
	BACKDRAFT DAMPER
	FIRE DAMPER AT FIRE WALL (PROVIDE ACCESS PANEL IN DUCT AND CEILING)
	SMOKE DAMPER/DETECTOR BY E.C. DAMPER BY H.C.
	COMBINATION FIRE/SMOKE DAMPER
	FIRE DAMPER IN VERTICAL DUCT THRU FLOOR OR HORIZONTAL DUCT ABOVE CEILING (PROVIDE ACCESS PANEL IN DUCT AND WALL OR CEILING)
	ACCESS DOOR ON BOTTOM OF DUCT (HINGED & GASKETED)
	ACCESS DOOR ON SIDE OF DUCT (HINGED & GASKETED)
	SUPPLY AIR DIFFUSER
	THERMAL VAV DIFFUSER
	RETURN AIR REGISTER
	EXHAUST REGISTER
	EXHAUST/RETURN AIR REGISTER (DUCT OR WALL)
	SUPPLY AIR REGISTER (DUCT OR WALL)

### SINGLE LINE - SHEET METAL SYMBOLS

	DUCT SIZE (WIDTH X DEPTH)
	ROUND DUCT SIZE (DIAMETER)
	FLEXIBLE DUCT (DIAMETER SIZE)
	SUPPLY DUCT CROSS SECTION UP
	SUPPLY DUCT CROSS SECTION DN
	RETURN CROSS SECTION UP
	RETURN CROSS SECTION DN
	EXHAUST CROSS SECTION UP
	EXHAUST CROSS SECTION DN
	SQUARE ELBOW WITH TURNING VANES
	RADIUS TURN ELBOW
	DUCT END CAP

## HVAC GENERAL NOTES

- NOT ALL SYMBOLS ARE NECESSARILY USED.
- COORDINATE FINAL LOCATIONS OF DIFFUSERS AND GRILLES WITH ARCHITECTURAL, REFLECTED CEILING PLANS.
- DRAWINGS ARE DIAGNOSTIC. CONTRACTOR TO FIELD VERIFY DUCT AND PIPE ROUTING AND COORDINATE ANY CHANGES PRIOR TO INSTALLATION.
- DUCTWORK TO BE INSTALLED TIGHT TO UNDERSIDE OF STRUCTURE ABOVE UNLESS NOTED OTHERWISE.
- PROVIDE ALL MATERIALS, EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL COMPLETE AND OPERABLE MECHANICAL SYSTEMS AS INDICATED ON THE DRAWINGS, AS SPECIFIED, AND AS REQUIRED BY CODE.
- CONTRACT DOCUMENT DRAWINGS FOR MECHANICAL WORK ARE DIAGNOSTIC AND ARE INTENDED TO CONVEY SCOPE AND GENERAL ARRANGEMENT ONLY. CONTRACTOR SHALL BE RESPONSIBLE TO FIELD SURVEY ACTUAL SITE CONDITIONS AND ACCOMMODATE ACTUAL SITE CONDITIONS AS PART OF SCOPE OF WORK AT NO COST TO OWNER.
- INSTALL ALL MECHANICAL EQUIPMENT AND APPURTENANCES IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, CONTRACT DOCUMENTS, APPLICABLE BUILDING, STATE, AND LOCAL CODES, SEISMIC REQUIREMENTS, ENERGY CODES, AND INSURANCE UNDERWRITER REQUIREMENTS.
- COORDINATE CONSTRUCTION OF ALL MECHANICAL WORK WITH ARCHITECTURAL, STRUCTURAL, CIVIL, AND ELECTRICAL WORK, ETC. SHOWN ON OTHER CONTRACT DOCUMENT DRAWINGS.
- MAINTAIN A MINIMUM OF 6" IF CLEARANCE TO UNDERSIDE OF PIPES, DUCTS, CONDUITS, SUSPENDED EQUIPMENT, SUPPORTS, ETC. THROUGHOUT ACCESS ROUTES TO MECHANICAL ROOMS.
- ALL TESTS SHALL BE COMPLETED AND ACCEPTED BY THE INSPECTOR BEFORE ANY MECHANICAL EQUIPMENT OR PIPING INSTALLATION IS APPLIED.
- LOCATE ALL TEMPERATURE, PRESSURE, AND FLOW MEASURING DEVICES IN ACCESSIBLE LOCATIONS WITH A STRAIGHT SECTION OF PIPE OR DUCT UPSTREAM AND DOWNSTREAM, AS RECOMMENDED BY THE MANUFACTURER OR ACCURACY.
- TESTING, ADJUSTING AND BALANCING (TAB) AGENCY SHALL BE A MEMBER OF THE ASSOCIATED AIR BALANCING COUNCIL (AABC) OR THE NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB). TAB FIRM SHALL HAVE A MINIMUM OF 5 YEARS EXPERIENCE IN MECHANICAL WORK. CONTRACTOR SHALL PROVIDE THE REQUIREMENTS OF THE TAB PROCEDURAL STANDARD RECOMMENDED BY THE TAB TRADE ASSOCIATION THAT APPROVED THE TAB FIRM'S QUALIFICATIONS.
- WHERE TWO OR MORE ITEMS OF THE SAME TYPE OF EQUIPMENT ARE REQUIRED, THE PRODUCTS OF A SINGLE MANUFACTURER SHALL BE USED.
- COORDINATE ALL FINAL EQUIPMENT CONNECTIONS WITH MANUFACTURER'S CERTIFIED DRAWINGS. COORDINATE AND PROVIDE ALL LACTORY AND PIPING TRANSITIONS REQUIRED FOR FINAL EQUIPMENT CONNECTIONS TO FURNISHED EQUIPMENT. FIELD VERIFY AND COORDINATE ALL DUCTWORK AND PIPING DIMENSIONS BEFORE FABRICATION.
- ALL CONTROL WIRE AND CONDUIT SHALL COMPLY WITH THE NATIONAL ELECTRIC CODE, DIVISION 26 OF THE SPECIFICATIONS, ALL LOCAL CODES, AND OWNER'S INSURANCE UNDERWRITER REQUIREMENTS.
- THE LOCATIONS AND SIZES OF ALL ITEMS SHOWN IN THE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS THAT ARE NOT IDENTIFIED BY DIMENSIONS ARE APPROXIMATE. ONLY THE EXACT LOCATIONS AND SIZES NECESSARY TO SECURE THE CONDITIONS AND RESULTS SHALL BE DETERMINED BY THE ENGINEER. THE CONDITIONS AND SHALL HAVE THE APPROVAL OF THE ENGINEER BEFORE BEING INSTALLED. DO NOT SCALE DRAWINGS.
- PLAN DRAWINGS AND SECTION CUTS WHICH SPECIFICALLY IDENTIFY SERVICE ROUTE OFFSETS, ELEVATION CHANGES, OBSTRUCTIONS, ACCESS DOORS, BALANCING DEVICES, ETC. ARE SHOWN FOR CLARITY WHERE INTERFERING CONDITIONS EXIST. CONTRACTOR SHALL COORDINATE EQUIPMENT, DUCTWORK AND PIPING ROUTINGS WITH ALL OTHER TRADES. REQUIREMENTS NOT SPECIFICALLY IDENTIFIED SHALL NOT BE INTERPRETED EXCLUSIVELY TO CONTRACTOR'S SCOPE OF WORK. CONTRACTOR SHALL BE RESPONSIBLE FOR ACTUAL SITE CONDITIONS AND SHALL INCLUDE SUCH CONDITIONS IN SCOPE OF WORK AT NO ADDITIONAL COST TO THE OWNER.
- ALL MISCELLANEOUS STEEL REQUIRED TO ENSURE PROPER INSTALLATION AND SUPPORT OF MECHANICAL WORK AS SHOWN IN DETAILS FOR PIPING, DUCTWORK AND EQUIPMENT (UNLESS OTHERWISE NOTED) SHALL BE FURNISHED AND INSTALLED BY THE MECHANICAL CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
- ALL EQUIPMENT, PIPING, DUCTWORK, ETC., SHALL BE SUPPORTED AS DETAILED, SPECIFIED AND AS REQUIRED TO PROVIDE A VIBRATION FREE INSTALLATION.
- ALL OPENINGS IN FIRE RATED WALLS AND SMOKE PARTITIONS DUE TO DUCTWORK, PIPING, CONDUIT, ETC., SHALL BE FIRE STOPPED WITH APPROVED FIRESTOPPING MATERIALS.
- REFER TO TYPICAL DETAILS FOR DUCTWORK, PIPING AND EQUIPMENT INSTALLATION.
- UNLESS OTHERWISE SHOWN, LOCATE ALL ROOM THERMOSTATS WITH TOP AT 48" ABOVE FINISHED FLOOR IN ACCORDANCE WITH ADA REQUIREMENTS. NOTIFY THE ENGINEER OF ANY ROOMS WHERE THE ABOVE LOCATION CANNOT BE MAINTAINED OR WHERE THERE IS A QUESTION ON LOCATION. COORDINATE FINAL LOCATIONS WITH OWNER.
- LOCATE ALL MECHANICAL EQUIPMENT (VAN BOXES, CABINET HEATERS, UNIT HEATERS, ETC.) FOR UNOBSTRUCTED ACCESS TO UNIT ACCESS PANELS, FAN FILTERS, CONTROLS AND VALVING. DO NOT LOCATE FAN POWERED VAN BOXES ABOVE LIGHTING FIXTURES.
- PROVIDE FLEXIBLE CONNECTIONS IN ALL DUCTWORK SYSTEMS (SUPPLY, RETURN AND EXHAUST) CONNECTED TO FANS AND OTHER EQUIPMENT WHICH REQUIRE VIBRATION ISOLATION. FLEXIBLE CONNECTIONS SHALL BE PROVIDED AT THE POINT OF CONNECTION TO THE EQUIPMENT UNLESS OTHERWISE INDICATED.
- ALL LOWERS SHALL BE FURNISHED AND INSTALLED BY THE GENERAL CONTRACTOR UNLESS OTHERWISE NOTED. GENERAL CONTRACTOR SHALL COORDINATE SIZES, LOCATIONS, AND CONNECTIONS WITH MECHANICAL CONTRACTOR. DUCTWORK CONNECTIONS TO LOWERS SHALL BE FURNISHED AND INSTALLED BY MECHANICAL CONTRACTOR.
- PROVIDE AN AIR VENT AT THE HIGH POINT OF EACH DROP IN HYDRONIC WATER PIPING SYSTEMS. ALL PIPING SHALL SLOPE TO LOW POINTS. PROVIDE HOSE END DRAIN VALVES AT THE BOTTOM OF ALL RISERS AND LOW POINTS.
- INSTALL PIPING SO THAT ALL VALVES, STRAINERS, UNIONS, TRAPS, FLANGES, AND OTHER APPURTENANCES REQUIRING ACCESS ARE ACCESSIBLE.
- ALL ISOLATION VALVES SHALL BE IN A LOCATION AND ELEVATION WHICH ALLOWS FOR EQUIPMENT AND BRANCH PIPING REMOVAL, WHILE MAINTAINING SERVICE UPSTREAM OF THE ISOLATION VALVE.
- UNLESS OTHERWISE SHOWN, LOCATE ALL ROOM THERMOSTATS WITH TOP AT 48" ABOVE FINISHED FLOOR IN ACCORDANCE WITH ADA REQUIREMENTS. NOTIFY THE ENGINEER OF ANY ROOMS WHERE THE ABOVE LOCATION CANNOT BE MAINTAINED OR WHERE THERE IS A QUESTION ON LOCATION. COORDINATE FINAL LOCATIONS WITH OWNER.
- MECHANICAL JOINTS SUCH AS UNIONS, FLANGES, OR TREADED FITTINGS SHALL BE INSTALLED AT EACH EQUIPMENT CONNECTION, IN PIPES, AT FLOOR PENETRATIONS, AT CONTROL DEVICES, AND IN LONG PIPE RUNS (100 FEET OR MORE) TO PERMIT DISASSEMBLY FOR ALTERATION AND REPAIRS.
- MEASURE, CUT, AND INSTALL PIPE LENGTH ACCURATELY TO MINIMIZE MISALIGNMENT. INSTALL ALL PIPING WITHOUT FORCING OR SPRINGING.
- PROVIDE FLEXIBLE CONNECTIONS IN ALL PIPING SYSTEMS CONNECTED TO PUMPS AND OTHER EQUIPMENT WHICH REQUIRE VIBRATION ISOLATION EXCEPT WATER COOLS. FLEXIBLE CONNECTIONS SHALL BE PROVIDED AS CLOSE TO THE EQUIPMENT AS POSSIBLE OR AS INDICATED ON THE DRAWINGS.
- PROVIDE VIBRATION ISOLATION FOR ALL MECHANICAL EQUIPMENT TO PREVENT VIBRATION TRANSMISSION TO BUILDING STRUCTURE.
- CONCRETE HOUSEKEEPING PADS SHALL BE FURNISHED AND INSTALLED BY THE GENERAL CONTRACTOR. MECHANICAL CONTRACTOR SHALL PROVIDE EQUIPMENT WEIGHTS, SIZES, AND LOCATION TO GENERAL CONTRACTOR. MINIMUM CONCRETE PAD THICKNESS SHALL BE IN ACCORDANCE WITH STRUCTURAL DETAILS. PAD SHALL EXTEND BEYOND THE EQUIPMENT FOOTPRINT A MINIMUM OF 6 INCHES ON EACH SIDE.
- ALL DUCTWORK, PIPING, AND EQUIPMENT SUPPORTED FROM STRUCTURAL STEEL SHALL BE COORDINATED WITH GENERAL CONTRACTOR. ALL ATTACHMENTS TO STEEL MEMBERS, BAR JOISTS, TRUSSES, OR JOIST GIRDERS SHALL BE APPROVED BY STRUCTURAL ENGINEER. WELDING TO STRUCTURAL MEMBERS SHALL NOT BE PERMITTED.
- MECHANICAL EQUIPMENT, DUCTWORK, AND PIPING SHALL NOT BE SUPPORTED FROM ROOF OR DECK ASSEMBLY. SUPPORTS SHALL ATTACH TO STRUCTURAL MEMBERS. COORDINATE WITH STRUCTURAL DRAWINGS.
- PROVIDE MANUFACTURER'S MATCHING ROOF CURBS FOR ALL ROOF MOUNTED EQUIPMENT. COORDINATE ACTUAL ROOF PITCH AND CONSTRUCTION DETAILS WITH GENERAL CONTRACTOR. PROVIDE SLOPED CURBS PER MANUFACTURER'S RECOMMENDATIONS. GENERAL CONTRACTOR SHALL INSTALL ROOF CURBS AND FLASHING PER ROOFING MANUFACTURER'S INSTALLATION REQUIREMENTS.
- UNLESS OTHERWISE NOTED, ALL PIPING AND DUCTWORK IS OVERHEAD, TIGHT TO UNDERSIDE OF STRUCTURE OR SLAB, WITH SPACES FOR INSULATION.
- PROVIDE CHAMFERED OPERATORS FOR ALL EXPOSED VALVES MOUNTED GREATER THAN 6" ABOVE FINISHED FLOOR LEVEL. CHAIN SHALL EXTEND UNOBSTRUCTED TO 7'-0" ABOVE FLOOR LEVEL.
- ALL PIPING AND DUCTWORK SHALL CLEAR DOORS, WINDOWS, EQUIPMENT CLEARANCES, MAINTENANCE REQUIREMENTS, CODE SETBACKS, ETC. TO ASSURE PROPER OPERATION, INSPECTION, AND MAINTENANCE.
- ALL VALVES SHALL BE ADJUSTED FOR SMOOTH AND EASY OPERATION.
- PROVIDE ALL 90 DEGREE SQUARE ELBOWS WITH DOUBLE RADIUS TURNING VANES UNLESS OTHERWISE INDICATED OR SPECIFIED. PROVIDE ACCESS DOORS UPSTREAM OF ALL ELBOWS CONTAINING TURNING VANES.
- ALL DUCTS SHALL BE BONDED ACROSS FLEXIBLE CONNECTIONS WITH FLEXIBLE COPPER GROUNDING STRAPS. GROUNDING STRAPS SHALL BE BOLTED OR SOLDERED TO BOTH THE EQUIPMENT AND THE DUCT.
- ALL EQUIPMENT SUBMITTALS AND SHOP DRAWINGS REQUIRED BY THE SPECIFICATIONS SHALL BE APPROVED BY ENGINEER PRIOR TO PURCHASE, FABRICATION, AND INSTALLATION.
- ALL HEATING DEVICES AND SURFACES WITH ELEVATED TEMPERATURES WHICH CAN BE ACCESSED OR COME IN CONTACT WITH OWNER PERSONNEL SHALL BE PROTECTED, INSULATED, OR CONTROLLED TO REMAIN BELOW 120°F.
- PROVIDE MANUAL VOLUME DAMPERS IN ALL RUNOUTS TO DIFFUSERS, BRANCH TAKE-OFFS FROM MAIN SUPPLY DUCT, AND IN ALL OTHER AREAS REQUIRED TO PROVIDE PROPER SYSTEM AIRFLOW BALANCING.

## HVAC DEMOLITION NOTES

- THE CONTRACTOR SHALL THOROUGHLY EXAMINE THE SITE PRIOR TO SUBMITTING THEIR BID. DUE TO THE NATURE OF THIS PROJECT AND THE STATE OF THE EXISTING BUILDING, IT IS IMPERISSIBLE TO COMPLETELY RELIATE THE SCOPE OF THE DEMOLITION REQUIRED TO THE CONTRACTOR THROUGH THE CONTRACT DOCUMENTS. FAILURE TO VISIT THE SITE WILL NOT RELIEVE THE CONTRACTOR OF THEIR DEMOLITION RESPONSIBILITIES UNDER THIS CONTRACT. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE AND COORDINATE THE EXACT EXTENT OF DEMOLITION NECESSARY TO PROVIDE A PERMANENTLY UNOCCUPIED NEW DUCT.
- INFORMATION REGARDING THE EXISTING CONDITIONS WAS GATHERED FROM AVAILABLE EXISTING DRAWINGS, SURVEY, AND CORRESPONDENCE WITH UTILITY, STAFF, AND FACILITIES PERSONNEL. THERE ARE NO WARRANTIES AS TO THE ACCURACY OF THIS INFORMATION AND IT IS OFFERED FOR INFORMATION ONLY.
- VERIFY EXISTING LOCATIONS OF EQUIPMENT, DUCTWORK, PIPING AND SYSTEM COMPONENTS PRIOR TO DEMOLITION. IF EXISTING CONDITIONS ARE DIFFERENT THAN WHAT IS INDICATED ON THE CONTRACT DOCUMENTS, THE CONTRACTOR SHALL NOTIFY THE COR AND ARCHITECT PRIOR TO PROCEEDING WITH THE WORK.
- MINIMIZE DISTURBANCE AND, OR, DAMAGE TO EXISTING FINISHED SURFACES AND FINISHES, WHERE DEMOLITION OF MECHANICAL SYSTEM COMPONENTS DAMAGES EXISTING SURFACES TO REMAIN. RESTORE THOSE SURFACES TO THE SAME CONDITION AS THE ADJACENT SURFACES. RESTORATION MUST BE PERFORMED BY WORKMAN SKILLED IN PERFORMING SUCH WORK. ALL FIRE AND SMOKE RATINGS SHALL BE RETAINED AS PART OF THE REPAIRS. PATCHES (SEAL HOLES WEATHERTIGHT) ALL PATCHES AND REPAIRS ARE SUBJECT TO THE REVIEW AND APPROVAL OF THE ARCHITECT.
- ALL AREAS OF EGRESS SHALL BE KEPT OPEN AND FREE FROM DEBRIS AT ALL TIMES.
- DO NOT REMOVE ITEMS SUPPORTING OTHER ITEMS WITHOUT PROVIDING TEMPORARY OR PERMANENT SUPPORT. PROPERLY SUPPORT ALL EXISTING ITEMS TO REMAIN. CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING REQUIRED SUPPORTS FOR AFFECTED ITEMS.
- VERIFY EXTENT OF PIPING, EQUIPMENT, COMPONENTS, AND CONTROLS TO BE RETAINED OR REUSED PRIOR TO THE DEMOLITION OF SPECIFIC ITEMS. PROTECT ITEMS WHICH ARE TO BE REUSED IN SITE TO MINIMIZE POST CONSTRUCTION REPAIRS. ALL ITEMS WHICH ARE DAMAGED SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE REPAIRED OR REPLACED AT NO COST TO THE CONTRACTOR.
- REFER TO PLANS FOR EXISTING PIPING, DUCTWORK, EQUIPMENT, AND SYSTEM COMPONENTS TO BE REUSED.
- THE OWNER RETAINS FIRST RIGHT OF REFUSAL TO ALL EQUIPMENT AND SYSTEM COMPONENTS DEMOLISHED FROM THE PROJECT PRIOR TO DISPOSAL. ALL ITEMS NOT REUSED BY THE OWNER SHALL BE PROMPTLY AND PROPERLY DISPOSED OF OR REMOVED FROM SITE.
- VERIFY ALL EXISTING STRUCTURAL CONDITIONS AND NOTIFY THE STRUCTURAL ENGINEER FOR APPROVAL OF PENETRATING EXISTING BUILDING STRUCTURAL SYSTEMS.
- NO DEMOLITION SHALL OCCUR EXTERIOR WHICH LEAVES THE BUILDING INTERIOR WITHOUT WEATHER PROTECTION. ALL DEMOLITION OF EXTERIOR OR EXTERIOR SURFACES SHALL BE FOLLOWED IMMEDIATELY BY PROTECTIVE CONSTRUCTION. CONTRACTOR SHALL PROVIDE AND INSTALL NECESSARY PROTECTION FOR ALL OPENINGS WHERE COVERS, WINDOWS, OR EXTERIOR DOORS HAVE BEEN REMOVED.
- THE DEMOLITION OF THE MECHANICAL SYSTEMS MUST BE PERFORMED TO CORRESPOND TO THE PHASED NATURE OF THE PROJECT. REFER TO ARCHITECTURAL PHASING PLANS FOR PROJECT PHASING. THE CONTRACTOR IS RESPONSIBLE FOR ALL TEMPORARY WORK AND EQUIPMENT NECESSARY TO KEEP REQUIRED SYSTEMS OPERATIONAL UNTIL THEY ARE NO LONGER NEEDED. THIS MAY INCLUDE BUT IS NOT LIMITED TO: RELOCATION OF EQUIPMENT AND ALL APPURTENANCES AND CONTROLS, RE-PIPING OF EQUIPMENT, AND REDUCING OF EQUIPMENT.

## HVAC PHASING NOTES

- THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINT

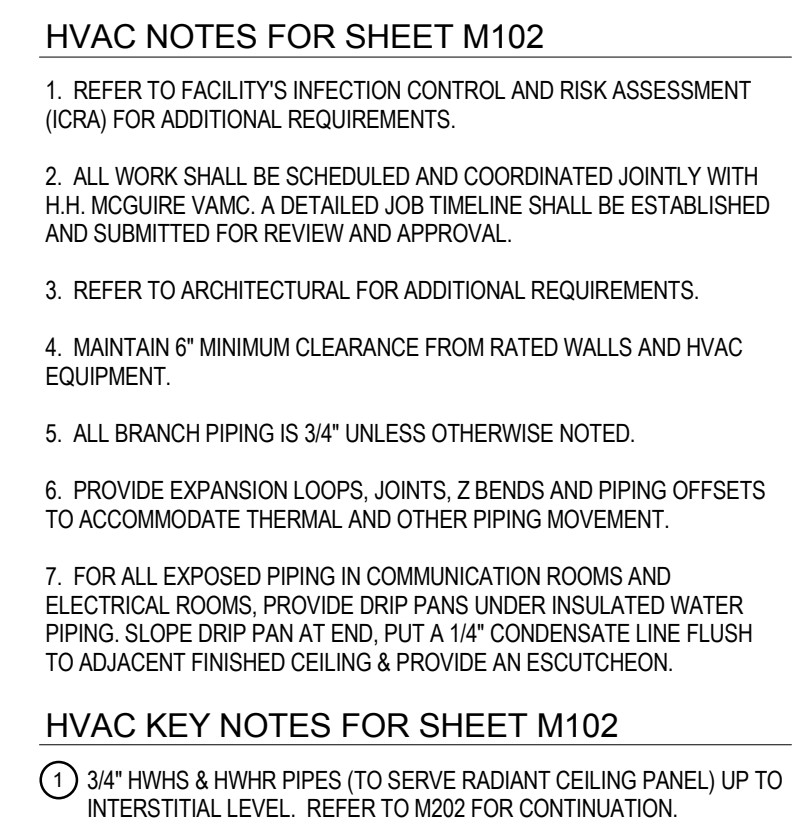




# FULLY SPRINKLERED BID DOCUMENTS

[illegible]





PROJECT  
NORTH



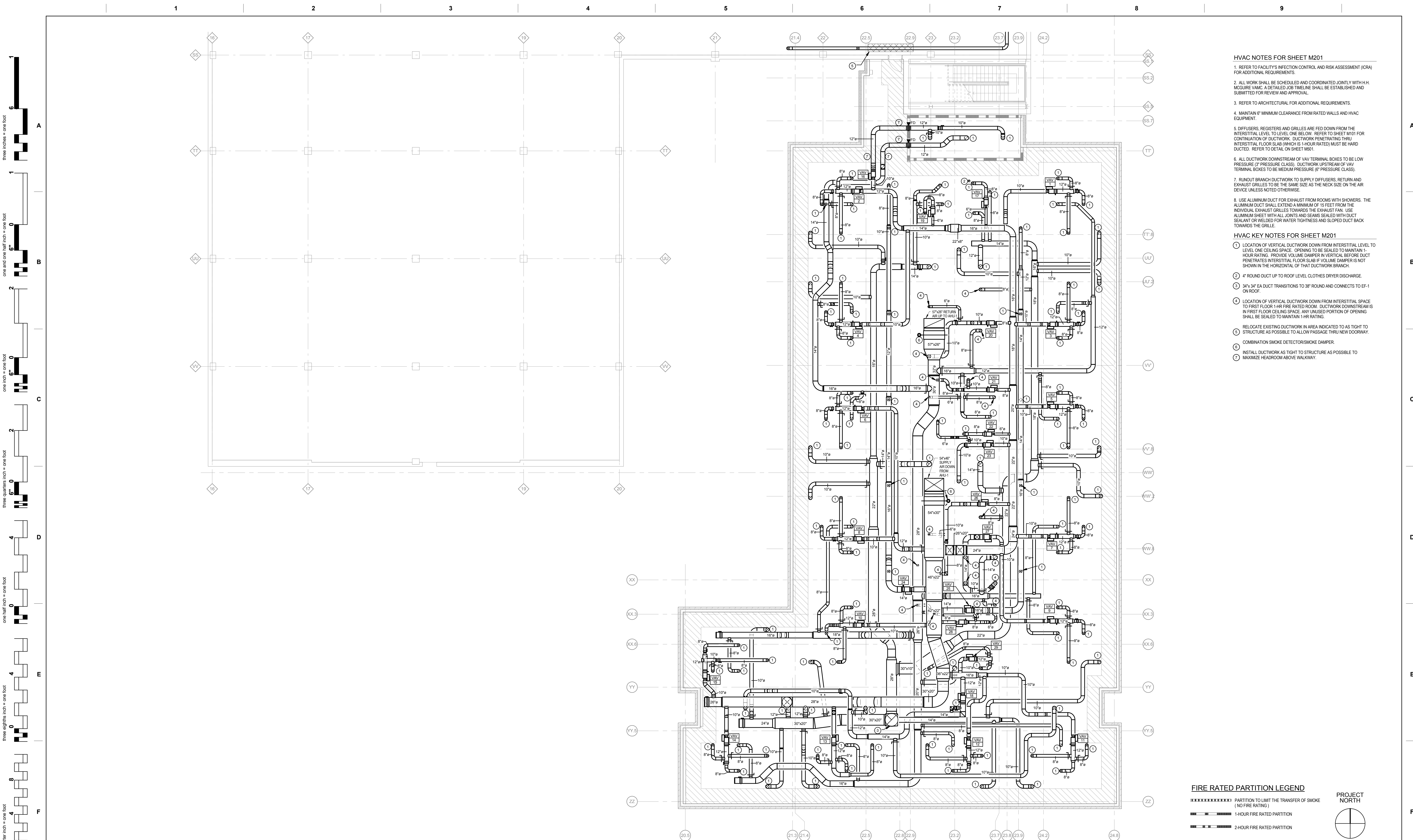
## FULLY SPRINKLERED BID DOCUMENTS

[illegible]









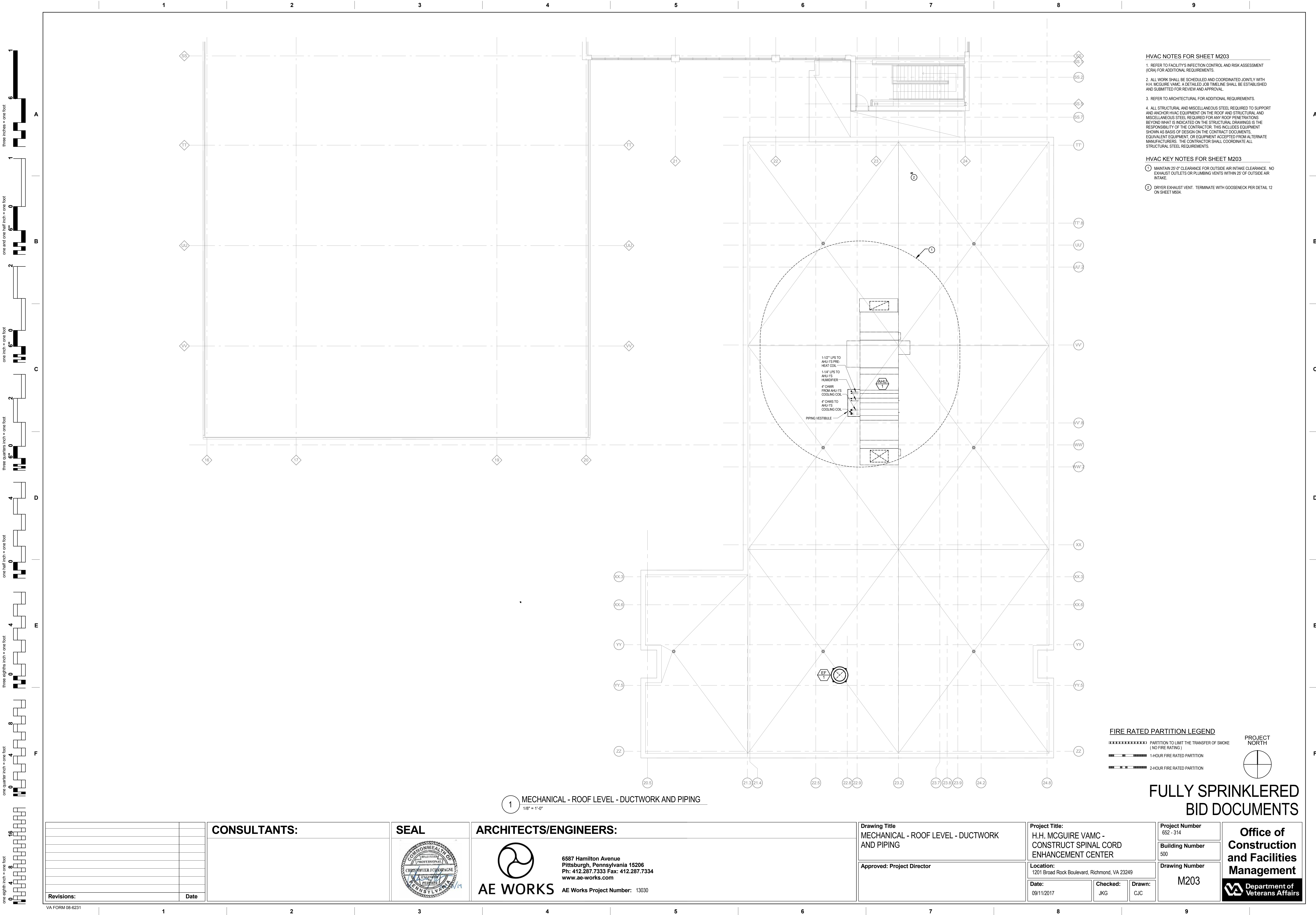
## FULLY SPRINKLERED BID DOCUMENTS

[illegible]









three inches = one foot

one and one half inch = one foot

one inch = one foot

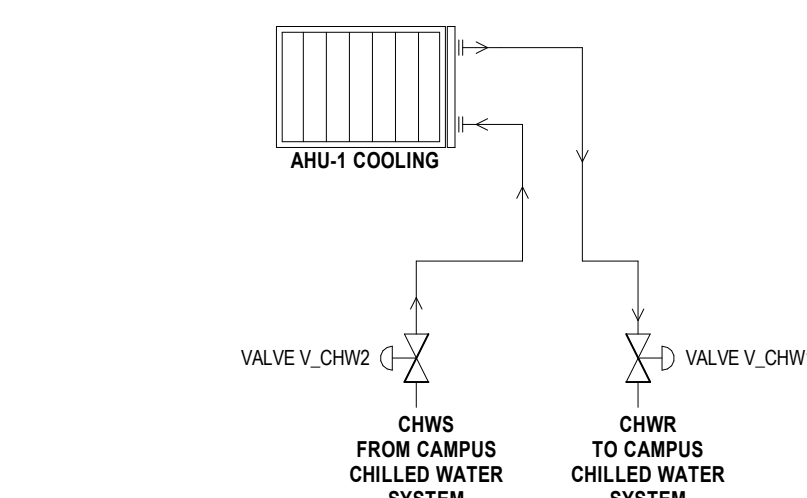
6" 0 2

Three quarters inch = one foot

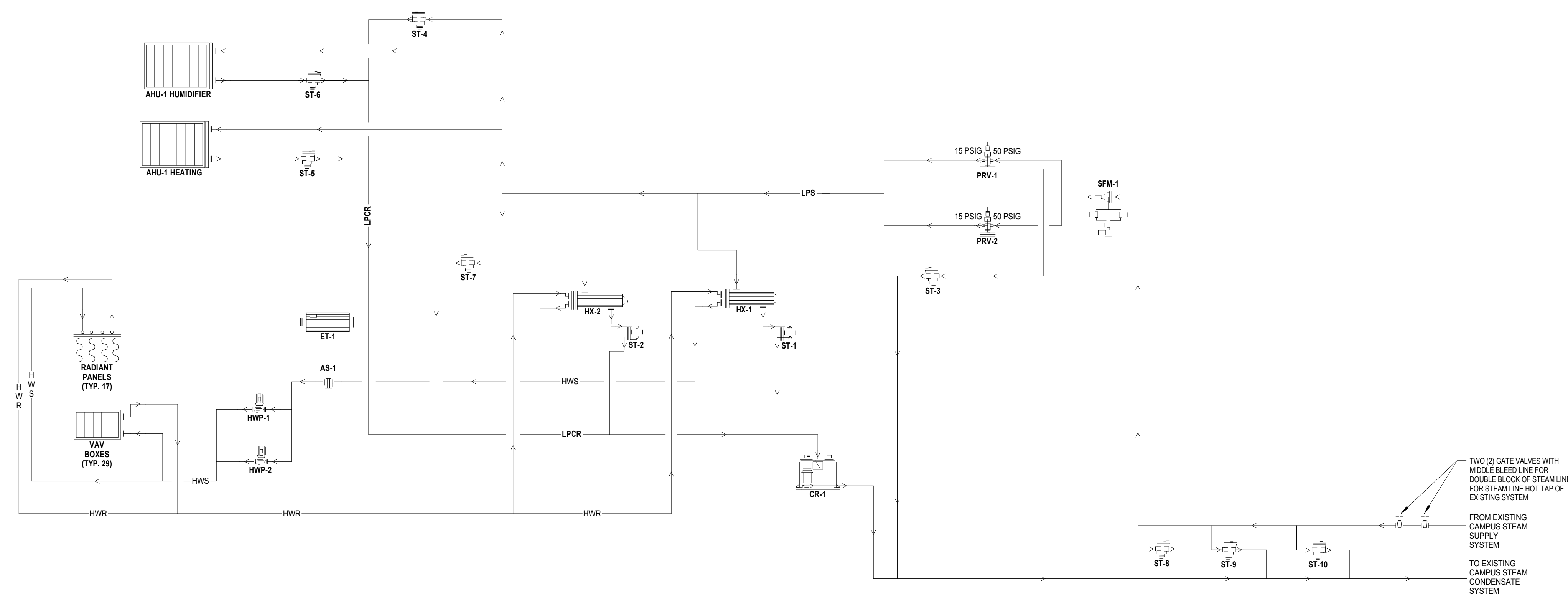
one half inch = one foot

Three eighths inch = one foot

0 4 8

[illegible]

1 SCHEMATIC - CHILLED WATER SYSTEM  
NTS



## 2 SCHEMATIC - HEATING HOT WATER AND STEAM SYSTEMS

## FULLY SPRINKLERED BID DOCUMENTS

[illegible]







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

RECTANGULAR DUCT REINFORCEMENT			
MAXIMUM RIGIDITY CLASS ON MINIMUM GAUGE DUCT			
MAX. DUCT DIMENSION	MAX. LENGTH 9'	REINFORCEMENT (ANGLE SIZE)	TRANSVERSE JOINT
10'-12" (UP TO 10')	A-26	NONE	-
13'-18" (UP TO 10')	A-24	NONE	-
19'-24'	B-24	NONE	-
25'-30'	C-24	NONE	-
31'-42'	D-22	NONE	-
43'-64'	F-22	NONE	-
55'-60'	H-20	NONE	-
61'-84'	J-18	1-1/2" X 1-1/2" X 18"	-
85'-96'	L-18	1-1/2" X 1-1/2" X 316"	-
97'-UP	L-18	2" X 2" X 1/4"	-
MINIMUM RIGIDITY CLASS SHEET METAL GAUGE			

1. AIRSIDE CONTRACTOR SHALL INDICATE UP TO 2 TRANSVERSE JOINTS TO BE USED FOR EACH RESPECTIVE DUCT SIZE RANGE. JOINTS SHALL BE SELECTED FROM SMACNA HVAC DUCT CONSTRUCTION STANDARDS TABLES 1-1.1, 1-1.2 AND 1-1.3. TYPE T-1 DRIVE SLIPS ACCEPTABLE AS CLASS A JOINT REINFORCEMENT FOR UP TO 18" MAX. DUCT DIMENSIONS.

2. WHERE CONTRACTOR WISHES TO EMPLOY TIE ROD REINFORCEMENT OPTIONS IN ADDITION TO THAT REQUIRED ABOVE, DETAILS SHALL BE SUBMITTED.

JOINT T-1: FLAT DRIVE SLIP.  
USE GAUGE NOT LESS THAN TWO GAUGES LIGHTER THAN DUCT GAUGE.  
WITH 1/4 GAUGE MINIMUM. SEE QUALIFICATION AS CLASS A JOINT REINFORCEMENT ABOVE. FLANGE SHALL BE OVERLAPPED AND RIVETED AT CORNERS.

JOINT T-2: STANDING SEAM DRIVE SLIP.  
FASTEN STANDING PORTIONS WITHIN 2" FROM EACH END AND ELSEWHERE AT 6" OR LESS INTERVALS. 4" W.G. MAX. 30" MAX. LENGTH AT 4" W.G. 30" LENGTH AT 3" W.G. FLANGE SHALL BE OVERLAPPED AND RIVETED AT CORNERS.

JOINT T-3: STANDING S BAR REINFORCED.  
FASTEN AS ON JOINT T-1. THIS STANDING PORTION OF THIS CLAY MAY BE FORMED PER ILLUSTRATION T-1.1 TO HOLD FLAT BAR. FASTEN THE BAR STOCK TO THE CONNECTOR AT ENDS AND INTERMEDIATE POSITIONS. 4" W.G. MAXIMUM.

JOINT T-4: STANDING S ANGLE REINFORCED.  
FASTEN AS ON JOINT T-1. THE ANGLE MUST BE FASTENED TO THE CONNECTOR OR THE DUCT WALL.

JOINT T-5: POCKET LOCK.  
USE ON ALL FOUR SIDES OF THE DUCT. A 7/8" FLANGE IS USED FOR 1" HIGH LOCK. 1-1/2" FLANGE FOR 1-1/2" LOCK. BUTT JOINTS WITHIN 2" OF CORNER AND AT 6" INTERVALS. 3" W.G. MAXIMUM. FLANGE SHALL BE OVERLAPPED AND RIVETED AT CORNERS.

JOINT T-6: POCKET LOCK FLAT BAR REINFORCED.  
FASTEN AS ON JOINT T-1. 2" W.G. MINIMUM.

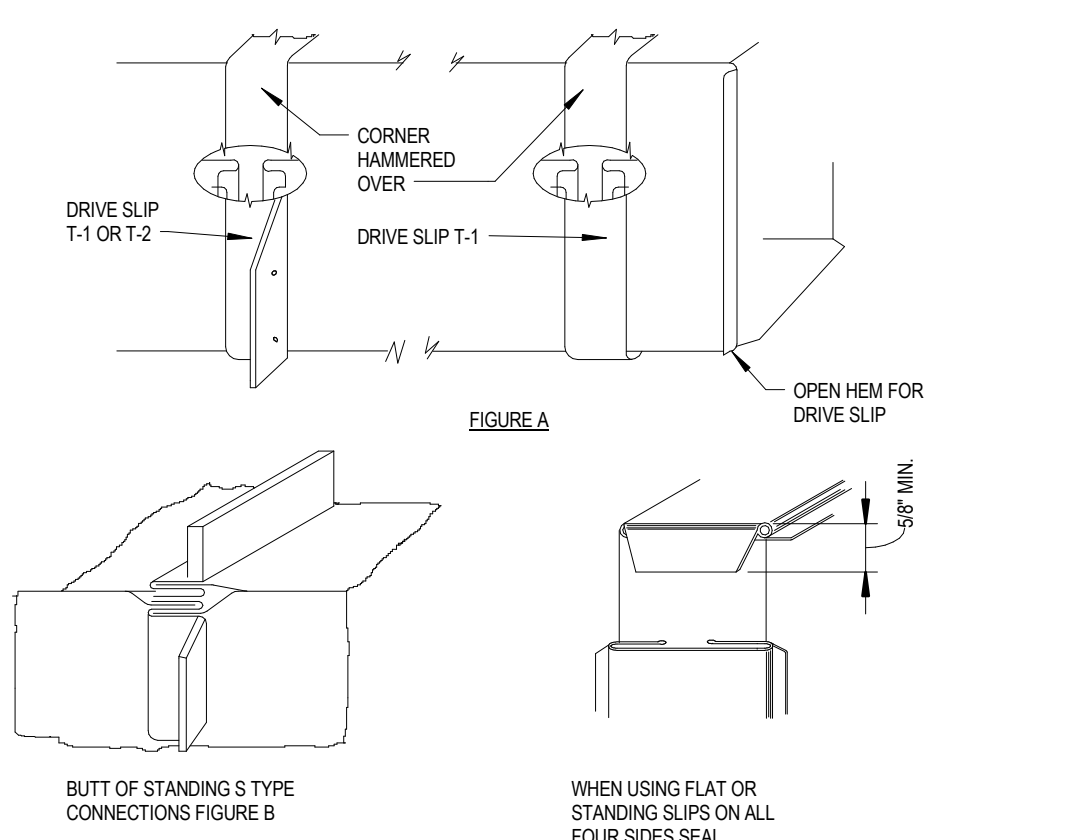
JOINT T-7: POCKET LOCK ANGLE REINFORCED.  
FASTEN AS ON JOINT T-1. FASTEN ANGLE TO DUCT WITHIN 2" OF CORNER AND AT 12" MAXIMUM SPACING. LOCK NEED NOT BE FASTENED TO THE BACKUP ANGLE. 3" W.G. MAXIMUM.

JOINT T-8: COMPANION ANGLE.  
W/STAKE TYPE WITH 3/8" FLANGE ON DUCT. ANGLES MUST HAVE WELDED CORNERS AND BE TACK WELDED, RIVETED, BOLTED OR SCREWED TO THE DUCT WALL AT 12" MAXIMUM SPACING. CENTERS BEGINNING AND ENDING WITH FASTENERS AT CORNERS. BOLT SCHEDULE BOX MUST BE 5/16" MINIMUM DIAMETER AT 6" MAXIMUM SPACING ON 4" W.G. OR LOWER PRESSURE CLASS AND 4" MAXIMUM SPACING ON HIGHER PRESSURES. EXCEPTION: 4" MAXIMUM SPACING MUST BE USED ON 18" THICK ANGLES AT 4" W.G.

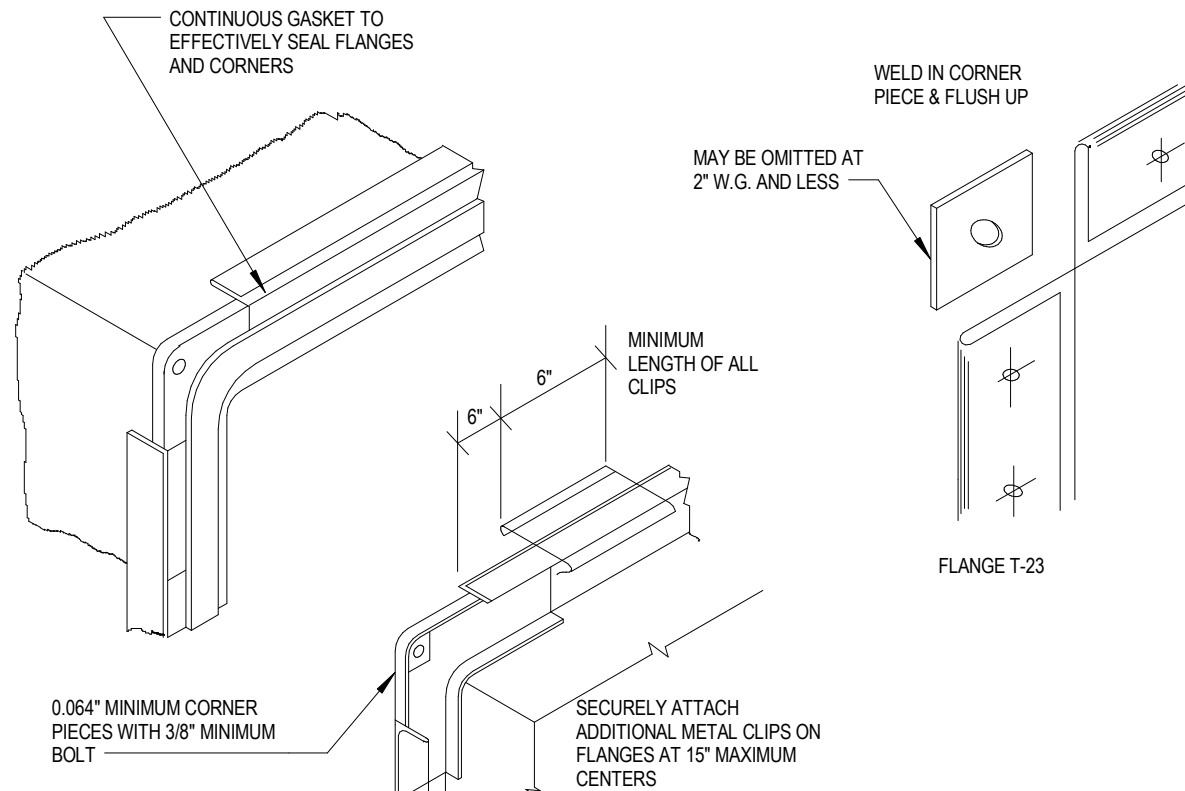
JOINT T-22: ALTERNATE FLANGE STYLE.  
THE JOINT MAY BE FORMED WITHOUT THE 3/8" FLANGE IF THE DUCT IS WELDED 1/8" BACK FROM THE VERTICAL FACE OF THE ANGLE AND TACK WELDED TO THE FLANGE ALONG THE EDGE OF THE DUCT. THE ANGLE IS OTHERWISE FASTENED NORMALLY. PLACE SEALANT BETWEEN ANGLE AND DUCT OR SEAL WELD. IF THE FACES OF FLANGES WILL FLUSH, THICK CONSISTENCY SEALANT MAY BE USED IN LIEU OF GASKET. OTHERWISE, USE GASKET SUITABLE FOR SPECIFIC SERVICE AND FIT UP UNIFORMLY TO AVOID PROTRUDING INSIDE THE DUCT.

JOINT T-23: FORMED FLANGE.  
THE JOINT IS FORMED FROM TWO STANDING SEAM POCKETS. NORMAL POSITION OR REVERSED. FULL FLANGE GASKETS ARE REQUIRED. GASKET MUST NOT PROTRUDE INTO INTERIOR OF DUCT. CORNERS REQUIRE SPECIAL PIECES FOR CLOSURE AS SHOWN IN ILLUSTRATIONS. USE BOLTS AT 6" MAXIMUM SPACING. 1/4" MINIMUM DIAMETER ON 3" W.G. OR LESS. 5/16" MINIMUM OVER 3" W.G. STATIC.

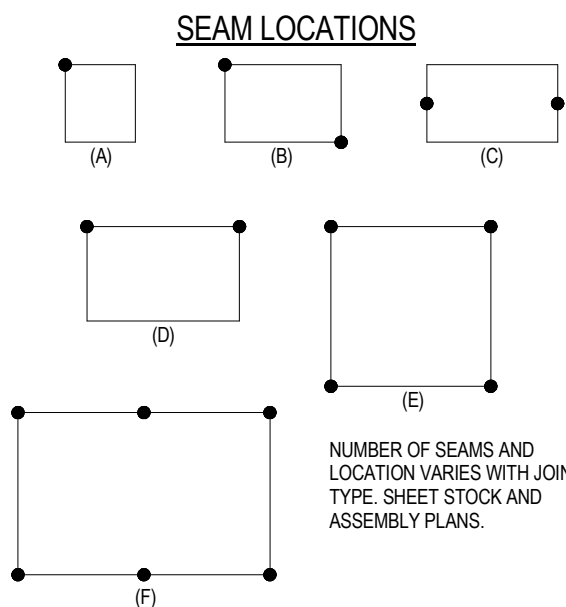
JOINT T-24: FORMED FLANGE.  
MATING FLANGES ARE FORMED ON THE ENDS OF THE DUCT IN DOUBLE FLANGE STYLE TO CREATE A TEE SHARP WHEN ASSEMBLED. 0.064" MINIMUM THICKNESS STEEL CORNER PIECES WITH 3/8" MINIMUM DIAMETER BOLTS SHALL BE USED TO CLOSE CORNERS. 1/8" BY 1/2" MINIMUM SIZE GASKETS OF SUITABLE DENSITY AND RESILIENCY SHALL BE CONTINUOUS AROUND THE JOINT AND SHALL BE LOCATED TO FORM AN EFFECTIVE SEAL. MATING FLANGES SHALL BE LOCKED TOGETHER BY 6" LONG CLIPS LOCATED WITHIN 6" OF EACH CORNER AND ALSO SPACED AT CENTERS NOT EXCEEDING 12" FOR 3" W.G. OR LESS STATIC PRESSURE, NOR EXCEEDING 12" FOR 4", 6" AND 10" W.G.



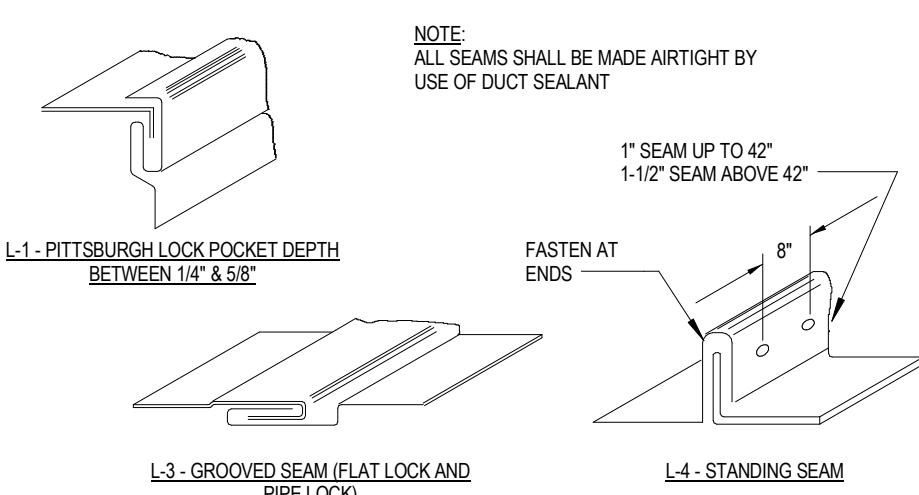
CORNER CLOSURES - SLIPS AND DRIVERS



CORNER CLOSURES - FLANGES



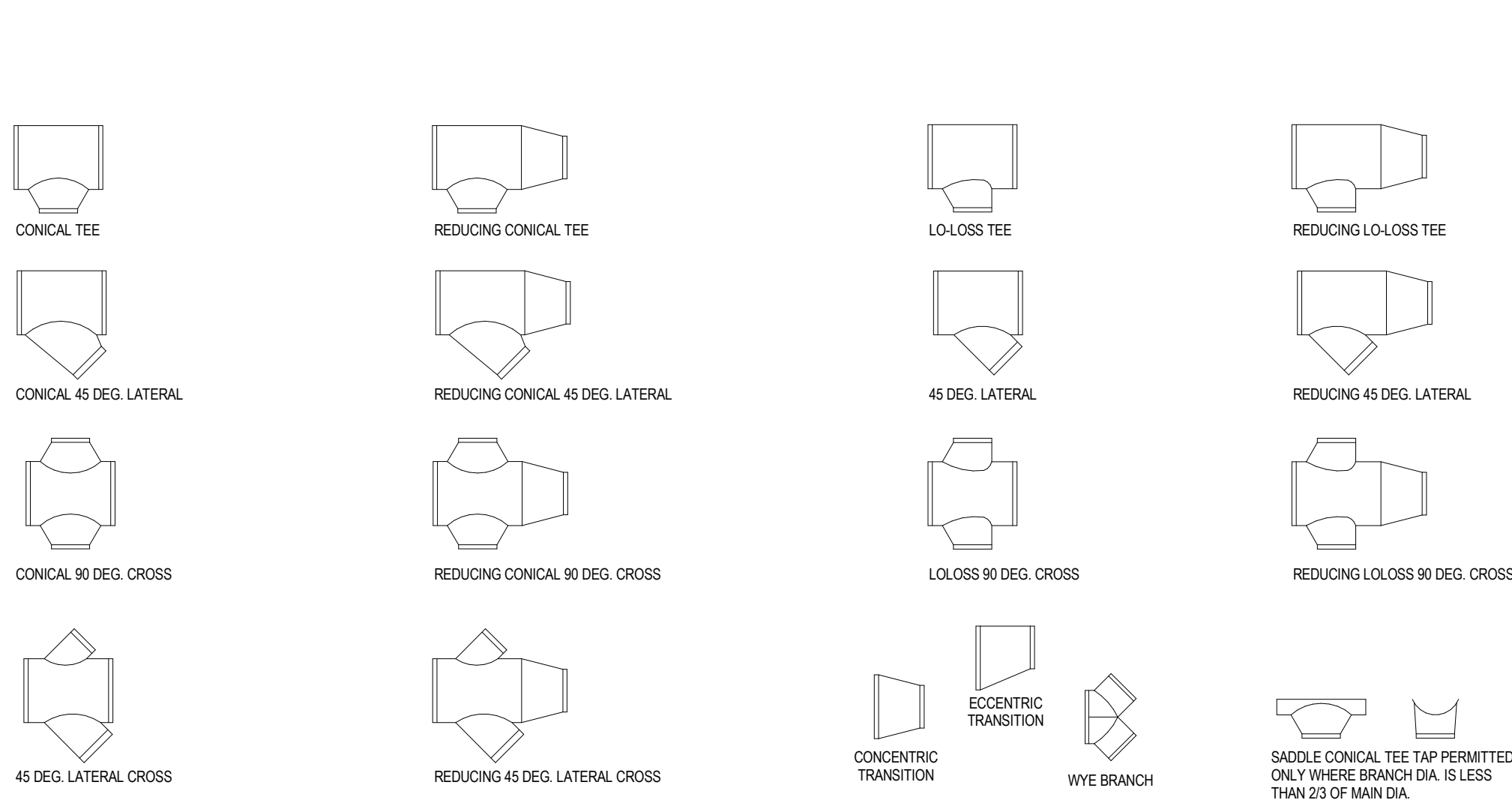
SEAM LOCATIONS



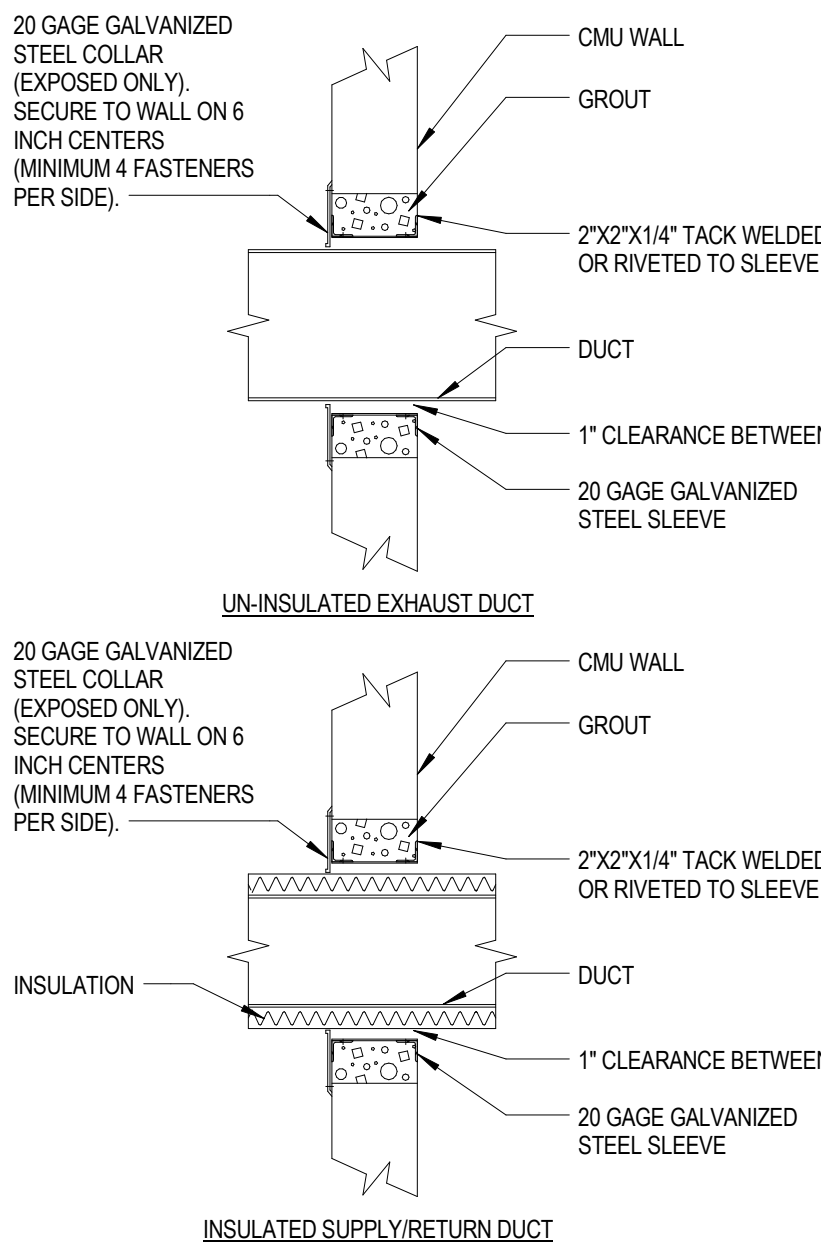
LONGITUDINAL SEAMS - RECT. DUCT

GENERAL FLEXIBLE DUCTWORK NOTES:  
1. USE OF FLEXIBLE DUCTWORK SHALL BE RESTRICTED TO CONNECTIONS BETWEEN THE VARIOUS AIR TERMINAL UNITS AND THE MEDIUM OR LOW PRESSURE SUPPLY DUCT AND CONNECTIONS BETWEEN SUPPLY DIFFUSERS AND THE LOW PRESSURE SUPPLY AIR DUCTWORK.  
2. USE OF FLEXIBLE DUCTWORK IN EXPOSED AREAS IS PROHIBITED.  
3. MAXIMUM LENGTH OF FLEXIBLE DUCTWORK SHALL BE 5'-0".  
4. DO NOT PENETRATE FIREWALLS AND INTERSTITIAL DECKS WITH FLEX. DUCTS.

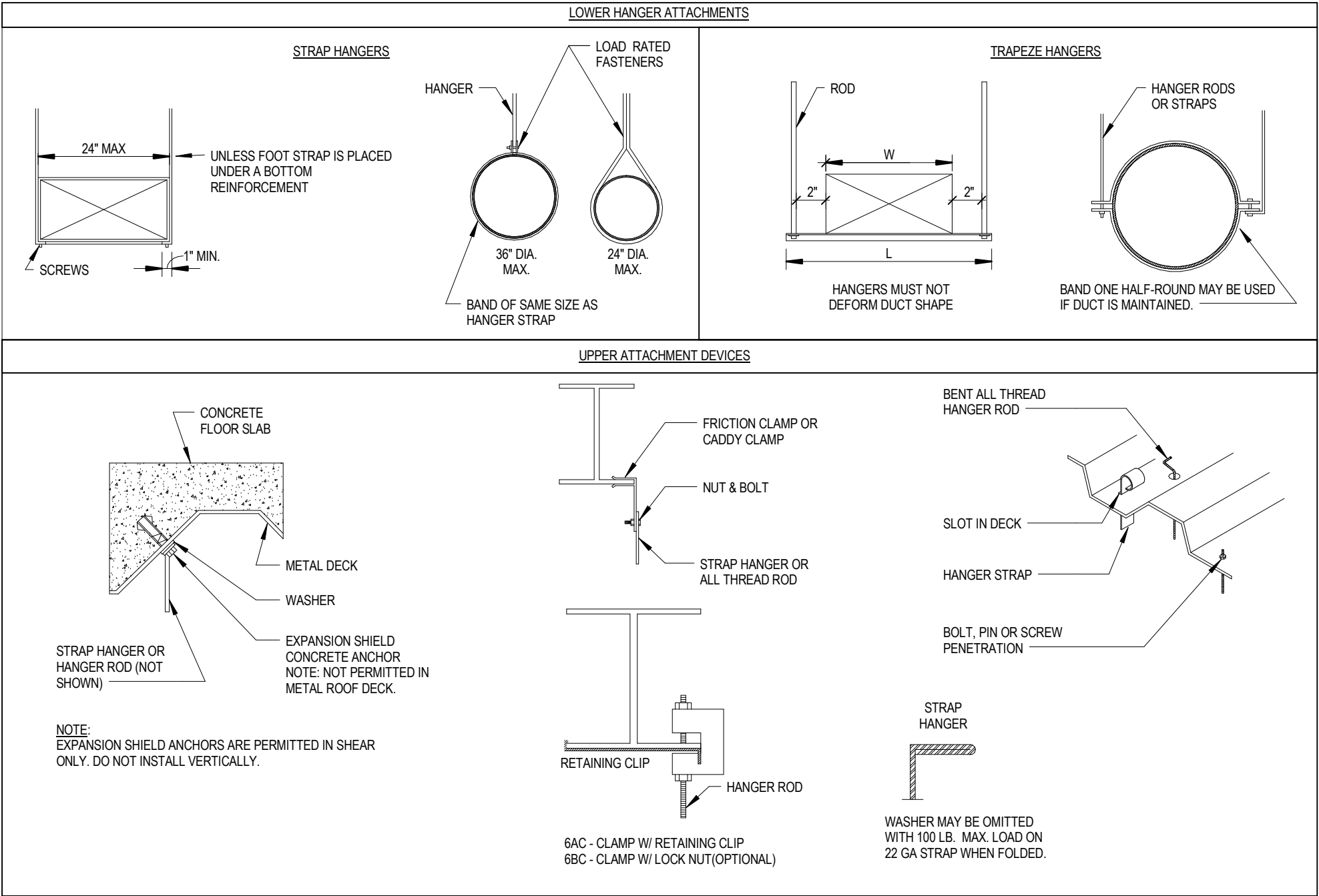
GENERAL FLEXIBLE DUCTWORK NOTES  
NOT TO SCALE



PERMISSIBLE ROUND / SPIRAL FITTINGS  
NTS



DUCT PENETRATIONS  
NTS

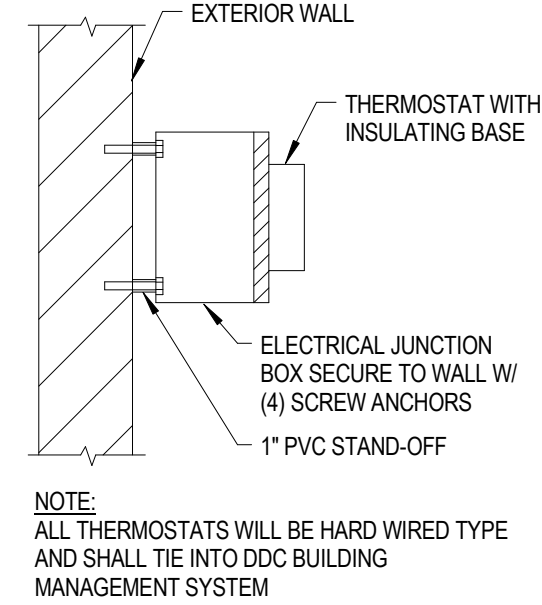


DUCT HANGERS  
NTS

MINIMUM ANGLE/ROD SIZES FOR TRAPEZE HANGERS		
DUCT DIA	ROD	MINIMUM ANGLE
UP TO 26"	1/4"	1" X 1" X 18"
32"	1/4"	1-1/2" X 1-1/2" X 18"
50"	3/8"	1-1/2" X 1-1/2" X 18"
66"	3/8"	1-1/2" X 1-1/2" X 316"
82"	3/8"	1-1/2" X 1-1/2" X 1/4"
98"	3/8"	2" X 2" X 316"
114"	3/8"	2-1/2" X 2-1/2" X 316"
130"	3/8"	2-1/2" X 2-1/2" X 1/4"

\*FOR SINGLE DUCT SUPPORT: FOR "GANGED" OR STACKED DUCT SUBMIT DETAIL OF HANGER SUPPORT FOR APPROVAL. MINIMUM 1 HANGER PER 9'-0" SECTION.

MINIMUM HANGER SIZES FOR ROUND DUCT				
DIAMETER	MAX. SPACING	WIRE DIAMETER	ROD	STRAP
1-10"	10'	(1) 12 GA.	1/4"	1" X 22 GA.
11-18"	10'	(2) 12 GA OR (1) 8 GA.	1/4"	1" X 22 GA.
19-24"	10'	(2) 10 GA.	1/4"	1" X 22 GA.
25-36"	10'	(2) 8 GA.	3/8"	1" X 20 GA.
37-50"	10'	-	(2) 3/8"	(2) 1" X 20 GA.
51-60"	10'	-	(2) 3/8"	(2) 1" X 18 GA.
61-84"	10'	-	(2) 3/8"	(2) 1" X 16 GA.



WALL MOUNTED THERMOSTAT  
NTS

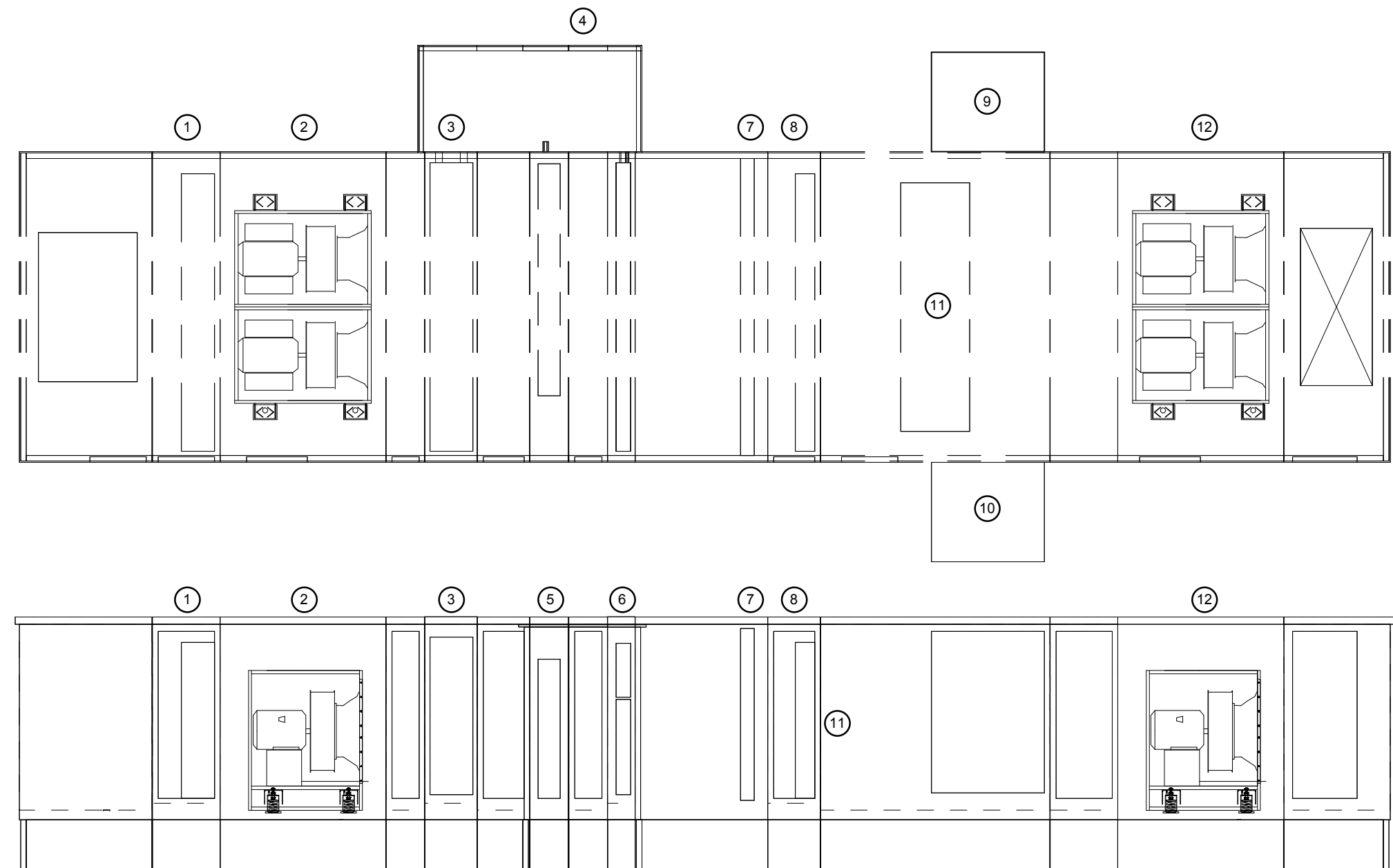
RECTANGULAR DUCT REINFORCEMENT  
NTS

CORNER CLOSURES  
NTS

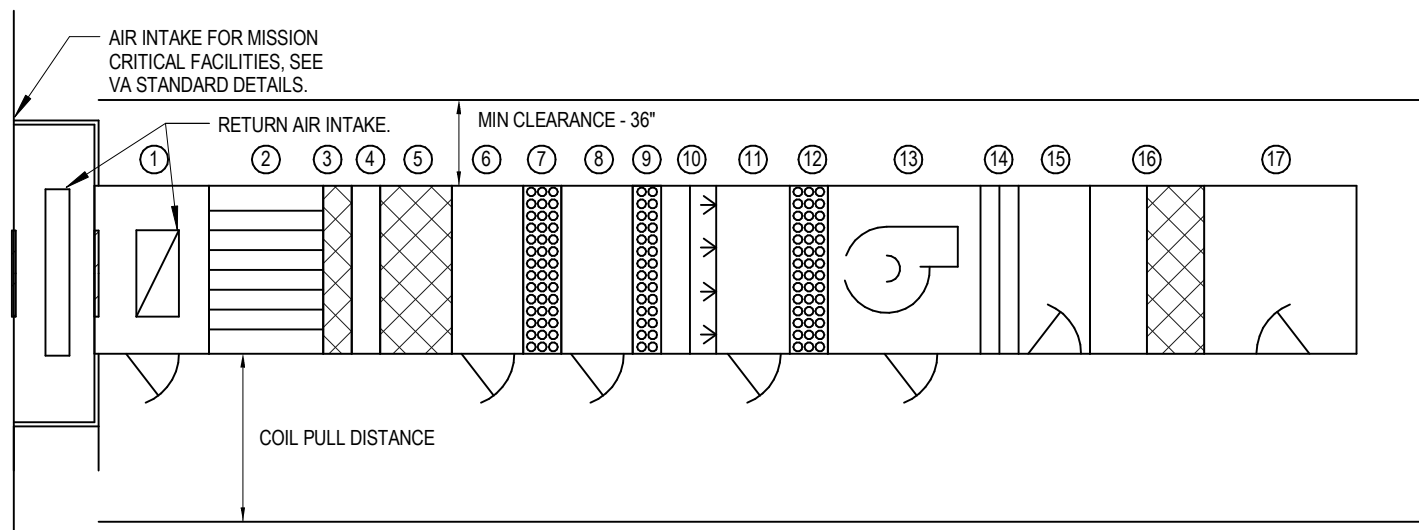
DUCT HANGERS  
NTS

DUCT HANGER SCHEDULE  
NTS

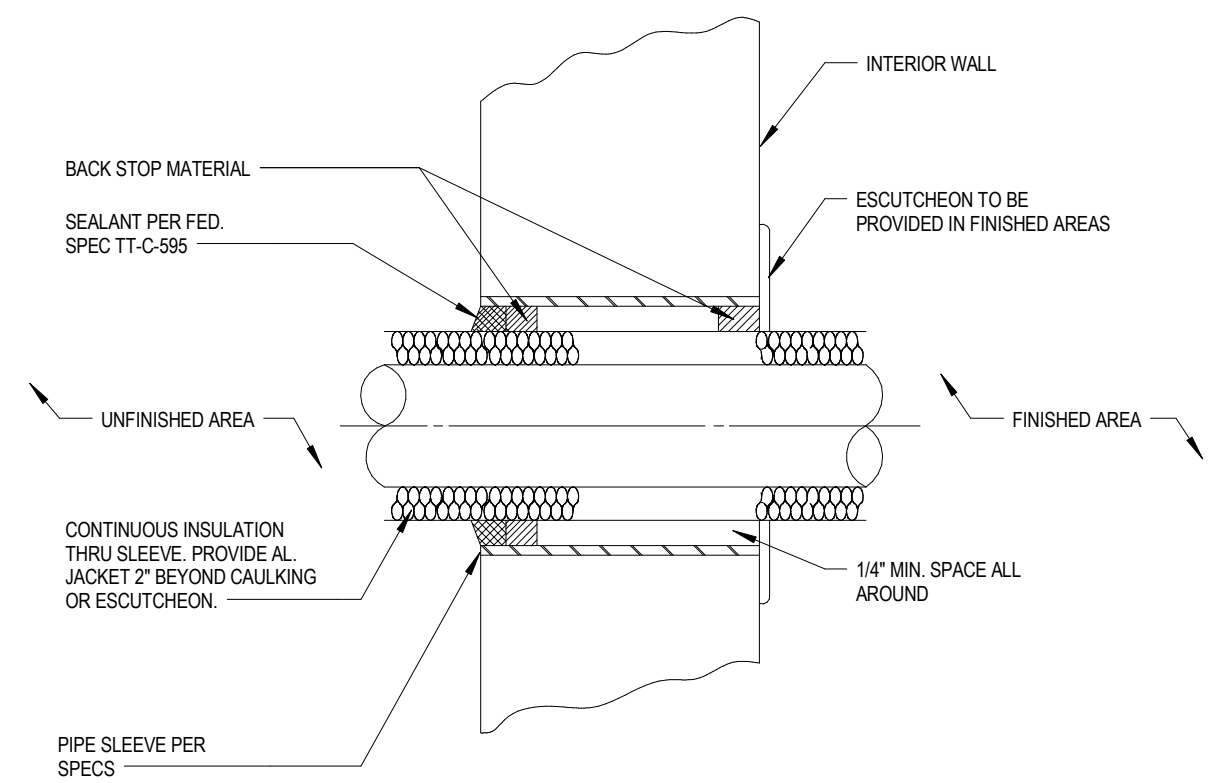
WALL MOUNTED THERMOSTAT  
NTS



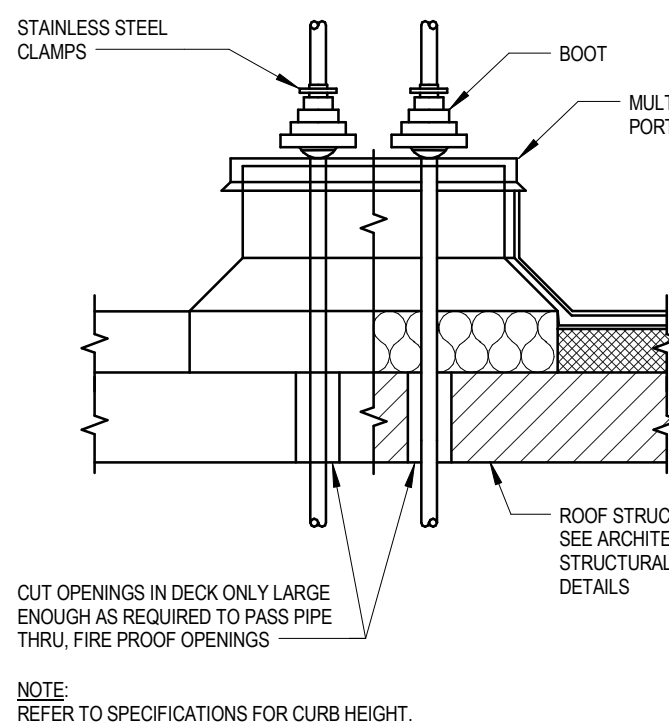
AHU-1 COMPONENTS  
NTS



ACCESS DOOR SWING DETAIL FOR AHU-1  
NTS



TYPICAL WALL PIPE SLEEVE DETAIL  
NTS



ROOF PIPE CURB  
NTS

Revisions:

Date:

CONSULTANTS:

SEAL

ARCHITECTS/ENGINEERS:

6587 Hamilton Avenue  
Pittsburgh, Pennsylvania 15206  
Ph: 412.287.7333 Fax: 412.287.7334  
www.ae-works.com  
AE Works Project Number: 13030

Drawing Title  
MECHANICAL DETAILS

Approved: Project Director

Project Title:  
H.H. MCGUIRE VAMC -  
CONSTRUCT SPINAL CORD  
ENHANCEMENT CENTER

Location:  
1201 Broad Rock Boulevard, Richmond, VA 23249

Date:  
09/11/2017

Checked:  
JKG

Drawn:  
CJC

Project Number  
652 - 314

Building Number  
500

Drawing Number  
M502

Office of  
Construction  
and Facilities  
Management

Department of  
Veterans Affairs









Department of  
Veterans Affairs

<b>Project Number</b> 652 - 314
<b>Building Number</b> 500
<b>Drawing Number</b> M504















## ROOFTOP AIR HANDLING UNIT

[illegible]

## ROOFTOP AIR HANDLING UNIT (CONT.)

[illegible]

NOTES:

1. SELECT UNIT AT 197 FT ABOVE SEA LEVEL.
2. REFER TO DETAIL SHEET M502 FOR AHU CONFIGURATION.
3. PROVIDE FACTORY FABRICATED INSULATED ROOF CURB. CURB SHALL BE OF SUFFICIENT HEIGHT SO THE BOTTOM OF THE OUTDOOR AIR INTAKE IS AT LEAST 36" ABOVE FINISHED ROOF. PROVIDE UNIT WITH FACTORY-SUPPLIED EXTERNAL PIPING CABINET(S) AND THE FACTORY SUPPLIED CURB MUST INCLUDE A CURB SECTION FOR THE PIPE CABINETS.
4. PROVIDE 2-WAY VALVES FOR COOLING COIL.
5. PROVIDE WITH DOUBLE WALL CONSTRUCTION THROUGHOUT WITH SOLID INNER LINER.
6. PROVIDE WITH SLOPED DOUBLE WALL STAINLESS STEEL DRAIN PANS.
7. STANDARD COLOR UNIT.
8. SINGLE POINT ELECTRICAL CONNECTION FOR FANS. SEPARATE ELECTRICAL CONNECTIONS FOR LIGHTS AND RECEPTACLES.
9. MECHANICAL (DIVISION 23) CONTRACTOR TO PROVIDE VFDs/DISCONNECTS. REFER TO SPECIFICATION SECTIONS 262911 AND 262921 FOR REQUIREMENTS. ELECTRICAL (DIVISION 26) CONTRACTOR TO INSTALL VFDs/DISCONNECTS AND ALL WIRING.
10. PROVIDE LIGHTS AND RECEPTACLES PRE-WIRED PER SPECIFICATIONS. FACTORY WIRE TO SEPARATE 120V DISCONNECT FOR SEPARATE CONNECTION BY ELECTRICAL CONTRACTOR.

## STEAM TRAPS

MARK	BASIS OF DESIGN MANUFACTURER & MODEL NO.	LOCATION	SERVICE	ORIFICE SIZE	MAX OPERATING PRESSURE (PSI)	FLOW DIRECTION	CONN. SIZE (IN)	TRAP TYPE	NOTES
1	ARMSTRONG 15-B6	MECH RM A101	HX-1	1/2"	30	HORIZONTAL	1-1/2"	FLOAT & THERMOSTATIC	
2	ARMSTRONG 15-B6	MECH RM A101	HX-2	1/2"	30	HORIZONTAL	1-1/2"	FLOAT & THERMOSTATIC	
3	ARMSTRONG 800	MECH RM A101	PRV-1/PRV-2	#38	150	HORIZONTAL	3/4"	INVERTED BUCKET	
4	ARMSTRONG 800	INTERSTITIAL	END OF MAIN LINE	#38	150	HORIZONTAL	3/4"	INVERTED BUCKET	
5	ARMSTRONG 800	AHU-1 HEATING COIL	AHU-1 HEATING COIL	#38	150	HORIZONTAL	3/4"	INVERTED BUCKET	
6	ARMSTRONG 800	AHU-1 HEATING COIL	AHU-1 HUMIDIFIER	#38	150	HORIZONTAL	3/4"	INVERTED BUCKET	
7	ARMSTRONG 800	MECH RM A101	MAIN LINE ELBOW	#38	150	HORIZONTAL	3/4"	INVERTED BUCKET	
8	ARMSTRONG 800	CRAWLSPACE	MAIN LINE	#38	150	HORIZONTAL	3/4"	INVERTED BUCKET	
9	ARMSTRONG 800	CRAWLSPACE	MAIN LINE	#38	150	HORIZONTAL	3/4"	INVERTED BUCKET	
10	ARMSTRONG 800	CRAWLSPACE	MAIN LINE	#38	150	HORIZONTAL	3/4"	INVERTED BUCKET	

NOTES:

## STEAM FLOW METERS

MARK	BASIS OF DESIGN MANUFACTURER & MODEL NO.	SERVICE	LOCATION	LINE SIZE	TYPE	TURNDOWN	ACCURACY	CAPACITY (LBS/HR)	ANALOG OUTPUT	OPER. WT. (LBS)	NOTES
1	SPIRAX SARCO VLM10	STEAM	MECH RM 1U-144	2-1/2"	VORTEX	20:1	+/- 1.5%	1,656	Y	32	
NOTES:											

## NOTES

## SHELL AND TUBE HEAT EXCHANGERS (STEAM TO LIQUID)

MARK	BASIS OF DESIGN MANUFACTURER & MODEL NO.	SERVICE	LOCATION	CAP (MBH)	SHELL SIDE		TUBE SIDE					MINIMUM SURFACE AREA (FT²)	OVERALL LENGTH (IN)	SHELL DIA. (IN)	PRESS. RATING (PSIG)	OPER WT. (LBS)	NOTES	
					PRESS. (PSIG)	FLOW (LBS/HR)	GPM	% GLYCOL	EWTF (°F)	LWTF (°F)	WPD (FT/HD)							FOULING FACTOR
1	B&G QSU 6-3-2	HEATING HOT WATER	MECH RM 1U-144	537.4	15	568.4	55.0	0	160	180	0.57	0.00076	7.6	40	6-5/8	150	93	
2	B&G QSU 6-3-2	HEATING HOT WATER	MECH RM 1U-144	537.4	15	568.4	55.0	0	160	180	0.57	0.00076	7.6	40	6-5/8	150	93	

NOTES

## STEAM PRESSURE REDUCING VALVES

MARK	BASIS OF DESIGN MANUFACTURER & MODEL NO.	SERVICE	LOCATION	SIZE	TYPE	MAX PRESS. DROP (PSIG)	PRESSURE SETTING (PSIG)		INLET SIZE (IN)	OUTLET SIZE (IN)	BYPASS SIZE (IN)	ASME RATING (PSIG)	CAPACITY (LBS/HR)	OPER. WT. (LBS)	NOTES
							IN	OUT							
1	SPIRAX DRV	STEAM (1/3 VALVE)	MECH RM 1U-144	2-1/2"	PILOT OPERATED	-	60	15	2-1/2"	4"	-	-	552	-	
2	SPIRAX DRV	STEAM (2/3 VALVE)	MECH RM 1U-144	2-1/2"	PILOT OPERATED	-	60	15	2-1/2"	4"	-	-	1,104	-	

## NOTES

## STEAM CONDENSATE RECEIVER/PUMP

[illegible]

**NOTES:**

1. PROVIDE NON-RESETTABLE HOUR METERS TO LOG RUN TIME OF EACH PUMP.	
2. MECHANICAL (DIVISION 23) CONTRACTOR TO PROVIDE STARTERS/DISCONNECTS. TO INSTALL STARTERS/DISCONNECTS AND ALL WIRING.	REFER TO SPECIFICATION SECTIONS 262911 AND 262921 FOR REQUIREMENTS. ELECTRICAL (DIVISION 26) CONTRACTOR

## HEATING HOT WATER PUMPS

MARK	BASIS OF DESIGN MANUFACTURER & MODEL NO.	SERVICE	LOCATION	TYPE	GPM	WPD (FT HD)	MIN. EFF. (%)	NPSH REQ (FT)	WORKING (PSIG)	IMPELLER SIZE (IN)	SIZE		AFD (Y/N)	MOTOR DATA			ELECTRICAL DATA		OPER. WT. (LBS)	NOTES
											DISCHARGE (IN)	SUCTION (IN)		BHP	HP	RPM	V/PH/Hz	EMER POWER (Y/N)		
HWP-1	BELL & GOSSETT E-90 1.5AB	HEATING HOT WATER	MECH RM 1U-144	INLINE	55	30	60	6.1	150	5.875	1.5	1.5	N	0.69	1.5	1725	460/3/60	Y	75	
HWP-2	BELL & GOSSETT E-90 1.5AB	HEATING HOT WATER	MECH RM 1U-144	INLINE	55	30	60	6.1	150	5.875	1.5	1.5	N	0.69	1.5	1725	460/3/60	Y	75	

**NOTES:**  
1. MECHANICAL (DIVISION 23) CONTRACTOR TO PROVIDE VFDS/STARTERS/DISCONNECTS. REFER TO SPECIFICATION SECTIONS 262911 AND 262921 FOR REQUIREMENTS. ELECTRICAL (DIVISION 26) CONTRACTOR TO INSTALL STARTERS /DISCONNECTS AND ALL WIRING.

## HEATING HOT WATER EXPANSION TANKS - DIAPHRAGM

[illegible]

NOTES:

## HEATING HOT WATER AIR/DIRT SEPARATORS

MARK	BASIS OF DESIGN MANUFACTURER & MODEL NO.	SERVICE	LOCATION	CAPACITY (GPM)	STRAINER	SIZE DIA X H (IN)	OPER. WT. (LBS.)	NOTES
1	SPIROTHERM VSR-250	HEATING HOT WATER	MECH RM 1U-144	55	YES	6 X 19	59	

NOTES:

## STEAM SAFETY (RELIEF) VALVES

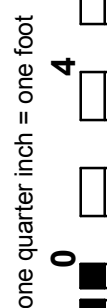
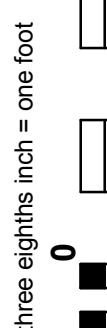
[illegible]

**NOTES:**

## FULLY SPRINKLERED BID DOCUMENTS

[illegible]





## RADIANT CEILING PANELS (HOT WATER)

RCP	SELECTION BASED ON MANUFACTURER & MODEL NO. (MODIFIED)	SERVICE/LOCATION	CAPACITY (MB/H)	GPM	MAX W/FD (FT)	EWT DB (°F)	LWT DB (°F)	PANEL LENGTH (IN)	TOTAL PANEL LENGTH (1) (FT - IN)	ACTIVE PANEL LENGTH (1) (FT - IN)	NOTES
1	AEROTECH AXO	PATIENT ROOM 1X-101	1.8	0.5	0.25	180	160	8	14'-0"	11'-0"	
2	AEROTECH AXO	PATIENT ROOM 1X-103	1.8	0.5	0.25	180	160	8	14'-0"	11'-0"	
3	AEROTECH AXO	PATIENT ROOM 1X-105	0.5	0.5	0.25	180	160	8	14'-0"	11'-0"	
4	AEROTECH AXO	PATIENT ROOM 1X-107	1.8	0.5	0.25	180	160	8	14'-0"	11'-0"	
5	AEROTECH AXO	PATIENT ROOM 1X-109	1.8	0.5	0.25	180	160	8	14'-0"	11'-0"	
6	AEROTECH AXO	PATIENT ROOM 1X-111	1.8	0.5	0.25	180	160	8	14'-0"	11'-0"	
7	AEROTECH AXO	PATIENT ROOM 1X-113	1.8	0.5	0.25	180	160	8	14'-0"	11'-0"	
8	AEROTECH AXO	PATIENT ROOM 1X-115	0.5	0.5	0.25	180	160	8	14'-0"	11'-0"	
9	AEROTECH AXO	PATIENT ROOM 1X-117	1.8	0.5	0.25	180	160	8	14'-0"	11'-0"	
10	AEROTECH AXO	PATIENT ROOM 1X-132	1.8	0.5	0.25	180	160	8	14'-0"	11'-0"	
11	AEROTECH AXO	PATIENT ROOM 1X-134	1.8	0.5	0.25	180	160	8	6'-0"	6'-0"	
12	AEROTECH AXO	PATIENT ROOM 1X-136	1.8	0.5	0.25	180	160	8	14'-0"	11'-0"	
13	AEROTECH AXO	PATIENT ROOM 1X-138	1.8	0.5	0.25	180	160	8	14'-0"	11'-0"	
14	AEROTECH AXO	PATIENT ROOM 1X-140	1.8	0.5	0.25	180	160	8	14'-0"	11'-0"	
15	AEROTECH AXO	PATIENT ROOM 1X-142	1.8	0.5	0.25	180	160	8	14'-0"	11'-0"	
16	AEROTECH AXO	CORRIDOR CIX-2	1.8	0.5	0.25	180	160	8	8'-0"	8'-0"	
17	AEROTECH AXO	CORRIDOR CIX-5	1.8	0.5	0.25	180	160	8	8'-0"	8'-0"	

NOTES:

1. ALUMINUM PANELS.
2. CONTRACTOR TO COORDINATE PANEL DIMENSIONS WITH REFLECTED CEILING.
3. WHERE PANELS ARE SHOWN IN CONTINUOUS APPLICATION, PANELS SHALL BE CONTINUOUS WITH END CAPS BETWEEN MODULES. END CAPS ONLY AT END OF THE ASSEMBLY.
4. PROVIDE DOUBLE PASS PANELS SO THAT SUPPLY & RETURN PIPING CONNECTIONS ARE ON THE SAME END OF THE PANEL.

## EXHAUST FANS

EF	SELECTION BASED ON MANUFACTURER & MODEL NO. (MODIFIED)	SERVICE	AIRFLOW (CFM)	STATIC PRESSURE	BHP	HP	RPM	dBA	SONES	ELECTRICAL		WEIGHT	NOTES
										VOLT	PHASE		
1	GREENHEAT GB-330-50	GENERAL EXHAUST	11,285	1.0	3.8	5	632	70	20	460	3	236	1,2
2	TJERNLUND LB1	LAUNDRY EXHAUST	160	-	-	50 W	-	-	-	120	1	-	1,2,3,4,5

NOTES:

1. MECHANICAL (DIVISION 23) CONTRACTOR TO PROVIDE STARTERS/DISCONNECTS. REFER TO SPECIFICATION SECTIONS 262911 AND 262921 FOR REQUIREMENTS. ELECTRICAL (DIVISION 26) CONTRACTOR TO INSTALL STARTERS/DISCONNECTS AND ALL WIRING.
2. PROVIDE WITH PREMIUM EFFICIENCY MOTORS.
3. PROVIDE WITH PRESSURE SENSING FEATURE WITH SELF CLEANING SENSING TUBE. FAN AUTOMATICALLY OPERATES AND SHUTS OFF BASED ON OPERATION OF DRYER.
4. MOTOR TO BE LOCATED OUT OF AIR STREAM TO PREVENT EXPOSURE TO HEAT, LINT AND MOISTURE.
5. PROVIDE WITH METAL REVERSE INCLINED PARTICULATE HANDLING IMPELLER.

## VAV TERMINAL BOX SCHEDULE

VAV	SELECTION BASED ON MANUFACTURER & MODEL NO. (MODIFIED)	SYSTEM	MAX AIRFLOW (CFM)	MIN AIRFLOW (CFM)	HEATING AIRFLOW (CFM)	MAX AIR RSG (IN. WG.)	EAT (°F)	LAT (°F)	CAPACITY (MMH)	GPM	EWT (°F)	LWT (°F)	MAX WATER FLOW (FT. WG.)	INLET SIZE (IN.)	NC RATING (MAX)	NOTES
1	TITUS DESV	AHU-1	465	230	230	0.75	55	90	8.7	1.0	180.0	162.5	3.0	7	30	-
2	TITUS DESV	AHU-1	465	230	230	0.75	55	90	8.7	1.0	180.0	162.5	3.0	7	30	-
3	TITUS DESV	AHU-1	465	230	230	0.75	55	90	8.7	1.0	180.0	162.5	3.0	7	30	-
4	TITUS DESV	AHU-1	465	230	230	0.75	55	90	8.7	1.0	180.0	162.5	3.0	7	30	-
5	TITUS DESV	AHU-1	465	230	230	0.75	55	90	8.7	1.0	180.0	162.5	3.0	7	30	-
6	TITUS DESV	AHU-1	465	230	230	0.75	55	90	8.7	1.0	180.0	162.5	3.0	7	30	-
7	TITUS DESV	AHU-1	465	230	230	0.75	55	90	8.7	1.0	180.0	162.5	3.0	7	30	-
8	TITUS DESV	AHU-1	465	230	230	0.75	55	90	8.7	1.0	180.0	162.5	3.0	7	30	-
9	TITUS DESV	AHU-1	465	230	230	0.75	55	90	8.7	1.0	180.0	162.5	3.0	7	30	-
10	TITUS DESV	AHU-1	465	230	230	0.75	55	90	8.7	1.0	180.0	162.5	3.0	7	30	-
11	TITUS DESV	AHU-1	465	230	230	0.75	55	90	8.7	1.0	180.0	162.5	3.0	7	30	-
12	TITUS DESV	AHU-1	465	230	230	0.75	55	90	8.7	1.0	180.0	162.5	3.0	7	30	-
13	TITUS DESV	AHU-1	465	230	230	0.75	55	90	8.7	1.0	180.0	162.5	3.0	7	30	-
14	TITUS DESV	AHU-1	465	230	230	0.75	55	90	8.7	1.0	180.0	162.5	3.0	7	30	-
15	TITUS DESV	AHU-1	465	230	230	0.75	55	90	8.7	1.0	180.0	162.5	3.0	7	30	-
16	TITUS DESV	AHU-1	500	250	-	0.75	55	-	-	-	-	-	-	7	30	1
17	TITUS DESV	AHU-1	125	60	60	0.75	55	90	2.3	0.5	180.0	170.9	3.0	4	30	-
18	TITUS DESV	AHU-1	865	430	430	0.75	55	90	16.3	1.5	180.0	158.2	3.0	9	30	-
19	TITUS DESV	AHU-1	115	60	60	0.75	55	90	2.3	0.5	180.0	170.9	3.0	4	30	-
20	TITUS DESV	AHU-1	340	170	170	0.75	55	90	6.5	0.5	180.0	154.2	3.0	6	30	-
21	TITUS DESV	AHU-1	250	130	130	0.75	55	90	4.9	0.5	180.0	160.3	3.0	5	30	-
22	TITUS DESV	AHU-1	100	50	50	0.75	55	90	1.9	0.5	180.0	172.4	3.0	4	30	-
23	TITUS DESV	AHU-1	350	180	180	0.75	55	90	6.8	0.5	180.0	152.7	3.0	6	30	-
24	TITUS DESV	AHU-1	1170	590	590	0.75	55	90	22.4	2.0	180.0	157.6	3.0	10	30	-
25	TITUS DESV	AHU-1	1,180	590	590	0.75	55	90	22.4	2.0	180.0	157.6	3.0	10	30	-
26	TITUS DESV	AHU-1	215	110	110	0.75	55	90	4.2	0.5	180.0	163.3	3.0	5	30	-
27	TITUS DESV	AHU-1	805	400	-	0.75	55	-	-	-	-	-	-	9	30	1
28	TITUS DESV	AHU-1	200	100	100	0.75	55	90	3.8	0.5	180.0	164.8	3.0	5	30	-
29	TITUS DESV	AHU-1	390	200	200	0.75	55	90	7.6	1.0	180.0	164.8	3.0	6	30	-

**NOTES:**  
1. UNIT TO BE CONSTANT VOLUME, COOLING ONLY

## DIFFUSER, REGISTER AND GRILLE SCHEDULE

MARK	SYSTEM	AIRFLOW RANGE (CFM)	MODULE SIZE (IN)	NECK SIZE (ID IN)	MAX NECK VELOCITY (FPM)	MAX NC IN (WG)	MAX DAMPER (WG)	OPPOSED BLADE DAMPER (Y/N)	MATERIAL	FINISH	NOTES
CD-1	SUPPLY	0-120	24 x 24	6"	500	30	0.1	Y	ALUMINUM, LOUVERED FACE	WHITE	
CD-2	SUPPLY	121-210	24 x 24	8"	500	30	0.1	Y	ALUMINUM, LOUVERED FACE	WHITE	
CD-3	SUPPLY	211-350	24 x 24	10"	500	30	0.1	Y	ALUMINUM, LOUVERED FACE	WHITE	
CD-4	SUPPLY	351-600	24 x 24	12"	500	30	0.1	Y	ALUMINUM, LOUVERED FACE	WHITE	
CD-5	SUPPLY	0-100	24 x 24	6"	500	30	0.1	Y	ALUMINUM SQUARE PLAQUE	WHITE	
CD-6	SUPPLY	101-175	24 x 24	8"	500	30	0.1	Y	ALUMINUM SQUARE PLAQUE	WHITE	
CD-7	SUPPLY	176-275	24 x 24	10"	500	30	0.1	Y	ALUMINUM SQUARE PLAQUE	WHITE	
CD-8	SUPPLY	276-395	24 x 24	12"	500	30	0.1	Y	ALUMINUM SQUARE PLAQUE	WHITE	
CD-9	SUPPLY	0-100	12 x 12	6"	500	30	0.1	Y	ALUMINUM SQUARE PLAQUE	WHITE	
CD-10	SUPPLY	101-175	12 x 12	8"	500	30	0.1	Y	ALUMINUM SQUARE PLAQUE	WHITE	
CD-11	SUPPLY	176-275	12 x 12	10"	500	30	0.1	Y	ALUMINUM SQUARE PLAQUE	WHITE	
RG-1, EG-2	RETURN / EXHAUST	0-120	24 x 24	6"	500	30	0.1	Y	ALUMINUM, PERFORATED, FLUSH FACE	WHITE	
RG-2, EG-2	RETURN / EXHAUST	121-210	24 x 24	8"	500	30	0.1	Y	ALUMINUM, PERFORATED, FLUSH FACE	WHITE	
RG-3, EG-3	RETURN / EXHAUST	211-350	24 x 24	10"	500	30	0.1	Y	ALUMINUM, PERFORATED, FLUSH FACE	WHITE	
RG-4, EG-4	RETURN / EXHAUST	351-600	24 x 24	12"	500	30	0.1	Y	ALUMINUM, PERFORATED, FLUSH FACE	WHITE	
RG-5, EG-5	RETURN / EXHAUST	601-805	24 x 24	14"	500	30	0.1	Y	ALUMINUM, PERFORATED, FLUSH FACE	WHITE	
RG-6, EG-6	RETURN / EXHAUST	0-100	12 x 12	6"	500	30	0.1	Y	ALUMINUM, PERFORATED, FLUSH FACE	WHITE	
RG-7, EG-7	RETURN / EXHAUST	101-175	12 x 12	8"	500	30	0.1	Y	ALUMINUM, PERFORATED, FLUSH FACE	WHITE	
RG-8, EG-8	RETURN / EXHAUST	176-275	12 x 12	10"	500	30	0.1	Y	ALUMINUM, PERFORATED, FLUSH FACE	WHITE	

NOTES:

1. PROVIDE LAY-IN MOUNTING FOR ACOUSTIC LAY-IN TILE CEILING AND SURFACE MOUNTING FOR DRYWALL, PLASTER AND OTHER CEILING TYPES OR WALLS.
2. PROVIDE DIRECTIONAL PATTERN DIFFUSERS AS SHOWN ON FLOOR PLANS.
3. COLOR SAMPLES TO BE PROVIDED TO THE ARCHITECT FOR APPROVAL PRIOR TO WORK COMMENCING.
4. CD-E, RG-E AND EG-E REFER TO EXISTING TO REMAIN DIFFUSERS, REGISTERS AND GRILLES.

# FULLY SPRINKLERED BID DOCUMENTS

[illegible]