

ABBREVIATIONS

A/E	ARCHITECT / ENGINEER	CD-2	CONSTRUCTION DOCUMENTS (SUBMISSION2)
AAHX	AIR TO AIR HEAT EXCHANGER	CENT	CENTRIFICAL
AB	AIR BLENDER	CFH	CUBIC FEET PER HOUR
AAV	AUTOMATIC AIR VENT	CFM	CUBIC FEET PER MINUTE
ACC	AIR COOLED CONDENSER	CFT	CUBIC FEET
ACCH	AIR COOLED CHILLER	CFP	CHEMICAL FEED PUMP
ACCU	AIR-COOLED CONDENSING UNIT	CG	CEILING GRILLE
ACU	AIR CONDITIONING UNIT	CH	CHILLER
ACD	AUTOMATIC CONTROL	CHP	CHILLED WATER PUMP
ACD-TP	DAMPER MODULATING AUTOMATIC CONTROL DAMPER TWO POSITION	CHW	CHILLER WATER
AD	ACCESS DOOR	CI	CAST IRON
AF	AFTER FILTER	CM	CARBON MONOXIDE
AFCV	AIR FLOW CONTROL VALVE	CM	CUBIC METER
AFF	ABOVE FINISHED FLOOR	CM/S	CUBIC METER PER SECOND
AFMD	AIR FLOW MEASURING DEVICE	CO	CLEAN OUT
AFW	AIR FOIL WHEEL (FAN)	CO2	CARBON DIOXIDE
AHU	AIR HANDLING UNIT	COMP	COMPRESSOR UNIT
AMP	AMPERGE	COP	COEFFICIENT OF PERFORMANCE
AP	ACCESS PANEL	CP	CONDENSATE PUMP
APD	AIR PRESSURE DROP	CS	CONDENSATE STORAGE TANK
ARI	AIR CONDITIONING AND REFRIGERATION INSTITUTE	CSG	CLEAN STEAM GENERATOR
AS	AIR SEPARATOR	CT	COOLING TOWER
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS	CU	CONDENSING UNIT
AW	AIR WASHER	CUH	CABINET UNIT HEATER
AXF	AXIAL FLOW	CV	CONSTANT VOLUME
B	BOILER	CW	COLD WATER (POTABLE)
BD	BUTTERFLY DAMPER	CWCC	CHILLED WATER COOLING COIL
BDD	BACKDRAFT DAMPER	CWP	CONDENSER WATER PUMP
BDR	BASE BOARD RADIATOR	CWR	CHILLED WATER RETURN
BFP	BACKFLOW PREVENTER	CWS	CHILLED WATER SUPPLY
BFT	BOILER PLANT FIRE TUBE	D	DAMPER - AUTOMATIC
BG	BOTTOM GRILLE	D-1	OUTDOOR AIR DAMPER
BHP	BRAKE HORSEPOWER	D-2	RETURN AIR DAMPER
BHW	HOT WATER HEATING BOILER	D-3	RELIEF AIR DAMPER
BHX	BOILER BLOWDOWN HEAT EXCHANGER	DB	DECELS
BIW	BACKWARD INCLINED WHEEL (FAN)	Db	DRY-BULB TEMPERATURE
BMT	BONE MARROW TRANSPLANT	DD-1	DESIGN DEVELOPMENT (SUBMISSION1)
BR	BOTTOM REGISTER	DD-2	DESIGN DEVELOPMENT (SUBMISSION2)
BSC	BIOLOGICAL SAFETY CABINETS	DDC	DIRECT DIGITAL CONTROLS
BT	BLOWOFF TANK	DEG	DEGREE
BTC	BLOWOFF TANK CONTROL VALVE	DF	DIFFUSER
BTU	BRITISH THERMAL UNIT	DIA	DIAMETER
BTUH	BRITISH THERMAL UNIT PER HOUR	DIW	DEIONIZED WATER
BWT	BOILER PLANT WATER TUBE	DP	DIFFUSER PLATE
C	CENTIGRADE (CELIUS)	DPA	DIFFERENTIAL PRESSURE ASSEMBLY
CC	COOLING COIL	DPS	DIFFERENTIAL PRESSURE SENSOR
CCD	COOLING COIL CONDENSATE	DX	DIRECT EXPANSION
DRAIN		DXCC	DIRECT EXPANSION COOLING COIL
CD	CEILING DIFFUSER		
CD-1	CONSTRUCTION DOCUMENTS (SUBMISSION1)		

ABBREVIATIONS

E	EXISTING	FT	FEET
EA	EXHAUST AIR	FT-LB	FOOT-POUND
EAT	ENTERING AIR TEMPERATURE	FTR	FIN TUBE RADIATION
EC	EVAPORATIVE COOLER	FV	FACE VELOCITY
ECC	ENGINEERING CONTROL CENTER	GA	GAUGE
ECU	EVAPORATIVE CONDENSER UNIT	GAL	GALLONS
EDH	ELECTRIC DUCT HEATER	GH	GRAVITY HOOD
EER	ENERGY EFFICIENCY RATIO	GPD	GALLONS PER DAY
EF	EXHAUST FAN	GPH	GALLONS PER HOUR
EG	EXHAUST GRILLE	GPM	GALLONS PER MINUTE
EGS	EMERGENCY GAS SHUTOFF	IN W	INCH WATER GAUGE
EGT	ENTERING GLYCOL TEMPERATURE	IN W	INCH WATER GAUGE
EH	EXHAUST HOOD	IN-LB	INCH-POUND
EJ	EXPANSION JOINT	IPLV	INTERGRATED PART LOAD VALUE
EMD	END OF MAIN DRIP (STEAM)	IRH	INTRADED HEATER
ENT	ENTERING	IS	INSECT SCREEN
ER	EXHAUST REGISTER	IU	INDUCTION UNIT
ERC	ELECTRIC REHEAT COIL	IV	INLET VANES
ERP	ELECTRIC RADIANT PANEL	J	INTENTIONALLY LEFT BLANK
ESP	EXTERNAL STATIC PRESSURE	kg	KILOGRAM
ET	EXPANSION TANK	kg/HR	KILOGRAM PER HOUR
ETO	ETHYLENE OXIDE	kPa	KILOPASCAL
EUH	ELECTRIC UNIT HEATER	kW	KILOWATT
ENC	EVAPORATIVE WATER COOLER	kWh	KILOWATT HOUR
EWT	ENTERING WATER TEMPERATURE	L	LITER
EX	EXISTING	Lh	LITERS PER HOUR (OR LITERS/HOUR)
F	FAHRENHEIT	Lm	LITERS PER MINUTE (OR LITERS/MINUTE)
F&T	FLOAT AND THERMOSTATIC	L/s	LITERS PER SECOND (OR LITERS/SECOND)
F/SDPR	COMBINATION FIRE SMOKE DAMPER	LAT	LEAVING AIR TEMPERATURE
FA	FREE AREA	LBSHR	POUNDS PER HOUR
FC	FLEXIBLE CONNECTION	LG	LEAVING GLYCOL TEMPERATURE
FCU	FAN COIL UNIT (4 PIPE)	LH	LATENT HEAT
FCUC	FAN COIL UNIT COOLING ONLY	LPG	LIQUID PROPANE GAS
FCUH	FAN COIL UNIT HEATING ONLY	LPR	LOW PRESSURE RETURN (STEAM CONDENSATE)
FCW	FORWARD CURVED WHEEL (FAN)	LPRC	LOW PRESSURE STEAM RETURN (CLEAN)
FD	FLOOR DRAIN	LLHX	LIQUID TO LIQUID HEAT EXCHANGER
FD	FIRE DAMPER	LPS	LOW PRESSURE STEAM
FF	FINAL FILTER	LPSG	LOW PRESSURE STEAM (CLEAN)
FHX	FLUE GAS/FEEDWATER HEAT EXCHANGER	LSD	LINEAR SLOT DIFFUSER
FM	FLOW METER	LTC	LOCAL TEMPERATURE CONTROL PANEL
FOP	FUEL OIL PUMP	LVG	LEAVING
FOT	FUEL OIL TANK	LVR	LOUVER
FOHX	FUEL OIL HEAT EXCHANGER	LWT	LEAVING WATER TEMPERATURE
FPM	FEET PER MINUTE		
FPS	FEET PER SECOND		
FPTU	FAN POWERED TERMINAL UNIT		
FR	FLOOR REGISTER		
FRP	FIBER REINFORCED POLYESTER		
FS	FLOW SWITCH		
FSTAT	FREEZESTAT		

ABBREVIATIONS

I/O	INPUT/OUTPUT	M	METER, SI UNIT
IAQ	INDOOR AIR QUALITY	M/s	METERS PER SECOND (OR METERS/SECOND)
IBT	INVERTED BUCKET TRAP	MA	MIXED AIR
ICF	IN-LINE CENTRIFUGAL FAN	MAT	MIXED AIR TEMPERATURE
ICU	INTENSIVE CARE UNIT	MAU	MAKE-UP AIR UNIT
ID	INSIDE DIAMETER	MAX	MAXIMUM
IFB	INTEGRAL FACE AND BYPASS	MB	MIXING BOX
IN	INCHES	MBH	1000 BTUH
IN HG	INCHES OF MERCURY	MCA	MINIMUM BRANCH CIRCUIT AMPACITY
IN WC	INCH WATER COLUMN	MER	MECHANICAL EQUIPMENT ROOM
IN W	INCH WATER GAUGE	MERV	MINIMUM EFFICIENCY REPORTING
IN-LB	INCH-POUND		
IPLV	INTERGRATED PART LOAD VALUE		
IRH	INTRADED HEATER		
IS	INSECT SCREEN		
IU	INDUCTION UNIT		
IV	INLET VANES		
J	INTENTIONALLY LEFT BLANK		
kg	KILOGRAM		
kg/HR	KILOGRAM PER HOUR		
kPa	KILOPASCAL		
kW	KILOWATT		
kWh	KILOWATT HOUR		
L	LITER		
Lh	LITERS PER HOUR (OR LITERS/HOUR)		
Lm	LITERS PER MINUTE (OR LITERS/MINUTE)		
L/s	LITERS PER SECOND (OR LITERS/SECOND)		
LAT	LEAVING AIR TEMPERATURE		
LBSHR	POUNDS PER HOUR		
LG	LEAVING GLYCOL TEMPERATURE		
LH	LATENT HEAT		
LPG	LIQUID PROPANE GAS		
LPR	LOW PRESSURE RETURN (STEAM CONDENSATE)		
LPRC	LOW PRESSURE STEAM RETURN (CLEAN)		
LLHX	LIQUID TO LIQUID HEAT EXCHANGER		
LPS	LOW PRESSURE STEAM		
LPSG	LOW PRESSURE STEAM (CLEAN)		
LSD	LINEAR SLOT DIFFUSER		
LTC	LOCAL TEMPERATURE CONTROL PANEL		
LVG	LEAVING		
LVR	LOUVER		
LWT	LEAVING WATER TEMPERATURE		

ABBREVIATIONS

P	PUMP	SA	SUPPLY AIR
PA	PASCAL	SAD	SOUND ATTENUATING DEVICE
PC	PUMPED CONDENSATE	SAT	SUPPLY AIR TEMPERATURE
PCF	POUNDS PER CUBIC FOOT (FEET)	SC	SHADING COEFFICIENT
PD	PRESSURE DROP	SCFM	STANDARD CUBIC FEET PER MINUTE
PEF	PROPELLER (TYPE) EXHAUST FAN	SCI	SPINAL CODE INJURY
PF	PRE-FILTER	SCR	SILICON CONTROLLER RECTIFIER
PG	PRESSURE GAGE	SCV	STEAM CONDENSATE VENT
PGW	PROPYLENE GLYCOL-WATER (SOLUTION)	SD	SMOKE DETECTOR
PHC	PREHEAT COIL	SD	SUPPLY AIR DIFFUSER
PHM	PARTS PER MILLION	SD-1	SCHEMATIC DESIGN (SUBMISSION1)
PRS	PRESSURE REGULATING (VALVE) STATION	SD-2	SCHEMATIC DESIGN (SUBMISSION2)
PRV	PRESSURE REGULATING VALVE	SDPR	SMOKE DAMPER
PSI	POUNDS PER SQUARE INCH	SDR	SMOKE DAMPER (RETURN)
PSIA	POUNDS PER SQUARE INCH -- ABSOLUTE	SDS	SMOKE DAMPER (SUPPLY)
PSIG	POUNDS PER SQUARE INCH -- GAGE	SEN	SENSIBLE HEAT
PSS	PRIMARY SECONDARY SYSTEM	SF	SUPPLY FAN
PSV	PRESSURE SAFETY VALVE	SG	SUPPLY AIR GRILLE
PTAC	PACKAGED TERMINAL AIR CONDITIONER	SH	STEAM HUMIDIFIER
R/E	RETURN OR EXHAUST	SHC	STEAM HEATING COIL
RA	RETURN AIR	SI	SQUARE INCHES
RAD	REFRIGERANT AIR DRYER	SP	STATIC PRESSURE
RAF	RADIO FREQUENCY	SP GR	SPECIFIC GRAVITY
RAH	ROTARY AIR HEAT EXCHANGER	SPD	SUPPLY PROCESS AND DISTRIBUTION
RAT	RETURN AIR TEMPERATURE	SPRV	STEAM PRESSURE REDUCING VALVE
RCCH	REMOTE CONDENSER CHILLER	SPS	STATIC PRESSURE SENSOR
RCU	RECIPROCATING CHILLER UNIT	SQ FT	SQUARE FOOT (FEET)
RD	REFRIGERANT DISCHARGE	SR	SUPPLY AIR REGISTER
RDS	ROOM DATA SHEETS	SS	STAINLESS STEEL
REA	RELIEF AIR	SSHX	STEAM TO STEAM HEAT EXCHANGER
RF	RETURN FAN	SSR	SOLID SEPARATOR
RG	RETURN GRILLE	ST	STEAM TRAP
RH	RELATIVE HUMIDITY	SUH	STEAM UNIT HEATER
RHC	REHEAT COIL	SV	STEAM PRESSURE REDUCING VALVE
RHG	REFRIGERANT HOT GAS	SVS	STEAM VENT SILENCER
RL	REFRIGERANT LIQUID LINE	SWHX	STEAM TO WATER HEAT EXCHANGER
RLA	RUN LOAD AMPERE	T & PCV	TEMPERATURE AND PRESSURE CONTROL VALVE
RO	REVERSE OSMOSIS	TAB	TESTING, ADJUSTING, BALANCE
RPM	REVOLUTIONS PER MINUTE	TD	TEMPERATURE DIFFERENCE
RPR	RETURN REGISTER	TDH	TOTAL DYNAMIC HEAD
RS	REFRIGERANT SUCTION	TDS	TOTAL DISSOLVED SOLIDS
RTU	ROOF TOP UNIT	TG	TRANSFER GRILLE
RV	RELIEF VALVE	TP	TRAP
		TR	TOP REGISTER
		TSP	TOTAL STATIC PRESSURE
		TSTAT	THERMOSTAT
		TU	TERMINAL UNIT
		TWU	THRU-WALL UNIT

ABBREVIATIONS

UC	UNDER CUT	W	WATTS
UC	UNIT COOLER	WAG	WASTE ANESTHESIA GAS
UH	UNIT HEATER	Wb	WET-BULB (TEMPERATURE)
UL	UNDERWRITERS LABORATORY	WC	WATER COOLED
URV	UPBLAST UNIT VENTILATOR	WCCH	WATER COOLED CHILLER
V	VALVE	WCHP	WATER COOLED CONDENSING UNIT
VAF	VANE-AXIAL FAN	WCHP	WATER COOLED HEAT PUMPS
VAV	VARIABLE AIR VOLUME	WCPU	WATER COOLED PACKAGED UNIT
VD	VOLUME DAMPER (MANUAL OPPOSED BLADE)	WEF	WALL EXHAUST FAN
VFD	VARIABLE FREQUENCY DRIVE	WF	WATER FILTER
VHA	VETERANS HEALTH ADMINISTRATION	WFCV	WATER FLOW CONTROL VALVE
VI	VIBRATION ISOLATOR	WFM	WATER FLOW METER
VIV	VARIABLE INLET VANES	WFMD	WATER FLOW MEASURING DEVICE
VP	VACUUM PUMP	WG	WATER GAGE
VPS	VARIABLE PRIMARY SYSTEM	WPD	WATER SIDE PRESSURE DROP
VR	VACUUM (STEAM CONDENSATE) RETURN	YR	YEAR
VSD	VARIABLE SPEED DRIVE		
VUH	VERTICAL UNIT HEATER		

MECHANICAL SHEET INDEX

MM001	MECHANICAL COVER SHEET
MM002	MECHANICAL COVER SHEET
MD101	HVAC DEMOLITION PLAN - FIRST FLOOR
MH101	HVAC FLOOR PLANS
M-501	MECHANICAL DETAILS
M-502	MECHANICAL DETAILS
M-511	MECHANICAL CONTROL DIAGRAMS
M-601	MECHANICAL SCHEDULES

GENERAL NOTES

- ALL PIPING IN FINISHED ROOMS OR SPACES SHALL BE CONCEALED IN A FURRED CHASE OR ABOVE THE HARD SUSPENDED CEILING.
- THE FIRST FIGURE OF DUCT SIZE INDICATES DIMENSION OF FACE SHOWN OR INDICATED. DUCT SIZES ARE NET INSIDE DIMENSIONS.
- ACCESS PANELS IN HARD SUSPENDED CEILINGS ARE REQUIRED FOR ALL VALVES, TRAPS, DAMPERS, CLEANOUTS, CONTROLS, ETC. ACCESS PANELS SHALL BE FURNISHED AND INSTALLED UNDER THE ARCHITECTURAL SPECIFICATIONS.
- TOTAL STATIC PRESSURE NOTED IN THE SCHEDULES INCLUDES DUCT SYSTEM, TERMINAL UNITS, FILTERS, COILS, ETC.
- FOR TYPICAL STEAM AND WATER PIPING CONNECTIONS TO EQUIPMENT, SEE STANDARD EQUIPMENT DETAILS.
- DIFFUSER, REGISTER, AND GRILLE SIZES SHOWN ON FLOOR PLANS ARE NECK SIZES.
- WATER PIPE CONNECTIONS TO AIR HEATING AND COOLING COILS SHALL BE MADE TO PROVIDE COUNTER FLOW BETWEEN WATER AND AIR.
- REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATIONS OF CEILING DIFFUSERS, REGISTERS, AND GRILLES.
- SEISMIC PROVISIONS - SEE SPECS. ALL PRESSURES LISTED ARE GAGE PRESSURE UNLESS OTHERWISE NOTED.
- SIZES OF ALL HWS & HWR RUNOUTS TO TERMINAL UNITS CAN BE FOUND ON THE EQUIPMENT SCHEDULES.
- THIS CONTRACTOR IS RESPONSIBLE FOR SUBMITTING FULL COORDINATION AND LAYOUT DRAWINGS PER SPECIFICATIONS SECTION 230511, 1.4 (G). COORDINATION SHOULD BE COMPLETED WITH ALL TRADES INCLUDED. CONSTRUCTION SHALL NOT BEGIN UNTIL COORDINATION DRAWINGS HAVE BEEN REVIEWED BY THE ENGINEER AND COR.**
- TAB CONTRACTOR SHALL BALANCE EXISTING GRILLES USING AIRFLOWS DETERMINED IN TAB PRE-BALANCE REPORT (SEE DEMO DRAWINGS).

SEISMIC BRACING NOTES

SOME MECHANICAL AND PLUMBING COMPONENTS OF THIS BUILDING REQUIRE SEISMIC BRACING. IT IS THE RESPONSIBILITY OF THIS CONTRACTOR AND THE GC TO ENGAGE A SEISMIC DESIGN ENGINEER TO DETERMINE AND DESIGN THE REQUIRED BRACING FOR EACH SYSTEM.

SYSTEMS REQUIRING BRACING INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

- ALL LIFE-SAFETY COMPONENTS INCLUDING FIRE PROTECTION SYSTEMS.
- COMPONENTS WEIGHING MORE THAN 400 POUNDS.
- COMPONENTS WITH A CENTER OF MASS GREATER THAN 4 FEET ABOVE FLOOR LEVEL AND WEIGHING MORE THAN 20 POUNDS. (E.G. TERMINAL UNITS).
- DISTRIBUTION SYSTEMS WEIGHING MORE THAN 5 POUNDS PER FOOT. (E.G. 12x12, 22 GAUGE, SHEET STEEL DUCTWORK AND CHILLED, HEATING, DOMESTIC, HOT, AND DOMESTIC COLD WATER PIPING LARGER THAN 1 1/2".

FLEXIBLE CONNECTIONS ARE REQUIRED BETWEEN ALL COMPONENTS AND ASSOCIATED DUCTWORK, PIPING, AND CONDUITS.

THE FOLLOWING COMPONENTS ARE NOT REQUIRED TO BE BRACED:

- PLUMBING FIXTURES

THE CONTRACTOR SHALL PROVIDE ALL COMPONENT SUBMITTALS WITH COMPONENT WEIGHTS TO SEISMIC DESIGN ENGINEER FOR USE IN BRACING DESIGN.

BRACING SHALL BE DESIGNED TO MEET ASCE7 AND NFPA 13 BRACING REQUIREMENTS. REFER TO ASCE7 CHAPTER 13 FOR MORE INFORMATION ON SYSTEMS REQUIRED TO BE BRACED.

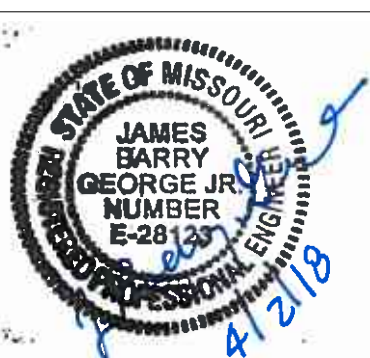
CONSULTANTS:

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ARCHITECT/ENGINEERS:

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**PEC**  
PROFESSIONAL ENGINEERING CONSULTANTS, P.A.



Drawing Title

MECHANICAL COVER SHEET

Approved: Project Director

Project Title

RENOVATE MAIN LOBBY

Location

Columbia, Missouri

Date

04/03/2018

Checked

BOH

Drawn

AR

Project Number

589-334

Building Number

Drawing Number

MM001

Dwg.

Office of  
Construction  
and Facilities  
Management



Department of  
Veterans Affairs



PIPING SYMBOLS

FWD	FEEDWATER PUMP DISCHARGE
FWS	FEEDWATER PUMP SUCTION
CTPD	CONDENSATE TRANSFER PUMP DISCHARGE
CTPS	CONDENSATE TRANSFER PUMP SUCTION
VR	VACUUM CONDENSATE RETURN
TC	TUBE CLEANER WATER SUPPLY
BO	BOILER BLOWOFF
CBD	CONTINUOUS BLOWDOWN
BWS	BOILER WATER SAMPLE
FWS	FEEDWATER SAMPLE (FROM DEAERATOR)
CF	CHEMICAL FEED
OEL	OVERFLOW
A	COMPRESSED AIR
G	NATURAL GAS MAIN FUEL
GE	NATURAL GAS IGNITER FUEL
LPGL	LIQUEFIED PETROLEUM GAS IGNITER FUEL
FOS	FUEL OIL SUPPLY
FOR	FUEL OIL RETURN
CW	COLD WATER (CITY WATER)
SW	SOFTENED WATER
HW	HOT WATER
RH	ROLLER-TYPE HANGER
SH	VARIABLE SPRING-TYPE HANGER (TYPE 51)*
SCH	SPRING CUSHION-TYPE HANGER (TYPE 48 OR 49)*
TH	CLEVIS-TYPE HANGER
PS	TRAPEZE HANGER (PROVIDE U-BOLT PIPE ATTACHMENT TO TRAPEZE EXCEPT WHERE RH ARE INDICATED)
RC	FLOOR-SUPPORTED PIPE STAND
RS	RISER CLAMP (TYPE 42)*
WB	WALL BRACKET (TYPE 31, 32, 33)*
CSH	CONSTANT SUPPORT HANGER (TYPE 54, 55, 56)*
SS	SLIDING SUPPORTS (TYPE 35)*

\* TYPE NUMBERS REFER TO MANUFACTURER'S STANDARDIZATION SOCIETY STANDARD PRACTICE SP-58

PIPING SYMBOLS

HPS	HIGH PRESSURE STEAM (60 PSIG AND ABOVE)
HPR	HIGH PRESSURE STEAM CONDENSATE RETURN
MPS	MEDIUM PRESSURE STEAM (16 PSIG THRU 59 PSIG)
MPR	MEDIUM PRESSURE STEAM CONDENSATE RETURN
LPS	LOW PRESSURE STEAM (15 PSIG AND BELOW)
LPR	LOW PRESSURE STEAM CONDENSATE RETURN
PC	CONDENSATE PUMP DISCHARGE
HWS	HOT WATER HEATING SUPPLY
HWR	HOT WATER HEATING RETURN
GHWS	GLYCOL-WATER HEATING SUPPLY
GHWR	GLYCOL-WATER HEATING RETURN
SWWS	SOLAR WATER SUPPLY
SWWR	SOLAR WATER RETURN
RL	REFRIGERANT LIQUID
RS	REFRIGERANT SUCTION
RHG	REFRIGERANT HOT GAS
CWS	CONDENSER WATER SUPPLY (FROM TOWER)
CWR	CONDENSER WATER RETURN (TO TOWER)
CHWS	CHILLED WATER SUPPLY
CHWR	CHILLED WATER RETURN
GCS	CHILLED GLYCOL-WATER SUPPLY
GCSR	CHILLED GLYCOL-WATER RETURN
MW	MAKE-UP WATER
D	DRAIN LINE
V	VENT LINE
GRS	GLYCOL-WATER RUN AROUND SUPPLY
GRR	GLYCOL-WATER RUN AROUND RETURN
X	EXISTING PIPE TO BE REMOVED

GENERAL PIPING SYMBOLS

	DIRECTION OF PIPE PITCH (DOWN)
	DIRECTION OF FLOW
	ANCHOR
	REDUCER OR INCREASER
	ECCENTRIC REDUCER
	TOP CONNECTION, 45° OR 90°
	BOTTOM CONNECTION, 45° OR 90°
	SIDE CONNECTION
	CAPPED OUTLET
	RISE OR DROP IN PIPE
	UNION
	PIPE UP
	PIPE DOWN
	INVERTED BUCKET TRAP SET INCLUDING PIPING ACCESSORIES SEE DETAIL
	FLOAT & THERMOSTATIC TRAP SET INCLUDING PIPING ACCESSORIES SEE DETAIL
	THERMOSTATIC TRAP SET INCLUDING PIPING ACCESSORIES SEE DETAIL
	THERMOMETER
	PRESSURE GAGE
	FLOW ELEMENT
	REFRIGERANT SIGHT GLASS
	TEST PLUG (PRESSURE/TEMPERATURE)
	VENT LINE
	AUTOMATIC AIR VENT
	MANUAL AIR VENT
	QUICK-COUPLE HOSE CONNECTOR
	FIRE PROTECTION RISER LOCATION

VALVE SYMBOLS

	GATE VALVE - THREADED/FLANGED
	GLOBE VALVE - THREADED/FLANGED
	GATE VALVE WITH 3/4" HOSE ADAPTER
	CHECK VALVE
	WYE STRAINER (WITH BALL VALVE & HOSE CONNECTION)
	WYE STRAINER WITH VALVED DRAIN AND QUICK-COUPLE HOSE CONNECTOR
	FLEXIBLE CONNECTION
	ANGLE GLOBE VALVE
	BUTTERFLY VALVE
	BALL VALVE
	MODULATING CONTROL VALVE
	MODULATING CONTROL BUTTERFLY VALVE
	TWO POSITION CONTROL VALVE
	THREE-WAY MODULATING CONTROL VALVE
	THREE-WAY TWO POSITION CONTROL VALVE
	PRESSURE REGULATING VALVE
	PRESSURE SAFETY VALVE
	AUTOMATIC BALANCING CONTROL VALVE
	WATER BALANCE DEVICE
	CIRCUIT SETTER VALVE
	GATE VALVE WITH GLOBE-VALVED BYPASS
	PLUG VALVE
	CONTROL VALVE (CV) - FLOAT-OPERATED
	PRESSURE REDUCING VALVE (PRV)
	WATER LEVEL CONTROLLER
	FLOW METER

DRAWING SYMBOLS

	DETAIL NUMBER
	DRAWING NUMBER WHERE DRAWN
	SECTION LETTER
	DRAWING NUMBER WHERE SHOWN
	BUILDING NO. WHERE EQUIPMENT IS LOCATED.
	EQUIPMENT ABBREVIATION (SUPPLY FAN)
	SUPPLY FAN NO. 3 IN BUILDING NO. 26
	TYPICAL UNIT NO.
	BUILDING NO. WHERE EQUIPMENT IS LOCATED
	ITEM (TERMINAL UNIT SHOWN)
	ITEM NUMBER (TERMINAL UNIT NO. 1)
	SERVED BY AIR HANDLER UNIT NO. 1

AIR TERMINAL SYMBOLS

	TERMINAL UNIT WITH REHEAT COIL
	DOUBLE DUCT MIXING BOX.
	FAN POWERED VARIABLE VOLUME TERMINAL UNIT WITH HEATING COIL.

DUCTWORK SYMBOLS

	FLEXIBLE CONNECTION, EQUIPMENT, VIBRATION, OR SEISMIC
	VANED ELBOW (PROVIDE ALL SQUARE OR RECTANGULAR ELBOWS WITH VANES EVEN IF SYMBOL IS MISSING)
	VANED ELBOW (SHORT RADIUS)
	STANDARD RADIUS ELBOW (LONG RADIUS)
	NEW DUCT (INSIDE DIMENSIONS: WIDTH x DEPTH)
	EXISTING DUCT TO REMAIN
	EXISTING DUCT TO BE REMOVED
	LOUVER (LOUVER SPECIFIED IN ARCHITECTURAL SECTION.)
	FLEXIBLE DUCTWORK (INSULATED)
	DUCT WITH SOUND LINING
	MANUAL VOLUME DAMPER
	FIRE DAMPER
	BACK DRAFT DAMPER

DUCTWORK SYMBOLS

	COMBINATION FIRE/SMOKE DAMPER
	POINT OF CHANGE IN DUCT CONSTRUCTION BY STATIC PRESSURE CLASS. THE NUMBER ASSIGNS PRESSURE CLASS (IN. OF WATER) WHICH WILL ACCOMMODATE MAXIMUM OPERATING PRESSURE IN THE DUCT SUBSECTION. THE SYMBOL CONTINUES THE ASSIGNMENT UNTIL THE DUCT TERMINATES OR ANOTHER SYMBOL APPEARS. A "N" SUPERScript INDICATES NEGATIVE PRESSURE.
	AUTOMATIC CONTROL DAMPER MODULATING
	AUTOMATIC CONTROL DAMPER TWO POSITION
	STAINLESS STEEL DUCT
	MANUAL SPLITTER DAMPER
	STANDARD BRANCH SUPPLY OR RETURN, NO SPLITTER (45° TAP)
	DUCT MOUNTED COIL (HOT WATER OR STEAM COIL)
	DUCT MOUNTED COIL (ELECTRIC)

TERMINAL UNIT SYMBOLS

	CONVECTOR OR RADIATOR (RECESSED)
	CONVECTOR OR RADIATOR (WALL HUNG)
	FLOOR MOUNTED VERTICAL RECESSED FAN COIL UNIT. LETTER INDICATES UNIT SIZE.
	FLOOR MOUNTED VERTICAL CABINET FAN COIL UNIT. LETTER INDICATES UNIT SIZE.
	THRU WALL AIR CONDITIONING UNIT. LETTER INDICATES UNIT SIZE.
	WINDOW TYPE AIR CONDITIONING UNIT. LETTER INDICATES UNIT SIZE.
	FLOOR MOUNTED HEAT PUMP. LETTER INDICATES UNIT SIZE.
	AIR CURTAIN
	UNIT HEATER (HORIZONTAL)
	UNIT HEATER (VERTICAL)
	2x2' RADIANT CEILING PANEL
	2x4' RADIANT CEILING PANEL

DUCTWORK SYMBOLS

	SUPPLY DUCT (UP & DOWN)
	EXHAUST DUCT (UP & DOWN)
	RETURN DUCT (UP & DOWN)
	ROUND AND SQUARE 4-WAY CEILING DIFFUSERS
	SQUARE 3-WAY CEILING DIFFUSERS
	SQUARE 2-WAY CEILING DIFFUSERS
	SQUARE 1-WAY CEILING DIFFUSERS
	LINEAR SLOT DIFFUSER
	SUPPLY TOP REGISTER OR GRILLE (WALL TYPE)
	EXHAUST OR RETURN CEILING REGISTER OR GRILLE (WALL TYPE)
	EXHAUST OR RETURN BOTTOM REGISTER OR GRILLE (WALL TYPE)
	EXHAUST OR RETURN REGISTER OR TOP GRILLE (WALL TYPE)
	VANED ELBOW & AIR SPLIT TYPE DUCT TAKE-OFF
	CONNECT NEW DUCT TO EXISTING DUCT
	INCLINED RISE, IN DIRECTION OF AIR FLOW
	INCLINED DROP, IN DIRECTION OF AIR FLOW
	LIMIT OF DEMOLITION

CONSULTANTS:

-

ARCHITECT/ENGINEERS:



Drawing Title

MECHANICAL COVER SHEET

Approved: Project Director

Project Title

RENOVATE MAIN LOBBY

Location

Columbia, Missouri

Date

04/03/2018

Checked

BOH

Drawn

AR

Project Number

589-334

Building Number

Drawing Number

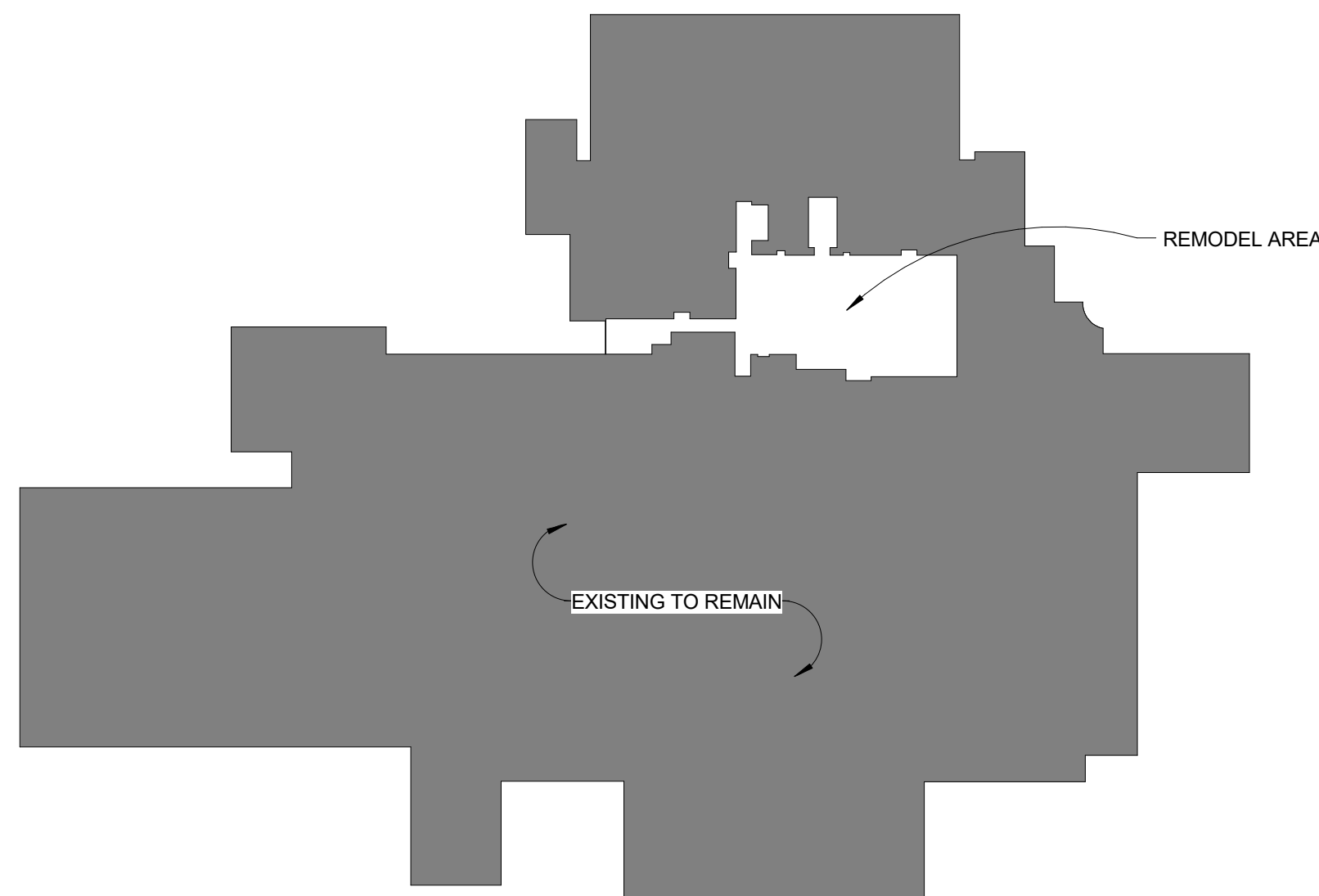
MM002

Dwg.

Office of  
Construction  
and Facilities  
Management







## GENERAL NOTES

- ## # DEMOLITION PLAN NOTES

1. REMOVE EXISTING DIFFUSERS/GRILLES.
2. REMOVE EXISTING DUCTWORK.
3. REMOVE EXISTING TERMINAL UNIT. DISCONNECT EXISTING HWS/HWR PIPING FROM TERMINAL BOX BEING REMOVED. LEAVE FOR CONNECTION TO NEW BOX. REMOVE EXISTING THERMOSTAT AND CONTROL WIRING ASSOCIATED WITH TERMINAL UNIT TO BE REMOVED.
4. REMOVE EXISTING DUCT BACK TO EXISTING BRANCH/MAIN CONNECTION.

① HVAC DEMOLITION PLAN - FIRST FLOOR  
1/8" = 1'-0"

N  
KEY PLAN LEVEL 1  
1" = 80'-0"

CONSULTANTS:



ARCHITECTURE



Drawing Title

## HVAC DEMOLITION PLAN - FIRST FLOOR

Approved: Project Director

Project Title

## RENOVATE MAIN LOBBY

Project Number

589-334

Building Number

Location

Columbia, Missouri

Date
------

04/03/2018

☐ Checked

BOH

Drawn

AR

Drawing Number

215

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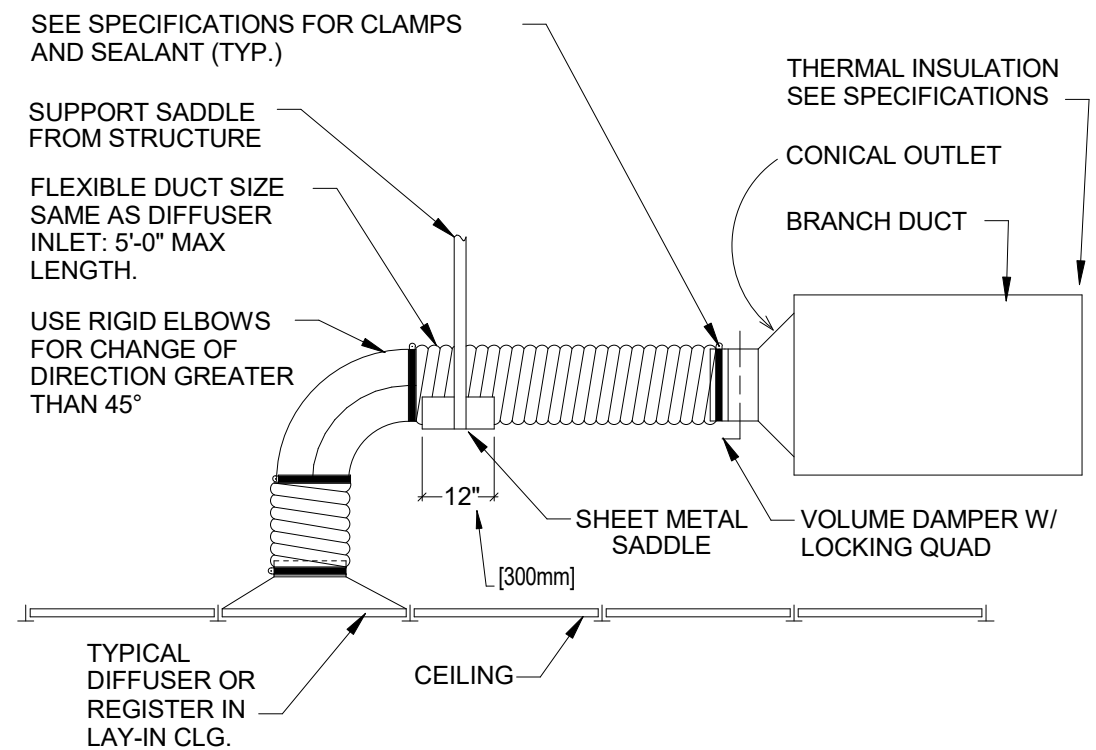


## **GENERAL NOTES**

1. ALL PIPING IN FINISHED ROOMS OR SPACES SHALL BE CONCEALED IN A FURRED CHASE OR ABOVE THE HARD SUSPENDED CEILING.
2. THE FIRST FIGURE OF DUCT SIZE INDICATES DIMENSION OF FACE SHOWN OR INDICATED. DUCT SIZES ARE NET INSIDE DIMENSIONS.
3. ACCESS PANELS IN HARD SUSPENDED CEILINGS ARE REQUIRED FOR ALL VALVES, TRAPS, DAMPERS, CLEANOUTS, CONTROLS, ETC. ACCESS PANELS SHALL BE FURNISHED AND INSTALLED UNDER THE ARCHITECTURAL SPECIFICATIONS.
4. TOTAL STATIC PRESSURE NOTED IN THE SCHEDULES INCLUDES DUCT SYSTEM, TERMINAL UNITS, FILTERS, COILS, ETC.
5. FOR TYPICAL STEAM AND WATER PIPING CONNECTIONS TO EQUIPMENT, SEE STANDARD EQUIPMENT DETAILS.
6. DIFFUSER, REGISTER, AND GRILLE SIZES SHOWN ON FLOOR PLANS ARE STOCK SIZE.
7. WATER PIPE CONNECTIONS TO AIR HEATING AND COOLING COILS SHALL BE MADE TO PROVIDE COUNTER FLOW BETWEEN WATER AND AIR.
8. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATIONS OF CEILING DIFFUSERS, REGISTERS, AND GRILLES.
9. SEISMIC PROVISIONS - SEE SPECS. ALL PRESSURES LISTED ARE GAGE PRESSURE UNLESS OTHERWISE NOTED.
10. SIZES OF ALL HWS & HWR RUNOUTS TO TERMINAL UNITS CAN BE FOUND ON THE EQUIPMENT SCHEDULES.
11. **THIS CONTRACTOR IS RESPONSIBLE FOR SUBMITTING FULL COORDINATION AND LAYOUT DRAWINGS PER SPECIFICATIONS SECTION 230511, 1.4 (G). COORDINATION MUST BE COMPLETED WITH ALL TRADES INCLUDED. CONSTRUCTION SHALL NOT BEGIN UNTIL COORDINATION DRAWINGS HAVE BEEN REVIEWED BY THE ENGINEER AND COI.**
12. TAB CONTRACTOR SHALL BALANCE EXISTING GRILLES USING AIRFLOWS DETERMINED IN TAB PRE-BALANCE REPORT (SEE DEMO DRAWINGS).

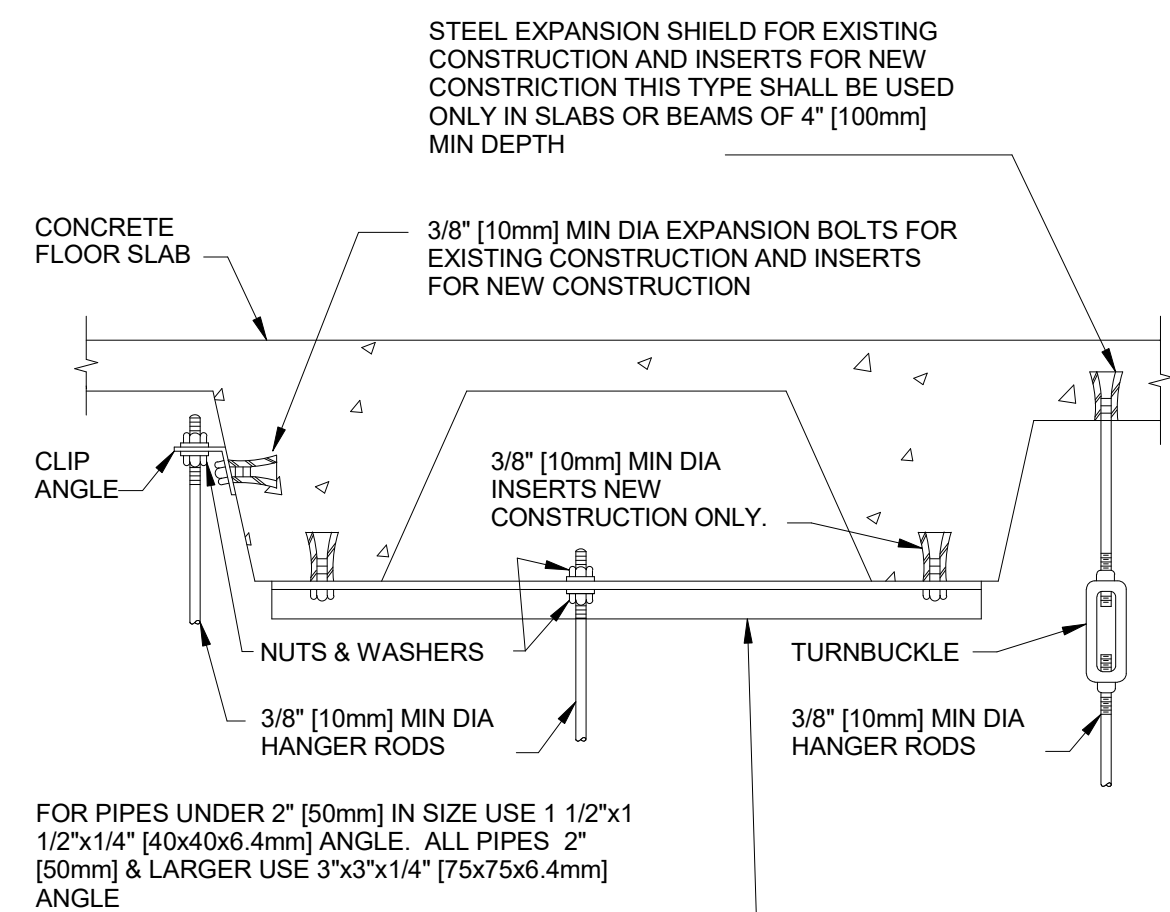
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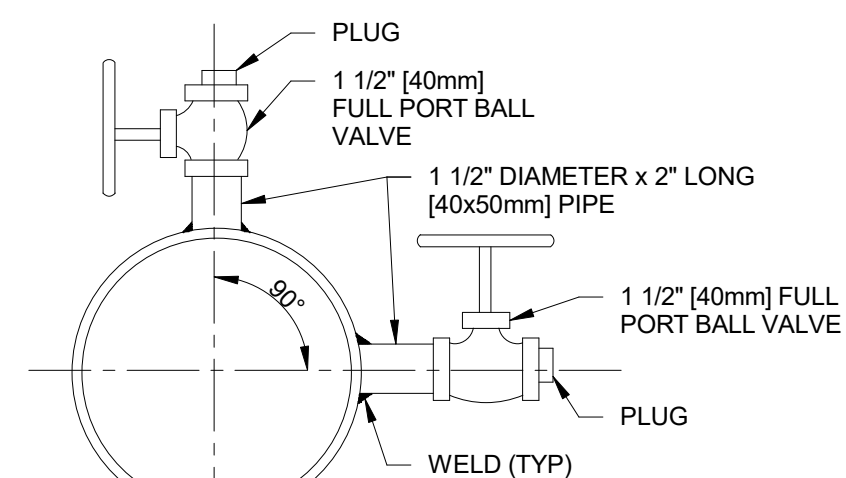
## FLEXIBLE AIR DUCT CONNECTOR

NTS



## SECURING HANGER RODS IN CONCRETE

NTS



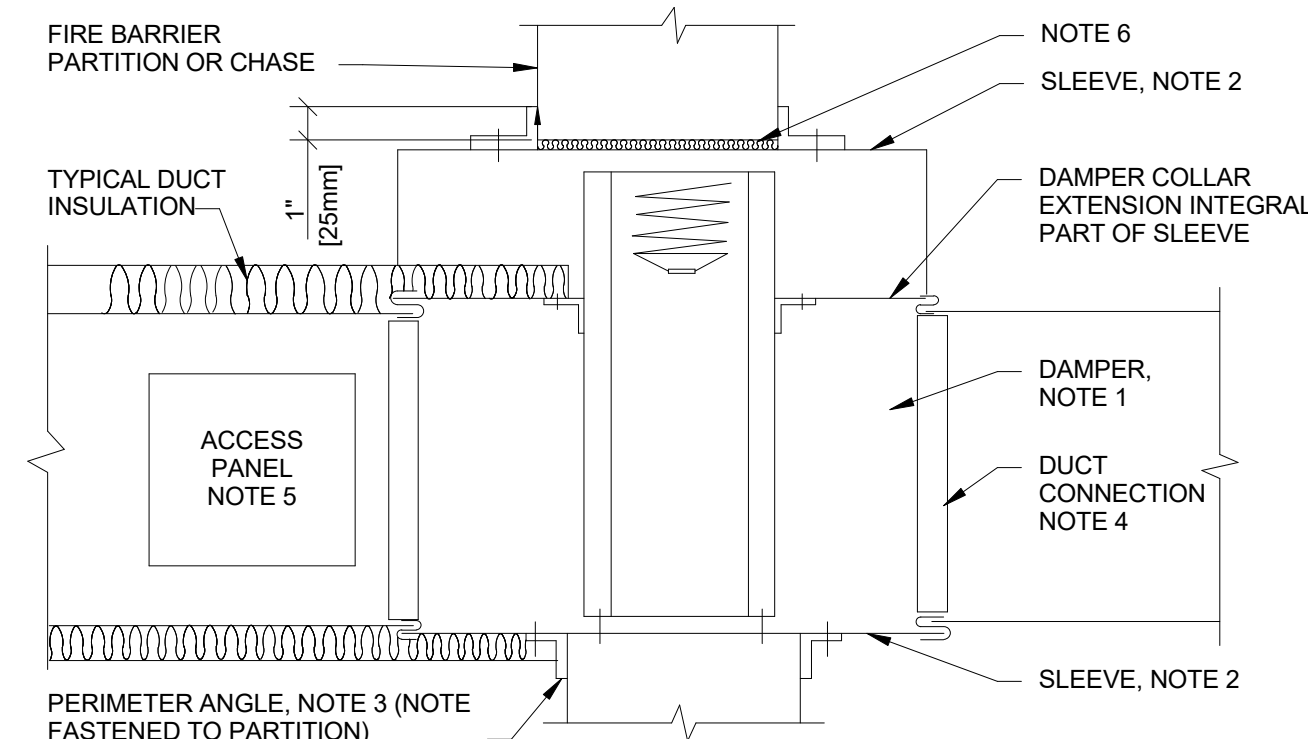
NOTE:

1. PROVIDE IN CHILLED WATER MAIN AND IN CONDENSER WATER MAIN.
2. LOCATE PILOT TUBE TAPS 20 PIPE DIAMETERS DOWNSTREAM AND 10 PIPE DIAMETERS UPSTREAM FROM THE NEAREST PIPE FITTING.

EITHER TOP OR SIDE LOCATION. BOTH ARE NOT REQUIRED AT SAME LOCATION.

## PITOT TEST CONNECTIONS

NTS

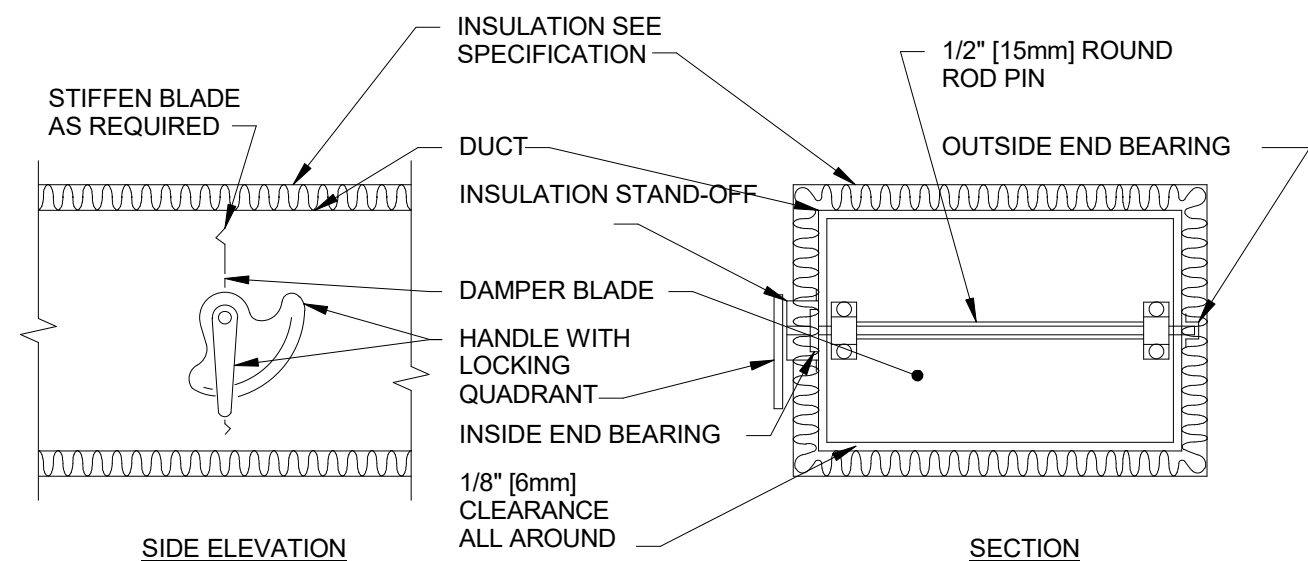


NOTE:

1. A VERTICAL DAMPER IS SHOWN. HORIZONTAL DAMPER INSTALLATION, IS SIMILAR. FOLLOW DAMPER MANUFACTURER'S INSTRUCTIONS, INCLUDING FASTENER OPTIONS AND GAGES FOR SLEEVE AND PERIMETER ANGLES. FIRE DAMPERS MUST BE INSTALLED IN THE PARTITION OR FLOOR AND NOT OUTSIDE THE PENETRATION.
2. GALVANIZED SLEEVE: GAGE NOT LESS THAN CONNECTING DUCT. FASTEN SLEEVE TO DAMPER FRAME AND TO PERIMETER ANGLES.
3. PERIMETER ANGLES: GALVANIZED STEEL, NOT LESS THAN 1 1/2"x1 1/2" [40x40mm], 14 GAGE, TO PROVIDE 1" [25mm] MINIMUM OVERLAP OF OPENING ON ALL 4 SIDES.
4. BREAKAWAY DUCT CONNECTION: CONTRACTOR'S OPTION OF TYPES SHOWN IN SMACNA. ACCESS PANELS: SIZE AND LOCATION TO PERMIT SERVICING THE FUSIBLE LINK OR LINKS.

## SECTION THRU FIRE DAMPER INSTALLATION

NTS

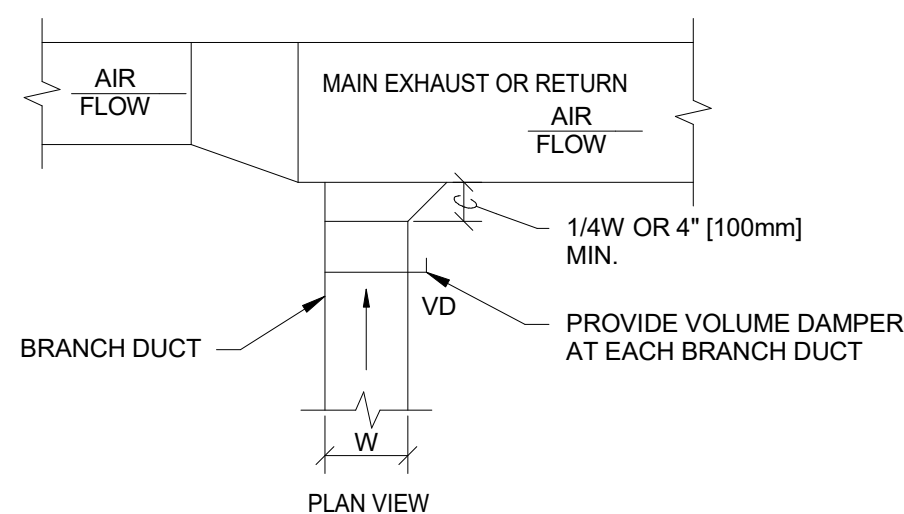


NOTE:

1. DELETE INSULATION STAND-OFF ON DUCTWORK WITHOUT EXTERIOR INSULATION.
2. DETAIL SHOWS SINGLE BLADE DAMPER. DAMPER INSTALLATION SHALL BE SIMILAR FOR MULTI-BLADE DAMPERS & ROUND DAMPERS.

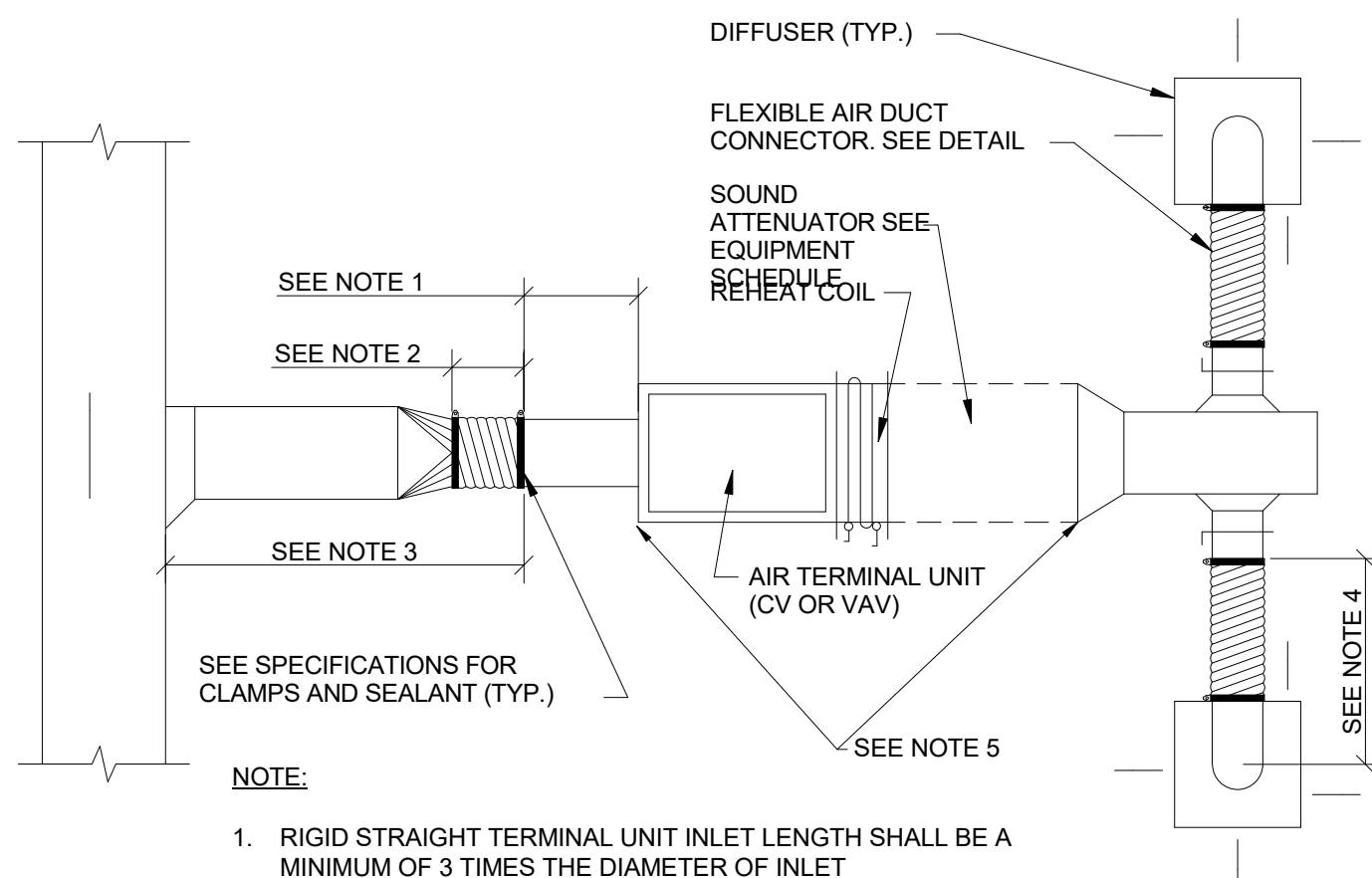
## VOLUME DAMPER DETAIL

NTS



## EXHAUST OR RETURN BRANCH DUCTWORK

NTS



NOTE:

1. RIGID STRAIGHT TERMINAL UNIT INLET LENGTH SHALL BE A MINIMUM OF 3 TIMES THE DIAMETER OF INLET
2. A FLEXIBLE AIR DUCT CONNECTOR IS NOT MANDATORY FOR INLET TO THIS BOX, BUT ALLOWED TO ACCOMMODATE MINOR OFFSETS. MAXIMUM LENGTH 3'-0" [900mm].
3. A BRANCH DUCT SERVING AN INDIVIDUAL BOX MAY BE THE SAME SIZE AS THE BOX INLET, PROVIDED THE EQUIVALENT LENGTH OF THE BRANCH DUCT, AS SHOWN, DOES NOT EXCEED 10 FEET (3 METERS). FOR LONGER LENGTHS, INCREASE THE DUCT SIZE AND PROVIDE A DUCT TRANSITION TO MAINTAIN THE DUCT STATIC PRESSURE DROP AT OR BELOW 0.2"/100' [1.64Pa/m].

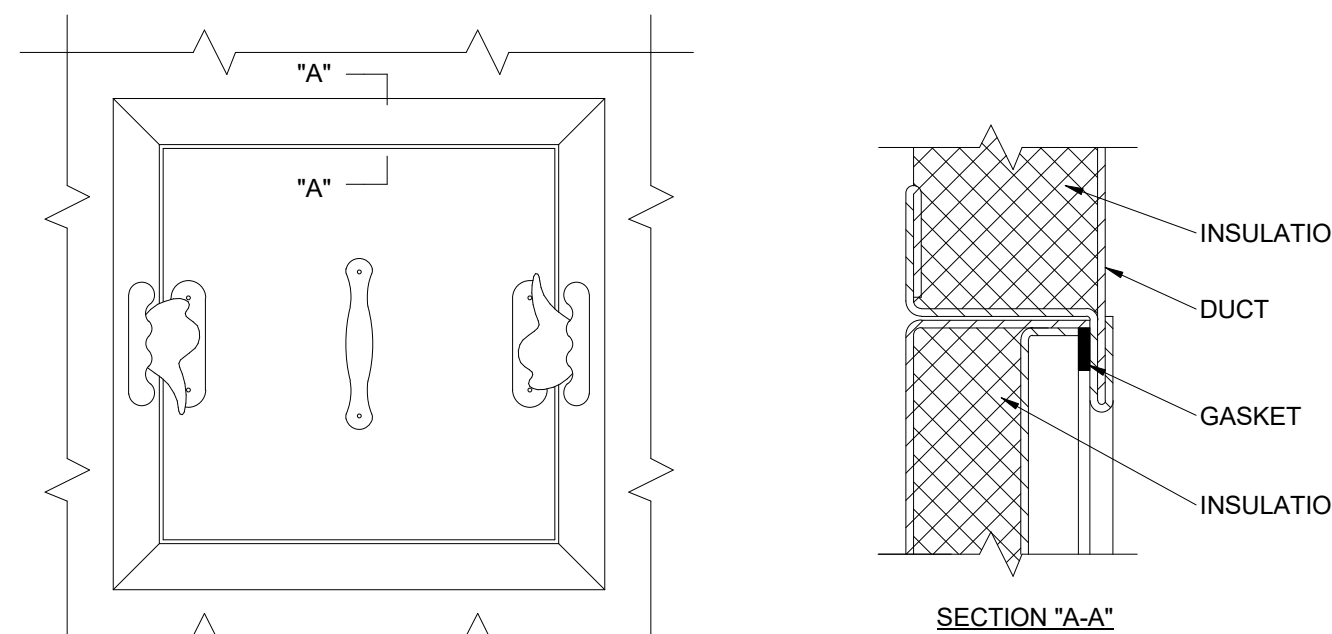
FLEXIBLE AIR DUCT CONNECTORS, WHEN USED FROM TERMINAL UNIT SUPPLY AIR DUCT TO DIFFUSER, SHALL NOT EXCEED 5'-0" [1500mm]. USE RIGID ELBOWS FOR CHANGE OF DIRECTION GREATER THAN 45°.

COMPONENT ARRANGEMENT MAY VARY BY MANUFACTURER. PROVIDE INSULATION W/VAPOR BARRIER FOR CONNECTING DUCT SECTIONS.

USE OF THE FLEXIBLE AIR DUCT CONNECTORS ARE NOT PERMITTED FOR THE DEDICATED AHU SERVING THE SURGICAL SUITE.

## DUCT CONNECTIONS - AIR TERMINAL UNITS

NTS

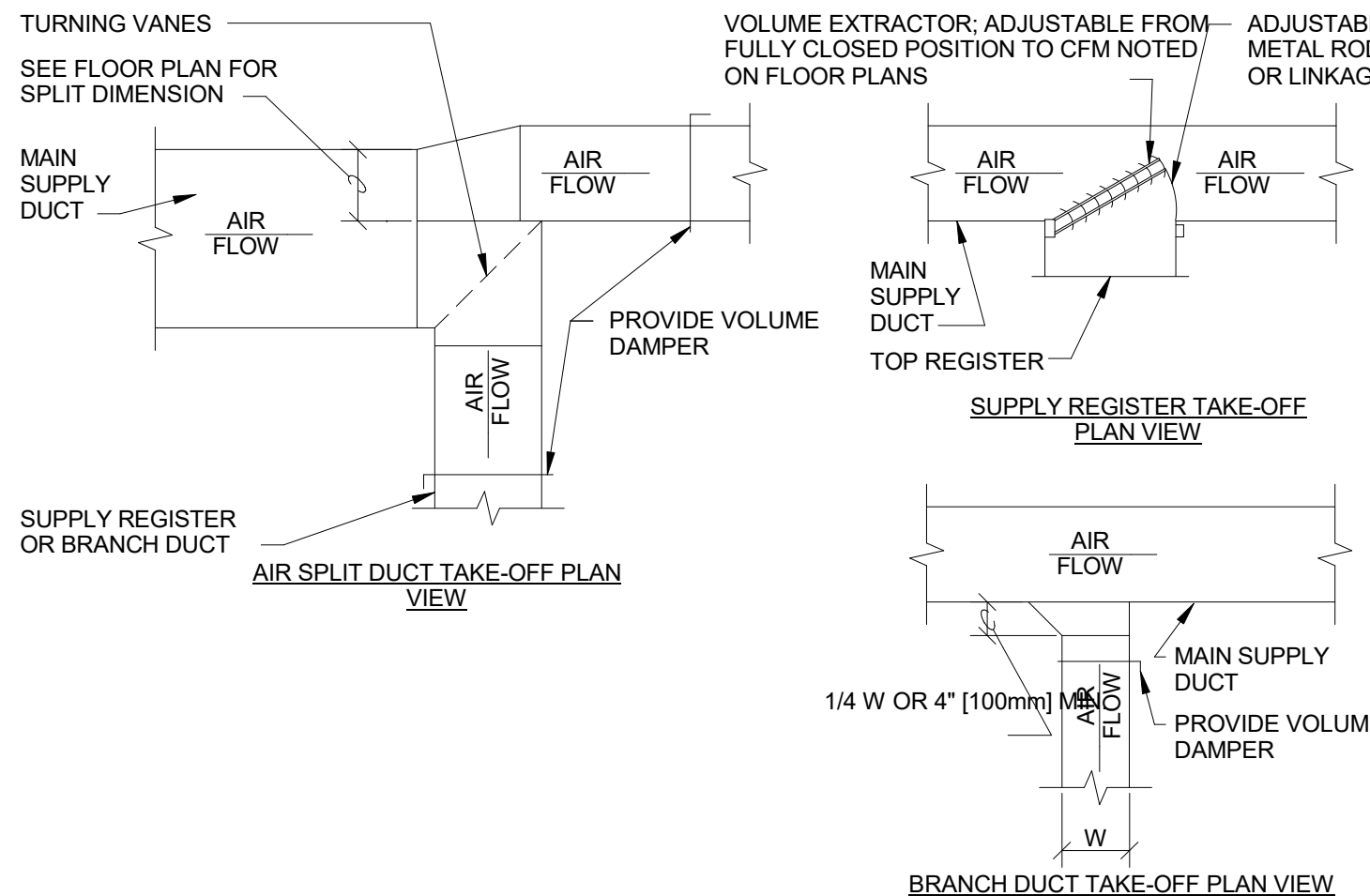


NOTES:

1. LATCHES SHALL BE OF THE WEDGE TYPE TO CLOSE DOORS TIGHTLY.
2. HINGES ON THE ACCESS DOORS SHALL HAVE NON-CORROSIVE PINS.
3. SEE SMACNA 2005, FIGURE 9-15

## ACCESS PANEL AND DOOR DETAIL

NTS



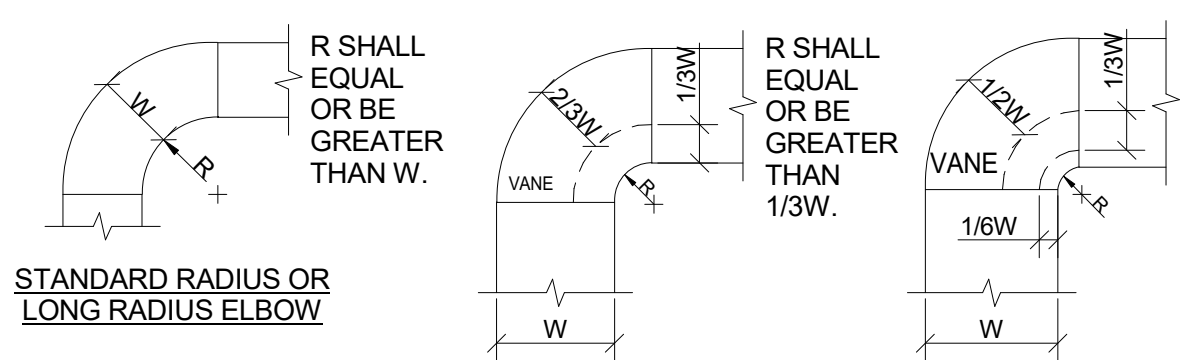
## SUPPLY DUCTWORK TAKE-OFFS

NTS

DESIGNER'S NOTES:

1. THE SUPPLY REGISTER TAKE-OFF MAY BE USED FOR UP TO 25% OF THE MAIN DUCT CFM. THE BRANCH DUCT TAKE-OFF MAY BE USED FOR UP TO 15% OF THE MAIN DUCT CFM ANYTIME AND UP TO 40% WHEN THE MAIN DUCT VELOCITY IS 1000 FPM [5.1 M/S] OR LESS. THE AIR SPLIT DUCT TAKE-OFF SHALL BE USED IN ALL OTHER CASES AND MAY BE USED AT ANYTIME.

2. SHOW ALL VOLUME DAMPERS ON FLOOR PLANS.

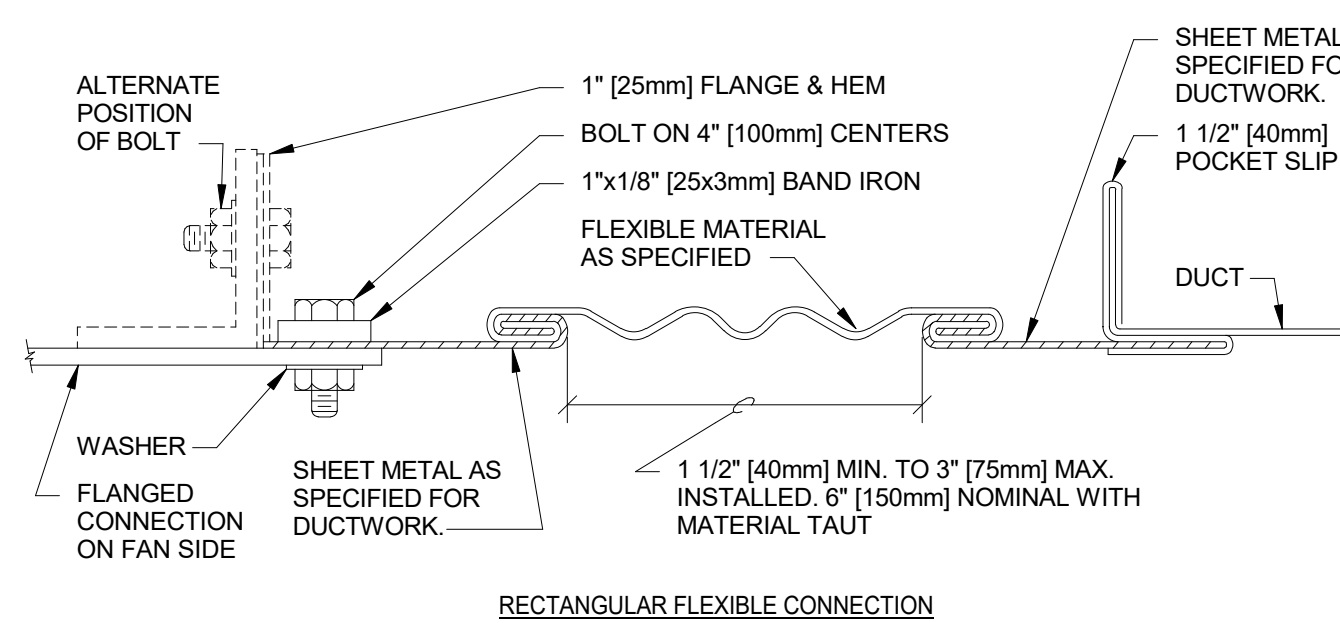


NOTE:

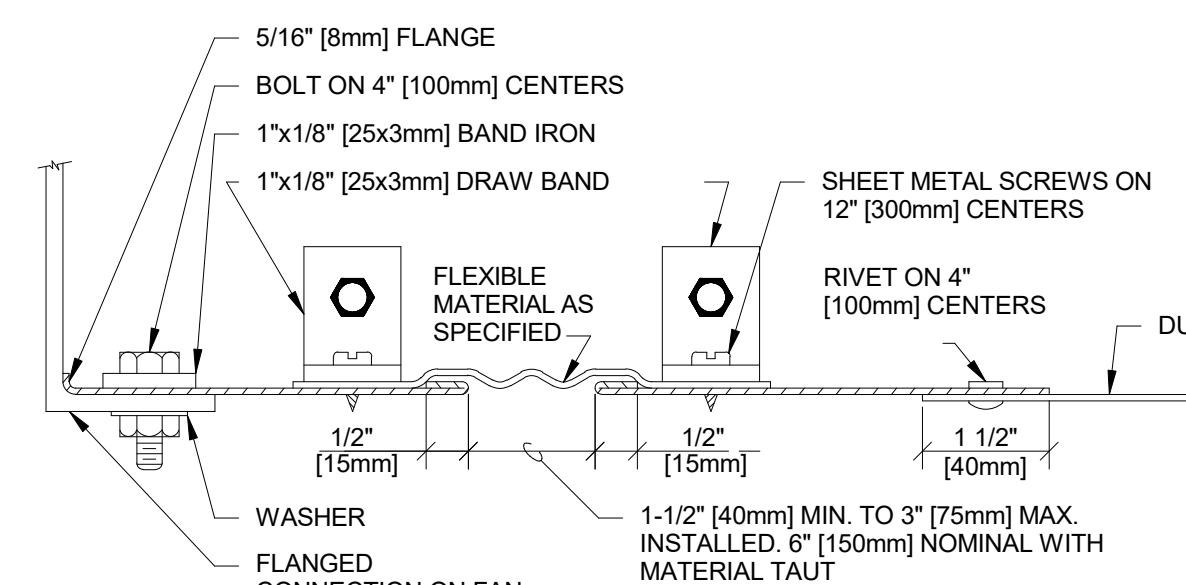
1. THE INTERIOR SURFACE OF ALL RADIUS ELBOWS SHALL BE MADE ROUND.
2. ALL STANDARD RADIUS ELBOWS CAN BE SUBSTITUTED WITH SHORT RADIUS ELBOWS. ALL SHORT RADIUS ELBOWS SHALL HAVE VANES. VANES SHALL BE CONSTRUCTED, SUPPORTED AND FASTENED AS RECOMMENDED BY SMACNA.

## DUCTWORK RADIUS ELBOWS

NTS



RECTANGULAR FLEXIBLE CONNECTION



ROUND FLEXIBLE CONNECTION

## FLEXIBLE DUCT CONNECTIONS

NTS

CONSULTANTS:		ARCHITECT/ENGINEERS:		Drawing Title		Project Title		Project Number		Office of Construction and Facilities Management Department of Veterans Affairs
-		m H E G ARCHITECTURE		MECHANICAL DETAILS		RENOVATE MAIN LOBBY		589-334		
Revisions:		JAMES BARRY GEORGE JR. NUMBER E-28134		Approved: Project Director		Location Columbia, Missouri		Building Number		
Date		4/2/18				Date 04/03/2018		Drawing Number M-501		
								Dwg.		



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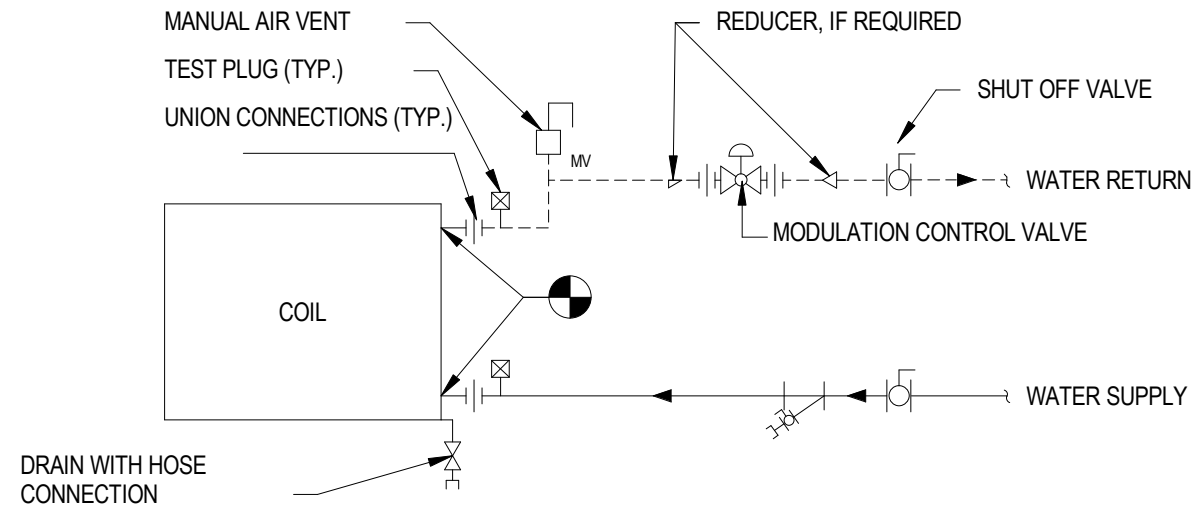
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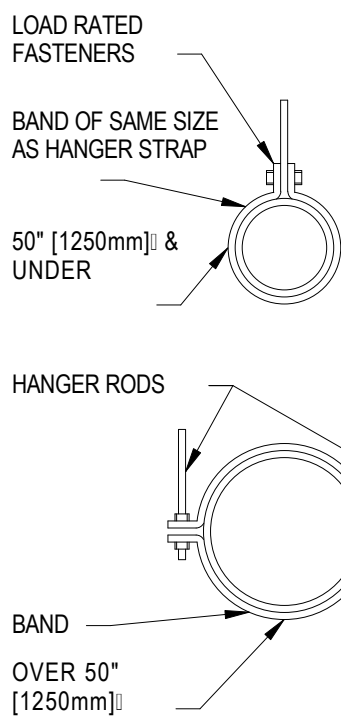
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## 5 TERMINAL UNIT WATER COILS - PIPING CONNECTIONS

NTS

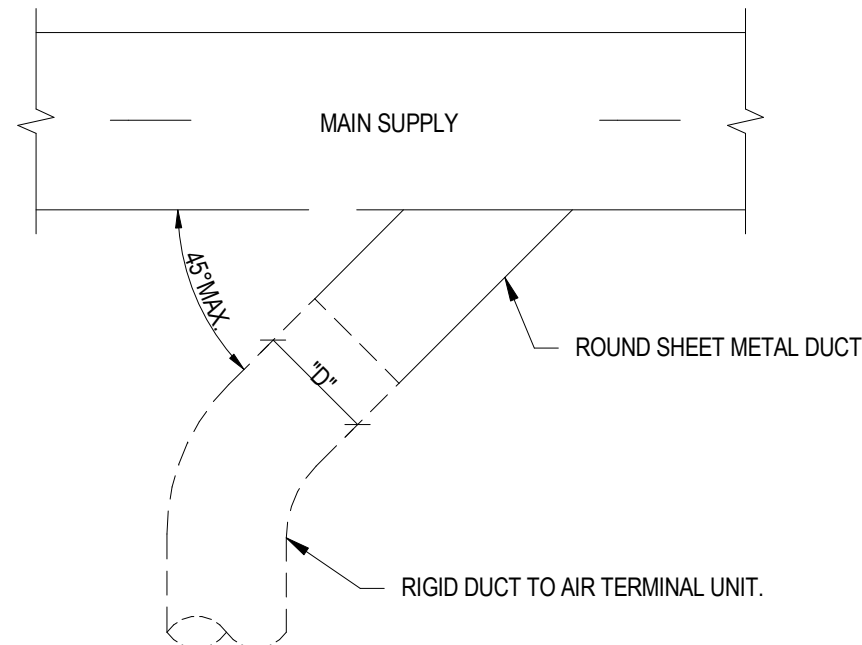


HANGER STRAPS OR RODS			
MAX. DUCT 1 IN. [mm]	QUANTITY/SIZE IN. [mm]	MAX. LOAD LBS. [kg]	MAX. SPACING IN. [mm]
26 [660]	ONE 1 [25] x 22 GA STRAP	260 [119]	144 [3600]
36 [900]	ONE 1 [25] x 16 GA STRAP	420 [190]	144 [3600]
50 [1250]	ONE 1 [25] x 16 GA STRAP	700 [317]	144 [3600]
60 [1500]	TWO 3/8 [10] RODS	1320 [598]	144 [3600]
84 [2100]	TWO 1/2 [13] RODS	2500 [1133]	144 [3600]

NOTE:  
TABULATED DATA FROM SMACNA ALLOWS FOR DUCT REINFORCING AND INSULATION, BUT NO EXTERNAL LOAD.

## 1 ROUND DUCT HANGERS

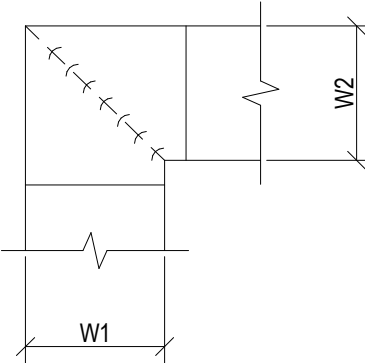
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PLAN VIEW

## 2 SUPPLY DUCT TAKEOFF - AIR TERMINAL UNIT

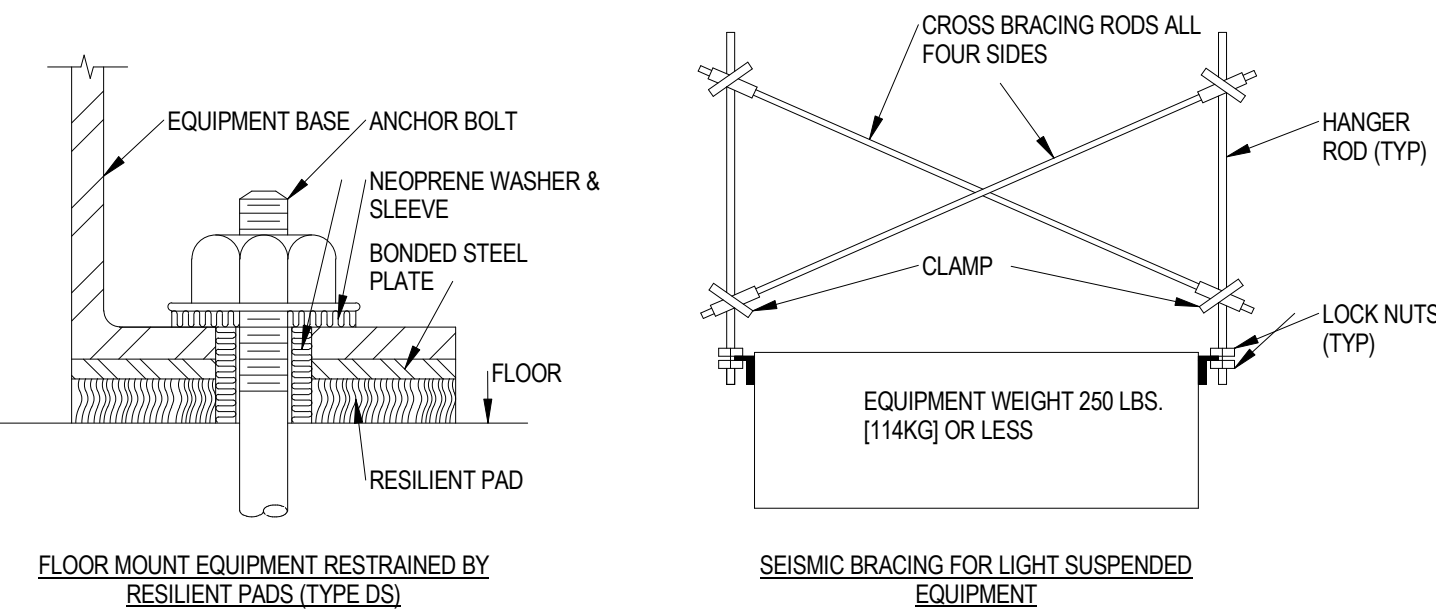
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- NOTE:
- ALL VANE ELBOWS SHALL BE CONSTRUCTED AND INSTALLED AS DETAILED BY SMACNA.
  - WHEN W1 DOES NOT EQUAL W2, VANE SHALL BE SINGLE THICKNESS VANE TYPE REGARDLESS OF W DIMENSION.
  - ALL SINGLE THICKNESS VANES SHALL HAVE A 2" [50mm] RADIUS, 1 1/2" [40mm] MAXIMUM SPACE BETWEEN VANES AND A 3/4" [20mm] TRAILING EDGE.
  - WHEN W EQUALS W2 AND W1 IS GREATER THAN 20" [500mm] VANES SHALL BE DOUBLE VANE TYPE.

## 3 DUCTWORK SQUARE VANE ELBOWS

NTS



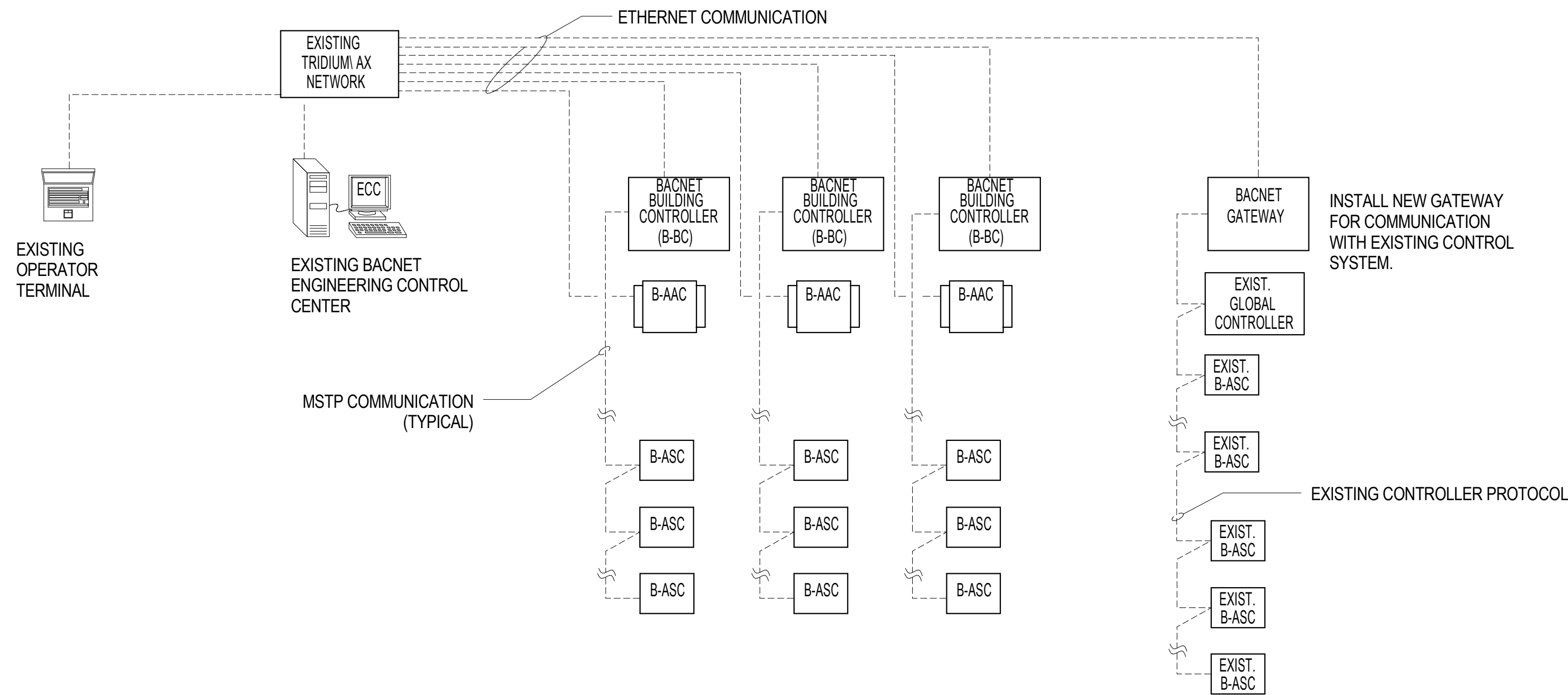
NOTE:  
NOT REQUIRED FOR AIR TERMINAL UNITS.

## 4 SEISMIC BRACING FOR EQUIPMENT

NTS

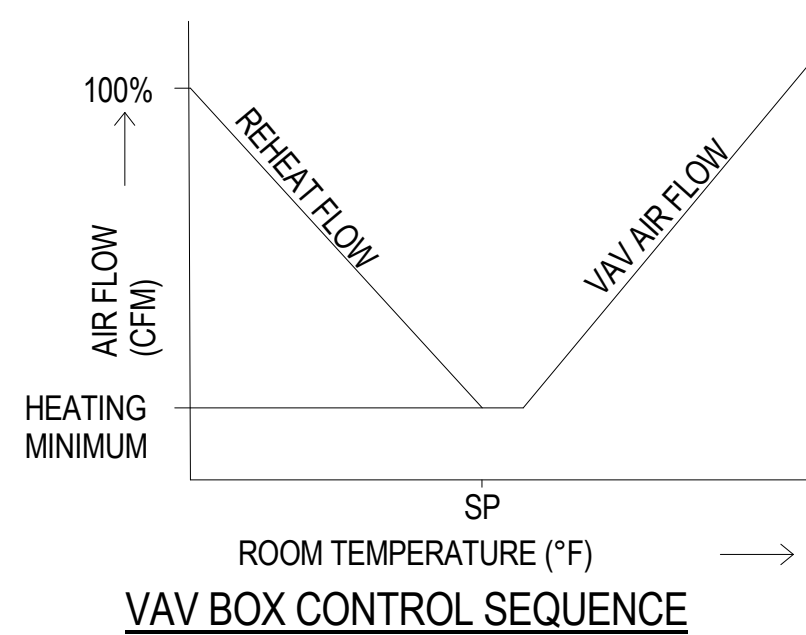
		CONSULTANTS:	ARCHITECT/ENGINEERS:	Drawing Title		Project Title		Project Number		Office of Construction and Facilities Management		
				MECHANICAL DETAILS		RENOVATE MAIN LOBBY		589-334				
				Approved: Project Director		Location Columbia, Missouri		Building Number				
						Date 04/03/2018		Checked BOH		Drawing Number <b>M-502</b>		
								Drawn AR				
								Dwg.		Department of Veterans Affairs		



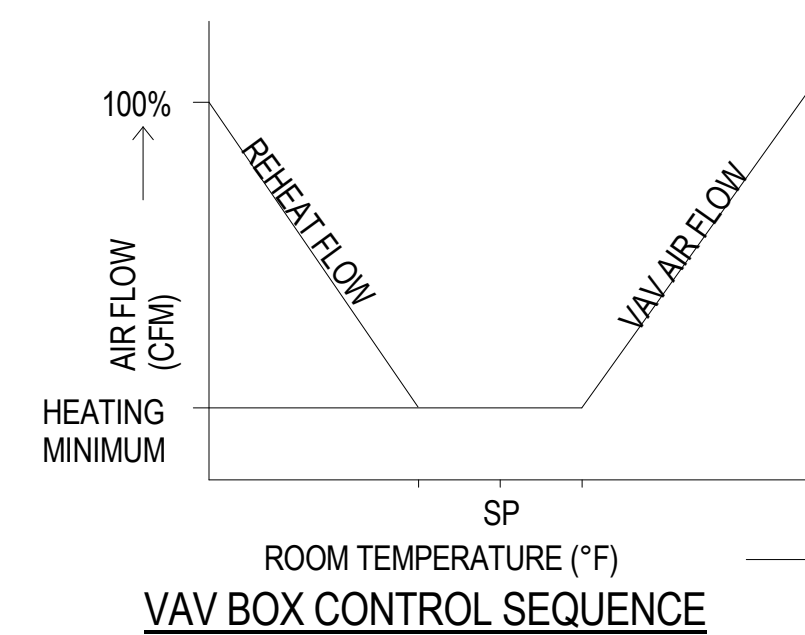


- NOTES:
- EXISTING CONTROLLERS TO REMAIN.
  - INSTALL NEW BACNET GATEWAY OR PANEL WITH FULL COMMUNICATION TO EXISTING CONTROLLERS.
  - INSTALL NEW BACNET COMMUNICATION NETWORK.
  - INSTALL NEW CONTROLLERS (B-AAC/B-ASC) AS REQUIRED.
  - NEW CONTROL PANEL TO BE LOCATED IN CLOSET B340. COORDINATE POWER AND DATA REQUIREMENTS WITH EC.

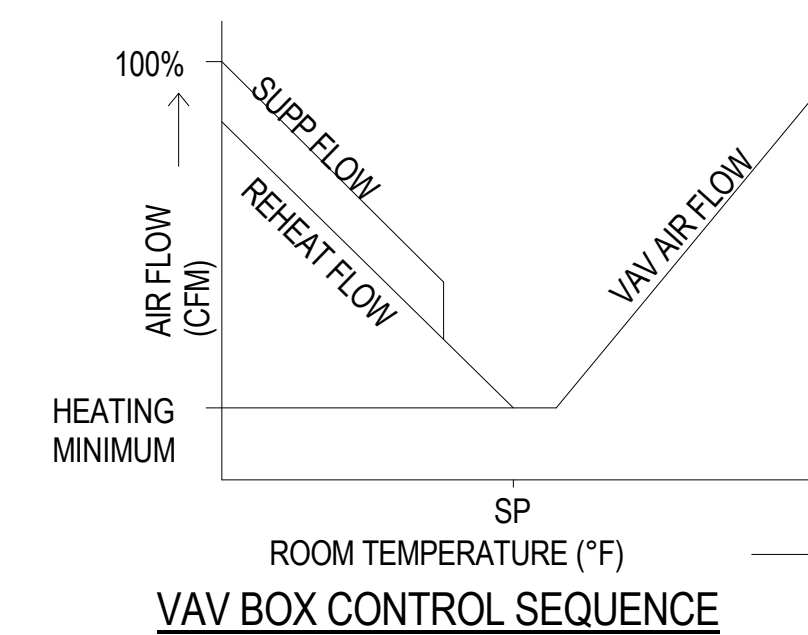
## 1 BACNET SYSTEM ARCHITECTURE



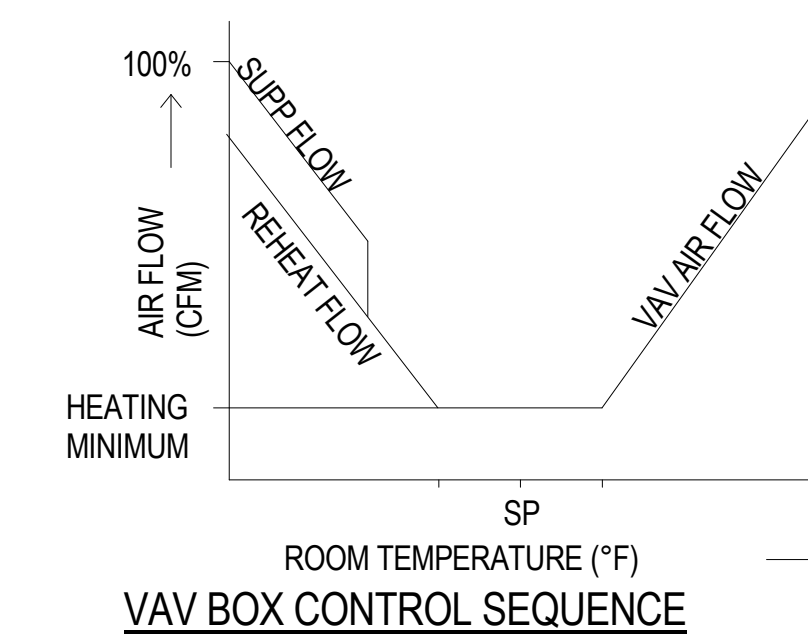
- A. UPON FALL IN SPACE TEMPERATURE THE VAV DAMPER WILL MODULATE TO MINIMUM POSITION.
- B. UPON FURTHER DROP IN SPACE TEMPERATURE VALVE V-1 WILL MODULATE TO MAINTAIN SET POINT  $\pm 5^\circ\text{F}$ . THE ADJUSTABLE TOLERANCE OF  $\pm 5^\circ\text{F}$  HAS BEEN SELECTED TO PREVENT VALVE HUNTING.
- C. THE REVERSE SHALL OCCUR ON THE RISE IN SPACE TEMPERATURE.



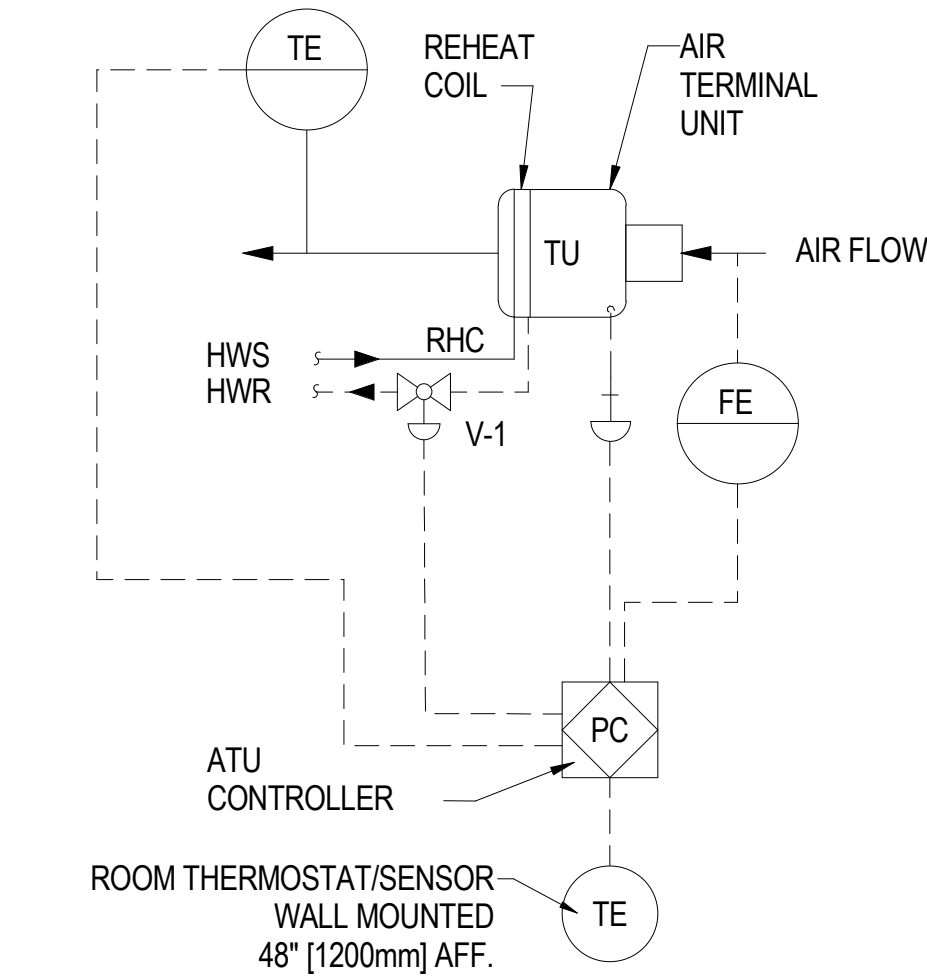
- A. SET POINTS SHALL BE SET AS FOLLOWS:  
COOLING  $75^\circ\text{F}$  (ADJ)  
HEATING  $70^\circ\text{F}$  (ADJ)
- DEADBAND OF  $5^\circ\text{F}$  BETWEEN HEATING AND COOLING SET POINTS WILL BE MAINTAINED.
- B. UPON FALL IN SPACE TEMPERATURE THE VAV DAMPER WILL MODULATE TO MINIMUM POSITION.
- C. UPON FURTHER DROP IN SPACE TEMPERATURE VALVE V-1 WILL MODULATE TO MAINTAIN SET POINT  $\pm 5^\circ\text{F}$ . THE ADJUSTABLE TOLERANCE OF  $\pm 5^\circ\text{F}$  HAS BEEN SELECTED TO PREVENT VALVE HUNTING.
- D. THE REVERSE SHALL OCCUR ON THE RISE IN SPACE TEMPERATURE.



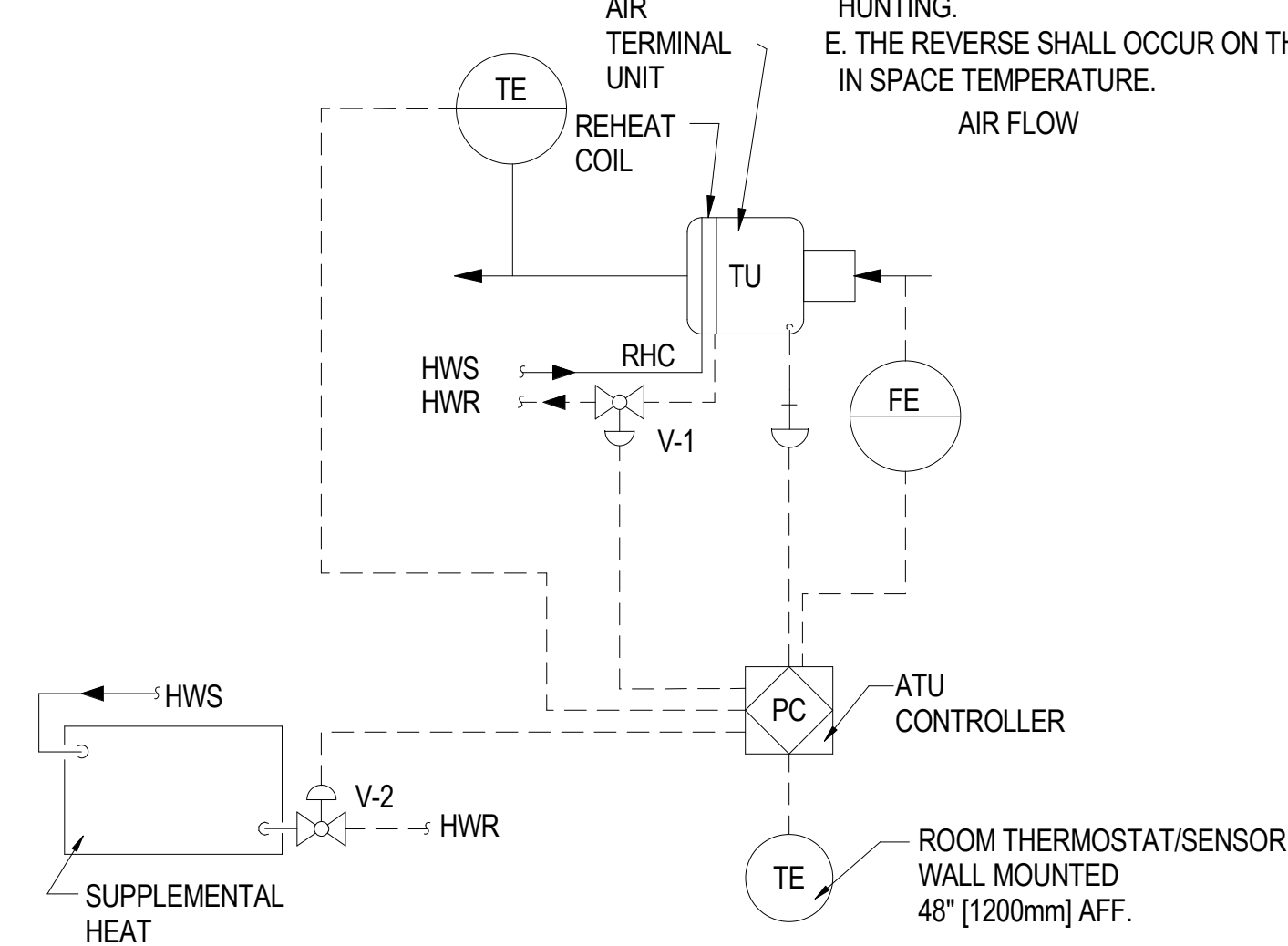
- A. UPON FALL IN SPACE TEMPERATURE THE VAV DAMPER WILL MODULATE TO MINIMUM POSITION.
- B. UPON FURTHER DROP IN SPACE TEMPERATURE VALVE V-1 WILL MODULATE TO MAINTAIN SET POINT  $\pm 5^\circ\text{F}$ . THE ADJUSTABLE TOLERANCE OF  $\pm 5^\circ\text{F}$  HAS BEEN SELECTED TO PREVENT VALVE HUNTING.
- C. VALVE V-2 SHALL BE ENABLED WHEN OUTSIDE AIR FALLS BELOW  $40^\circ\text{F}$  (ADJ) AND VALVE V-1 HAS BEEN MODULATED OPEN ABOVE 30% (ADJ). VALVE V-2 SHALL MAINTAIN SET POINT  $\pm 5^\circ\text{F}$ . THE ADJUSTABLE TOLERANCE OF  $\pm 5^\circ\text{F}$  HAS BEEN SELECTED TO PREVENT VALVE HUNTING. THE REVERSE SHALL OCCUR ON A RISE IN SPACE TEMPERATURE.



- A. SET POINTS SHALL BE SET AS FOLLOWS:  
COOLING  $75^\circ\text{F}$  (ADJ)  
HEATING  $70^\circ\text{F}$  (ADJ)
- DEADBAND OF  $5^\circ\text{F}$  BETWEEN HEATING AND COOLING SET POINTS WILL BE MAINTAINED.
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- D. VALVE V-2 SHALL BE ENABLED WHEN OUTSIDE AIR FALLS BELOW  $40^\circ\text{F}$  (ADJ) AND VALVE V-1 HAS BEEN MODULATED OPEN ABOVE 30% (ADJ). VALVE V-2 SHALL MAINTAIN SET POINT  $\pm 5^\circ\text{F}$ . THE ADJUSTABLE TOLERANCE OF  $\pm 5^\circ\text{F}$  HAS BEEN SELECTED TO PREVENT VALVE HUNTING.
- E. THE REVERSE SHALL OCCUR ON THE RISE IN SPACE TEMPERATURE.



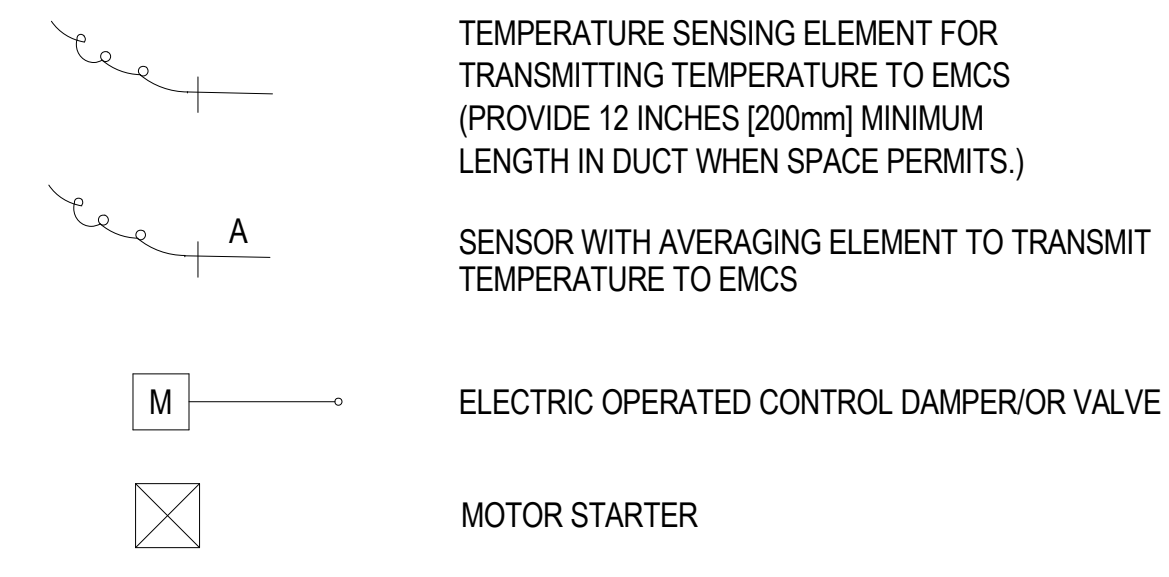
NO SUPPLEMENTAL HEATING



WITH SUPPLEMENTAL HEATING

## 2 VARIABLE VOLUME AIR TERMINAL UNIT CONTROL DIAGRAM

CONTROLS SYMBOLS		CONTROLS SYMBOLS	
T	ROOM THERMOSTAT/TRANSMITTER - WALL MOUNT	PSH	PRESSURE SWITCH HIGH
M	ROOM HUMIDISTAT (MOISTURE)/TRANSMITTER - WALL MOUNT	PSL	PRESSURE SWITCH LOW
TT	TEMPERATURE TRANSMITTER	EPT	ELECTRONIC TO PNEUMATIC TRANSDUCER
TT	TEMPERATURE TRANSMITTER, AVERAGING ELEMENT	AT <sub>CO2</sub>	CARBON DIOXIDE TRANSMITTER
MT	MOISTURE (HUMIDITY) TRANSMITTER	AT <sub>CO</sub>	CARBON MONOXIDE TRANSMITTER
PT	PRESSURE TRANSMITTER	AT <sub>OC</sub>	OCCUPANCY SENSOR
SPS	STATIC PRESSURE SENSOR	LTCP	LOCAL TEMPERATURE CONTROL PANEL
FT	FLOW TRANSMITTER	HVAC	HVAC CONTROL PANEL
IT	CURRENT TRANSMITTER	VSMC	VARIABLE SPEED MOTOR CONTROLLER
CT	CONDUCTIVITY TRANSMITTER	MC	MOTOR CONTROLLER
SD	SMOKE DETECTOR	ECC	INTEGRATE CONTROL POINT ON REMOTE GRAPHICS WORKSTATION AT ENERGY CONTROL CENTER
PDT	PRESSURE DIFFERENTIAL TRANSMITTER	TC	TEMPERATURE CONTROLLER. SEE SEQUENCE OF OPERATION
PDS	PRESSURE DIFFERENTIAL SWITCH	PC	PRESSURE CONTROLLER. SEE SEQUENCE OF OPERATION
HS	HAND SWITCH (HAND-OFF-AUTO SWITCH)	SC	SPEED CONTROLLER. SEE SEQUENCE OF OPERATION
ZC	VALVE OR DAMPER POSITION CONTROLLER	FC	FLOW CONTROLLER. SEE SEQUENCE OF OPERATION
KR	LOCAL RECORDING TIME CLOCK (RUNTIME)	FSH	FLOW SWITCH HIGH
TSL	TEMPERATURE SWITCH, LOW (FREEZE/STAT)	FSL	FLOW SWITCH LOW
TSH	TEMPERATURE SWITCH, HIGH (FREEZE/STAT)	KC	TIME CLOCK CONTROLLING EQUIPMENT ON A SCHEDULE
LC	LEVEL CONTROLLER		
LT	LEVEL TRANSMITTER		



CONSULTANTS:	ARCHITECT/ENGINEERS:	Drawing Title	Project Title	Project Number	Office of Construction and Facilities Management Department of Veterans Affairs	
		MECHANICAL CONTROL DIAGRAMS	RENOVATE MAIN LOBBY	589-334		
		Approved: Project Director	Columbia, Missouri	Building Number		
Revisions:			Date	Checked	Drawn	Drawing Number
			04/03/2018	BOH	AR	M-511
						Dwg.



HVAC DESIGN DATA													
DESIGN CONDITIONS		SUMMER					WINTER					LOWEST AVERAGE ANNUAL DEWPOINT	
		TEMP		WET BULB TEMP		% HUMIDITY	TEMP		DEWPOINT TEMP		% HUMIDITY		
		°F	[°C]	°F	[°C]		°F	[°C]	°F	[°C]		°F	[°C]
OUTDOOR DESIGN CONDITIONS		91.6	33.1	75.9	24.4	49	1.3	-17.1	0	-17.8	NA	-5.8	-21
INDOOR AREA DESIGN CONDITIONS													
CORRIDOR	75	23.9	62	16.7	50	70	21.1	53.9	12.2	30			
TOILETS - INTERIOR	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA			
LOUNGE	75	23.9	62	16.7	50	70	21.1	52.9	11.6	30			

[illegible]

AIR DEVICE SCHEDULE (SUPPLY)																
MARK	TYPE	AIR FLOW				MAX APD		MOUNTING	PANELFRAME SIZE		NECK SIZE		NC	DAMPER	FINISH	REMARKS
		MIN		MAX		IN W/G	[Pa]		IN x IN	[mm x mm]	IN	[mm]				
		CFM	[L/s]	CFM	[L/s]											
SD-11	LOUVERED FACE	40	19	100	76	0.080	20	CEILING	24 x 24	[600 x 600]	6 ø	[152 ø]	25	NONE	WHITE	---
SD-12	LOUVERED FACE	70	33	280	130	0.100	25	CEILING	24 x 24	[600 x 600]	8 ø	[203 ø]	25	NONE	WHITE	---
SD-14	LOUVERED FACE	160	76	470	220	0.080	20	CEILING	24 x 24	[600 x 600]	12 ø	[305 ø]	22	NONE	WHITE	---
SD-63	GRILLE	125	71	300	140	.090	23	DUCT MOUNTED	12 x 12	[305 x 305]	10 x 10	[254 x 254]	18	NONE	WHITE	---
<b>NOTES</b> 1. SEE FLOOR PLAN FOR THROW PATTERN. 4-WAY TYPICAL UNLESS OTHERWISE NOTED. 2. SEE DETAIL FOR DAMPER IN BRANCH DUCT SERVING EACH DIFFUSER. 3. PROVIDE SQUARE TO ROUND ADAPTER.																

MARK	TYPE	AIR FLOW				MAX APD		MOUNTING	PANEL/FRAME SIZE		NECK SIZE		NC	DAMPER	FINISH	REMARKS
		MIN		MAX					IN x IN	[mm x mm]	IN x IN	[mm x mm]				
		CFM	[L/s]	CFM	[L/s]	IN WIG	[Pa]									
RG-21	PERFORATED	60	28	100	47	0.088	22.000	CEILING	24 X 24	[600 x 600]	6 DIAM	[152 DIAM]	13	NONE	WHITE	---
RG-23	PERFORATED	170	80	250	120	0.088	22.000	CEILING	24 X 24	[600 x 600]	10 DIAM	[254 DIAM]	14	NONE	WHITE	---
RR-32	RETURN REGISTER	125	59	330	160	0.078	20.000	CEILING	12 X 12	[305 x 305]	10 X 10	[254 X 254]	15	NONE	WHITE	---

**NOTE**  
 PROVIDE SQUARE TO ROUND ADAPTER.

FAN SCHEDULE																									
MARK	LOCATION	AREA AND/OR BLDG SERVED	SYSTEM AND/OR SERVICE	AIR FLOW		TSP		FAN										MOTOR ELECTRICAL						CONTROL SEQUENCE	REMARKS
				CFM	[L/s]	IN	[Pa]	TYPE	WHEEL	CLASS	ARRANGEMENT, ROTATION, AND DISCHARGE	DIAMETER		MIN % EFF	DRIVE	FAN MAX RPM	NOMINAL POWER			VOLT	PHASE	RPM	SPEED CONTROL		
												IN	[mm]				BHP	HP	[kW]						
EF-57	ROOF	LOBBY RRS	EXHAUST	750	[354]	0.25	[63]	CENTRIFUGAL	-	-	UPBLAST, SIDE INLET VENT SET	7.67"	[195]	30%	DIRECT	1140	0.30	0.5	[0.37]	120	1	1140	1	A	#1
<b>REMARKS</b> 1. PROVIDE UNIT WITH ROOF CURB, BIRD SCREEN & BACK DRAFT DAMPER. A. EXHAUST FAN SHALL CONTINUOUSLY OPERATE AND SHALL TIE INTO EXISTING BMS SYSTEM.																									
<b>NOTE:</b> ALL SELECTIONS ARE BASED ON AN ALTITUDE OF 758 FT.																									

[illegible]

AIR CURTAIN SCHEDULE											
MARK	LOCATION	NOZZLE WIDTH	MAX FPM AT NOZZLE	CFM AT NOZZLE	HEATER KW	MOTOR HP	VOLTAGE	FLA	WEIGHT	REMARKS	ELEC REF
1A-1	ER VEST.	60"	3750	2217	24	(2) 1/2	480/3	32.0	115.0	1,2,3	--
--	--	--	--	--	--	--	--	--	--	--	--
REMARKS 1. CEILING RECESSED 2. NO HEATING OR COOLING 3. MOTOR CONTROL PANEL WITH DOOR LIMIT SWITCH											

AIR TERMINAL UNIT SIZING SCHEDULE																										
SIZE	MIN ALLOWABLE AIR FLOW		MAX ALLOWABLE AIR FLOW		DUCT INLET SIZE		MAX APD		MAXIMUM SOUND POWER LEVEL (Re 10-12 WATTS) FOR BOX DISCHARGE AT MAXIMUM INLET DUCT STATIC							HOT WATER HEATING COIL										REMARKS
								OCTAVE BANDS							EAT		EWT		FLOW		MAX WPD		PIPE RUNOUT SIZE TO COIL			
	CFM	[L/s]	CFM	[L/s]	IN	[mm]	IN WG	[Pa]	2	3	4	5	6	7	°F	[°C]	°F	[°C]	GPM	[L/m]	FT	[Pa]	IN	[mm]		
A	60	28	170	80	4	100	0.4	100	69	65	58	52	51	47	55	13	140	60	0.5	1.9	3	9	0.75	19	---	
B	90	42	260	120	5	130	0.4	100	69	63	59	52	51	47	55	13	140	60	0.5	1.9	3	9	0.75	19	---	
C	130	61	380	180	6	150	0.4	100	69	67	61	55	52	49	55	13	140	60	0.7	2.7	4	12	0.75	19	---	
D	160	76	490	230	7	180	0.4	100	70	68	63	57	53	49	55	13	140	60	0.7	2.7	4	12	0.75	19	---	
E	230	110	680	320	8	200	0.4	100	71	68	59	53	51	47	55	13	140	60	1	3.8	3	9	0.75	19	---	
F	270	130	790	370	9	230	0.4	100	71	69	60	54	51	47	55	13	140	60	1.5	5.7	4	12	0.75	19	---	
G	350	170	1050	500	10	250	0.4	100	74	68	61	57	54	52	55	13	140	60	1.5	5.7	4	12	0.75	19	---	
H	500	240	1500	710	12	300	0.4	100	73	69	64	59	57	53	55	13	140	60	2.5	9.5	3	9	0.75	19	---	
I	750	350	2250	1100	14	350	0.4	100	73	68	65	61	61	59	55	13	140	60	3.5	13	4	12	0.75	19	---	
J	1000	470	3000	1400	16	400	0.4	100	73	68	66	60	58	55	55	13	140	60	4.5	17	4	12	1	25	---	
NOTES																										
1. INLET STATIC BASED ON ARI 885-98.																										
2. THIS SCHEDULE IS USED WITH THE TERMINAL UNIT SCHEDULE.																										
3. CONTROL SEQUENCE SHALL BE AS INDICATED ON THE AIR TERMINAL UNIT SCHEDULE.																										
4. PROVIDE SOUND ATTENUATION AFTER-SECTION AS REQUIRED TO MEET ROOM NC LEVEL.																										

[illegible]