

MECHANICAL ABBREVIATIONS

A/E ARCHITECT / ENGINEER	DD-2 DESIGN DEVELOPMENT SUBMISSION 2	HSTAT HUMIDISTAT	OA OUTSIDE AIR	TP TRAP
AAHX AIR TO AIR HEAT EXCHANGER	DDC DIRECT DIGITAL CONTROLS	HTM HUMIDIFIER TERMINAL	OAG OUTSIDE AIR GRILLE	TR TOP REGISTER
AAV AUTOMATIC AIR VENT	DEG DEGREES	HUM HUMIDIFIER UNIT MOUNTED	OAI OUTSIDE AIR INTAKE	TSP TOTAL STATIC PRESSURE
AB AIR BLENDER	DF DIFFUSER	HVD HOISTWAY VENT DAMPER	OD OUTER DIAMETER	TSTAT THERMOSTAT
ACC AIR COOLED CONDENSER	DI DIGITAL INPUT	HVU HEATING AND VENTILATING UNIT	OFM OIL FLOWMETER	TU TERMINAL UNIT
ACCH AIR COOLED CHILLER	DIA DIAMETER	HW HOT WATER	OR OPERATING ROOM	TWU THRU-WALL UNIT
ACCU AIR-COOLED CONDENSING UNIT	DIW DEIONIZED WATER	HWC HOT WATER COIL	P PUMP	UCT UNDERCUT
ACD AUTOMATIC CONTROL DAMPER, MODULATING	DO DIGITAL OUTPUT	HWHC HOT WATER HEATING COIL	PA PASCAL	UC UNIT COOLER
ACD-TP AUTOMATIC CONTROL DAMPER, TWO POSITION	DP DEW POINT TEMPERATURE	HWP HEATING WATER PUMP	PC PUMPED CONDENSATE	UH UNIT HEATER
ACFM ACTUAL CUBIC FEET PER MINUTE	DP DIFFUSER PLATE	HWR HEATING WATER RETURN	PCF POUNDS PER CUBIC FOOT	UL UNDERWRITER'S LABORATORY
ACU AIR CONDITIONING UNIT	DPA DIFFERENTIAL PRESSURE ASSEMBLY	HWS HEATING WATER SUPPLY	PD PRESSURE DROP	URV UPBLAST UNIT VENTILATOR
AD ACCESS DOOR	DPS DIFFERENTIAL PRESSURE SENSOR	HWHU HOT WATER UNIT HEATER	PEF PROPELLER TYPE EXHAUST FAN	V VALVE
AF AFTER FILTER	DX DIRECT EXPANSION	HX HEAT EXCHANGER	PF PRE-FILTER	VAF VANE-AXIAL FAN
AFCV AIR FLOW CONTROL VALVE	DXCC DIRECT EXPANSION COOLING COIL	HZ HERTZ	PG PRESSURE GAUGE	VAV VARIABLE AIR VOLUME
AFF ABOVE FINISHED FLOOR	EA EXHAUST AIR	I/O INPUT/OUTPUT	PGW PROPYLENE GLYCOL-WATER SOLUTION	VD VOLUME DAMPER (MANUAL OPPOSED BLADE)
AFMD AIR FLOW MEASURING DEVICE	EAT ENTERING AIR TEMPERATURE	IAQ INDOOR AIR QUALITY	PHC PREHEAT COIL	VFD VARIABLE FREQUENCY DRIVE
AFW AIR FOIL WHEEL (FAN)	EAT ENTERING AIR TEMPERATURE	IBT INVERTED BUCKET TRAP	PHM PARTS PER MILLION	VHA VETERANS HEALTH ADMINISTRATION
AHU AIR HANDLING UNIT	EC EVAPORATIVE COOLER	ICF IN-LINE CENTRIFUGAL FAN	PRV PRESSURE REGULATING VALVE STATION	VI VIBRATION ISOLATOR
AI ANALOG INPUT	ECC ENGINEERING CONTROL CENTER	ICU INTENSIVE CARE UNIT	PSI POUNDS PER SQUARE INCH	VIV VARIABLE INLET VANES
AMP AMPERE	ECU EVAPORATIVE CONDENSER UNIT	ID INSIDE DIAMETER	PSIA POUNDS PER SQUARE INCH, ABSOLUTE	VP VACUUM PUMP
AO ANALOG OUTPUT	EDH ELECTRIC DUCT HEATER	IN INCHES	PSIG POUNDS PER SQUARE INCH, GAGE	VPS VARIABLE PRIMARY SYSTEM
AP ACCESS PANEL	EEH ENERGY EFFICIENCY RATIO	IN HG INCHES OF MERCURY	PSR PRIMARY SECONDARY SYSTEM	VR VACUUM (STEAM CONDENSATE) RETURN
APD AIR PRESSURE DROP	EF EXHAUST FAN	IN WC INCHES OF WATER COLUMN	PSV PRESSURE SAFETY VALVE	VSD VARIABLE SPEED DRIVE
ARI AIR CONDITIONING AND REFRIGERATION INSTITUTE	EG EXHAUST GRILLE	IN WG INCHES OF WATER, GAUGE	PTAC PACKAGED TERMINAL AIR CONDITIONER	VUH VERTICAL UNIT HEATER
AS AIR SEPARATOR	EGS EMERGENCY GAS SHUTOFF	IN-LB INCH-POUND	R/E RETURN OR EXHAUST	W WASTE
ASME AMERICAN SOCIETY OF MECHANICAL ENGINEERS	EGT ENTERING GLYCOL TEMPERATURE	IPLV INTEGRATED PART LOAD VALUE	RA RETURN AIR	WAG WASTE ANESTHESIA GAS
AV ANALOG VARIABLE	EH EXHAUST HOOD	IRH INFRARED HEATER	RAD REFRIGERANT AIR DRYER	WB WET BULB
AW AIR WASHER	EJ EXPANSION JOINT	IS INSECT SCREEN	RAF RADIO FREQUENCY	WC WATER COOLED
AXF AXIAL FLOW	EMD END OF MAIN DRIP (STEAM)	IU INDUCTION UNIT	RAHX ROTARY AIR HEAT EXCHANGER	WCCH WATER COOLED CHILLER
B BOILER	ENT ENTERING	IV INLET VANES	RAT RETURN AIR TEMPERATURE	WCCU WATER COOLED CONDENSING UNIT
BAS BUILDING AUTOMATION SYSTEMS	ER EXHAUST REGISTER	KG KILOGRAM	RCCH REMOTE CONDENSER CHILLER	WCPU WATER COOLED HEAT PUMPS
BD BUTTERFLY DAMPER	ERC ELECTRIC REHEAT COIL	KG/H KILOGRAMS PER HOUR	RCU RECIPROCATING CHILLER UNIT	WEF WATER COOLED PACKAGED UNIT
BDD BACKDRAFT DAMPER	ERP ELECTRIC RADIANT PANEL	KPA KILOPASCAL	RD REFRIGERANT DISCHARGE	WF WATER FILTER
BDR BASE BOARD RADIATOR	ESP EXTERNAL STATIC PRESSURE	KW KILOWATT	RDS ROOM DATA SHEETS	WFCV WATER FLOW CONTROL VALVE
BDF BACKFLOW PREVENTER	ET EXPANSION TANK	KWH KILOWATT HOURS	REA RELIEF AIR	WFM WATER FLOWMETER
BFT BOILER PLANT FIRE TUBE	ETO ETHYLENE OXIDE	L LITER	RF RETURN FAN	WFMD WATER FLOW MEASURING DEVICE
BG BOTTOM GRILLE	EUH ELECTRIC UNIT HEATER	L/H LITERS PER HOUR	RG RETURN GRILLE	WG WATER GAGE
BHP BRAKE HORSEPOWER	EWC EVAPORATIVE WATER COOLER	L/M LITERS PER MINUTE	RH RELATIVE HUMIDITY	WPD WATER SIDE PRESSURE DROP
BHW HOT WATER HEATING BOILER	EWT ENTERING WATER TEMPERATURE	L/S LITERS PER SECOND	RHC REHEAT COIL	YR YEAR
BHX BOILER BLOWDOWN HEAT EXCHANGER	EX EXISTING	LAT LEAVING AIR TEMPERATURE	RHG REFRIGERANT HOT GAS	
BIW BACKWARD INCLINED WHEEN (FAN)	F FAHRENHEIT	LB/H POUND PER HOUR	RL REFRIGERANT LIQUID LINE	
BR BONE REGISTER	F&T FLOAT AND THERMOSTATIC	LF LINEAR FOOT (FEET)	RLA RUN LOAD AMPERE	
BSC BIOLOGICAL SAFETY CABINETS	F/SDPR COMBINATION FIRE SMOKE DAMPER	LG T LEAVING GLYCOL TEMPERATURE	RO REVERSE OSMOSIS	
BT BLOWOFF TANK	FA FREE AREA	LH LATENT HEAT	RPM REVOLUTIONS PER MINUTE	
BTC BLOWOFF TANK CONTROL VALVE	FC FLEXIBLE CONNECTION	LLHX LIQUID TO LIQUID HEAT EXCHANGER	RR RETURN REGISTER	
BTU BRITISH THERMAL UNIT	FCU FAN COIL UNIT (4 PIPE)	LPG LIQUID PROPANE GAS	RS REFRIGERANT SUCTION	
BTUH BRITISH THERMAL UNIT PER HOUR	FCUC FAN COIL UNIT COOLING ONLY	LPR LOW PRESSURE RETURN (STEAM CONDENSATE)	RTU ROOFTOP UNIT	
BV BINARY VARIABLE	FCUH FAN COIL UNIT HEATING ONLY	LPRC LOW PRESSURE STEAM RETURN (CLEAN)	RV RELIEF VALVE	
BWT BOILER PLANT WATER TUBE	FCW FORWARD CURVED WHEEL (FAN)	LPS LOW PRESSURE STEAM	SA SUPPLY AIR	
C CENTIGRADE (CELSIUS)	FD FLOOR DRAIN	LPCD LOW PRESSURE STEAM (CLEAN)	SAD SOUND ATTENUATING DEVICE	
CC COOLING COIL	FD FIRE DAMPER	LSD LINEAR SLOT DIFFUSER	SAT SUPPLY AIR TEMPERATURE	
CCD COOLING COIL CONDENSATE DRAIN	FF FINAL FILTER	LTCF LOCAL TEMPERATURE CONTROL PANEL	SC SHADING COEFFICIENT	
CD CEILING DIFFUSER	FXH FLUE GAS/FEEDWATER HEAT EXCHANGER	LVG LEAVING	SCFM STANDARD CUBIC FEET PER MINUTE	
CD-1 CONSTRUCTION DOCUMENTS (SUBMISSION 1)	FM FLOW METER	LVR LOUVER	SCR SILICON CONTROLLED RECTIFIER	
CD-2 CONSTRUCTION DOCUMENTS (SUBMISSION 2)	FOHX FUEL OIL HEAT EXCHANGER	LWT LEAVING WATER TEMPERATURE	SD SMOKE DETECTOR	
CENT CENTRIFUGAL	FOP FUEL OIL PUMP	M METER	SD SUPPLY AIR DIFFUSER	
CFH CUBIC FEET PER HOUR	FOT FUEL OIL TANK	M/S METERS PER SECOND	SD-1 SCHEMATIC DESIGN SUBMISSION 1	
CFM CUBIC FEET PER MINUTE	FPM FEET PER MINUTE	MA MIXED AIR	SD-2 SCHEMATIC DESIGN SUBMISSION 2	
CFP CHEMICAL FEED PUMP	FPS FEET PER SECOND	MAT MIXED AIR TEMPERATURE	SDPR SMOKE DAMPER	
CFT CUBIC FEET	FPTU FAN POWERED TERMINAL UNIT	MAU MAKE-UP AIR UNIT	SDR SMOKE DAMPER (RETURN)	
CG CEILING GRILLE	FR FLOOR REGISTER	MAV MANUAL AIR VENT	SDS SMOKE DAMPER (SUPPLY)	
CH CHILLER	FRP FIBER REINFORCED POLYESTER	MAX MAXIMUM	SEN SENSIBLE HEAT	
CHP CHILLED WATER PUMP	FS FLOW SWITCH	MB MIXING BOX	SF SUPPLY FAN	
CHR CHILLED WATER RETURN	FSTAT FREEZE/STAT	MBH 1000 BTUH	SG SUPPLY AIR GRILLE	
CHS CHILLED WATER SUPPLY	FT FEET	MCA MINIMUM BRANCH CIRCUIT AMPACITY	SH STEAM HUMIDIFIER	
CHW CHILLED WATER	FT-LB FOOT-POUND	MER MECHANICAL EQUIPMENT ROOM	SHC STEAM HEATING COIL	
CI CAST IRON	FTR FINNED TUBE RADIATION	MERV MINIMUM EFFICIENCY REPORTING VALUE	SI SQUARE INCHES	
CM CARBON MONOXIDE	FV FACE VELOCITY	MH MANHOLE	SP STATIC PRESSURE	
CM CUBIC METER	GA GAUGE	MHP MOTOR HORSEPOWER	SP GR SPECIFIC GRAVITY	
CO2 CARBON DIOXIDE	GAL GALLONS	MIN MINIMUM	SPD SUPPLY PROCESS AND DISTRIBUTION	
COMP COMPRESSOR UNIT	GH GRAVITY HOOD	MM MILLIMETER	SPRV STEAM PRESSURE REDUCING VALVE	
COP COEFFICIENT OF PERFORMANCE	GPD GALLONS PER DAY	MOV MOTOR OPERATED VALVE	SPS STATIC PRESSURE SENSOR	
CP CONDENSATE PUMP	GPH GALLONS PER HOUR	MPR MEDIUM PRESSURE RETURN (STEAM CONDENSATE)	SQ FT SQUARE FOOT	
CR CEILING REGISTER	GPM GALLONS PER MINUTE	MPS MEDIUM PRESSURE STEAM	SR SUPPLY AIR REGISTER	
CS CONDENSATE STORAGE TANK	GPR GAS PRESSURE REGULATOR	MRI MAGNETIC RESONANCE IMAGING UNIT	SS STAINLESS STEEL	
CSG CLEAN STEAM GENERATOR	GS GALVANIZED STEEL	MTD MEAN TEMPERATURE DIFFERENCE	SSHX STEAM TO STEAM HEAT EXCHANGER	
CT COOLING TOWER	H HUMIDIFIER	MVD MANUAL VOLUME DAMPER	SSR SOLID SEPARATOR	
CU CONDENSING UNIT	H&CW HOT & COLD WATER	MZ MULTI-ZONE	ST STEAM TRAP	
CUH CABINET UNIT HEATER	HAC HOUSEKEEPING AID CLOSET	NA NOT APPLICABLE	SUH STEAM UNIT HEATER	
CV CONSTANT VOLUME	HB HOSE BIBB	NC NOISE CRITERIA	SV STEAM PRESSURE REDUCING VALVE	
CW COLD WATER (POTABLE)	HC HEATING COIL	NC NORMALLY CLOSED	SVS STEAM VENT SILENCER	
CWCC CHILLED WATER COOLING COIL	HD HEAD	NG NATURAL GAS	SWHX STEAM TO WATER HEAT EXCHANGER	
CWP CONDENSER WATER PUMP	HD HOOD	NGFM NATURAL GAS FLOW METER	T&PCV TEMPERATURE AND PRESSURE CONTROL VALVE	
CWR CONDENSER WATER RETURN (TO COOLING TOWER)	HOA HAND/OFF/AUTOMATIC	NO NORMALLY OPEN	TAB TESTING, ADJUSTING, AND BALANCING	
CWS CONDENSER WATER SUPPLY (FROM COOLING TOWER)	HP HEAT PUMP	NOAA NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION	TD TEMPERATURE DIFFERENCE	
D DAMPER - AUTOMATIC	HP HORSEPOWER	NOM NOMINAL	TDH TOTAL DYNAMIC HEAD	
D-1 OUTDOOR AIR DAMPER	HPDT HIGH PRESSURE DRIP TRAP	NPLV NON-STANDARD PART LOAD VALUE	TDS TOTAL DISSOLVED SOLIDS	
D-2 RETURN AIR DAMPER	HPR HIGH PRESSURE RETURN (STEAM CONDENSATE)	NPSH NET POSITIVE SUCTION HEAD	TG TRANSFER GRILLE	
D-3 RELIEF AIR DAMPER	HPS HIGH PRESSURE SUPPLY (STEAM)	NTS NOT TO SCALE		
Dd DRY BULB TEMPERATURE	HRC HEAT RECOVERY COIL			
dB DECIBEL	HRD HEAT RECOVERY DEVICE			
DD-1 DESIGN DEVELOPMENT SUBMISSION 1	HRP HYDRONIC RADIANT (CEILING) PANEL			
	HRW HEAT RECOVERY WHEEL			

HVAC GENERAL NOTES

- ALL PIPING AND DUCTS 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 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.
- WALL TYPE EXHAUST REGISTERS NOTED AS "BR" ON DRAWINGS ARE TO BE INSTALLED WITH BOTTOM ELEVATION OF REGISTER AT 7" ABOVE FINISHED FLOOR.
- ALL PRESSURES LISTED ARE GAGE PRESSURE UNLESS NOTED OTHERWISE
- ALL CONTROL SYSTEM EQUIPMENT SHALL BE COMPATIBLE WITH EXISTING BUILDING MANAGEMENT SYSTEM CONTROLS. EXTEND EXISTING CONTROL SYSTEM TO INCLUDE ALL OF THE CONTROLS AND SEQUENCES SHOWN.
- COORDINATE EXISTING FIRE SPRINKLER HEADS AND LIGHTS WITH NEW DUCTS AND DIFFUSERS.
- PROVIDE ACOUSTICAL SEALANT PER SPECIFICATIONS SECTION 07 92 00 AT ALL DUCT AND PIPE PENETRATIONS THROUGH SOUND RATED PARTITIONS.
- SUBMIT COMPLETE CONSOLIDATED AND COORDINATED SHOP DRAWINGS FOR ALL NEW SYSTEMS, AND FOR EXISTING SYSTEMS THAT ARE IN THE SAME AREAS. DO NOT INSTALL EQUIPMENT FOUNDATIONS, EQUIPMENT, OR PIPING UNTIL COORDINATION/SHOP DRAWINGS HAVE BEEN APPROVED.

GENERAL NOTES

- CONTRACTOR SHALL PROVIDE AN INFECTION CONTROL RISK ASSESSMENT BARRIER AROUND THE PROJECT AREA CONSISTENT WITH THE CONTRACTOR'S PHASING PLAN AS APPROVED BY THE VHA COR.
- CONTRACTOR SHALL PROVIDE ICRA BARRIER AROUND THE PROJECT AREA CONSISTENT WITH THE CONTRACTOR'S PHASING PLAN AS APPROVED BY THE VHA COR.

MECHANICAL/HVAC EQUIPMENT, PIPING AND DUCTWORK 2015 IBC AND ASCE 7-10 NONSTRUCTURAL SEISMIC RESTRAINT, BRACING AND ANCHORAGE NOTES:

REFERENCE SPECIFICATION: SECTION 13 05 41 SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS

SEISMIC DESIGN DATA FOR ANALYSIS AND DESIGN:

H-18-8 SEISMICITY = MODERATE-HIGH
 SEISMIC RISK CATEGORY BASED UPON OCCUPANCY = III
 COMPONENT IMPORTANCE FACTORS:
 IP=1.0 FOR NON-ESSENTIAL COMPONENTS
 IP=1.5 FOR LIFE SAFETY AND DESIGNATED SEISMIC SYSTEMS (DSS) AND PERMANENT EQUIPMENT AND COMPONENTS REQUIRING SPECIAL SEISMIC CERTIFICATION PER H-18-8

MAPPED SPECTRAL RESPONSE ACCELERATION PARAMETERS:
 SS=0.533G S1=0.154G

SITE CLASS C (PER GEOTECHNICAL REPORT)

DESIGN SPECTRAL RESPONSE ACCELERATION PARAMETERS:
 SDS=0.421G SD1=0.169G
 SEISMIC DESIGN CATEGORY (SDC) = C

NOTE: NONSTRUCTURAL SEISMIC EXCEPTIONS AND EXEMPTIONS SHALL BE DETERMINED IN ACCORDANCE WITH H-18-8 AND CHAPTER 13 OF ASCE 7 FOR SDC = D. REFERENCE SPECIFICATION SECTION 13 05 14.

H-18-8 SPECIAL SEISMIC CERTIFICATION (SSC) REQUIREMENT:

IN STRUCTURES ASSIGNED TO SEISMIC DESIGN CATEGORY C, D, E, OR F, PERMANENT EQUIPMENT AND COMPONENTS ARE TO HAVE SPECIAL SEISMIC CERTIFICATION IN ACCORDANCE WITH REQUIREMENTS OF SECTION 13.2.2 OF ASCE 7 EXCEPT FOR EQUIPMENT AND COMPONENTS THAT ARE CONSIDERED RUGGED AS LISTED IN SECTION 2.2 OF OSHPD CODE APPLICATION NOTICE CAN NO. 2-1708A.5, AND SHALL COMPLY WITH SECTION 13.2.6 OF ASCE 7.

CLARIFICATION OF ASCE 7 "12 INCH RULE" SUSPENDED SEISMIC BRACING CODE EXCEPTION FOR PIPING AND HVAC DUCTWORK:

ALL PIPING OR DUCTWORK SUSPENDED BY INDIVIDUAL HANGER RODS 1/2" OR LESS AS MEASURED FROM THE TOP OF THE PIPING OR DUCTWORK TO THE BOTTOM OF THE SUPPORT WHERE THE HANGER IS ATTACHED, IF THE 12" LIMIT IS EXCEEDED BY ANY HANGER IN THE RUN, SEISMIC BRACING IS REQUIRED FOR THE RUN. NOTE: A SINGLE SUPPORT LOCATION THAT MEETS THE REQUIREMENT OF THIS EXCEPTION DOES NOT CONSTITUTE A SEISMIC SWAY BRACE LOCATION. IN ADDITION, TO MEET THE CODE REQUIREMENTS, ALL OF THE FOLLOWING CONDITIONS MUST ALSO BE SATISFIED:

- LATERAL MOTION OF PIPING OR DUCTWORK WILL NOT CAUSE DAMAGING IMPACT WITH SURROUNDING SYSTEMS (E.G. OTHER CONDUIT, TRAY, PIPE, DUCT, EQUIPMENT, SPRINKLER HEADS ETC.) OR CAUSE LOSS OF SYSTEM VERTICAL SUPPORT.
- PIPING OR DUCTWORK MUST BE MADE OF DUCTILE MATERIAL WITH DUCTILE CONNECTIONS.

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										<p>Location 3687 VETERANS DRIVE, FORT HARRISON, MT 59636</p>		<p>Building Number 173 / 154</p>		<p>Drawing Number M-001</p>	
<p>Issue Date 08/05/2020</p>		<p>Checked DD</p>		<p>Drawn DN</p>											

CONTROLS SYMBOLS

	ROOM THERMOSTAT/TRANSMITTER - WALL MOUNT
	ROOM HUMIDISTAT (MOISTURE)/TRANSMITTER - WALL MOUNT
	TEMPERATURE TRANSMITTER
	TEMPERATURE TRANSMITTER, AVERAGING ELEMENT
	MOISTURE (HUMIDITY) TRANSMITTER
	PRESSURE TRANSMITTER
	STATIC PRESSURE SENSOR
	FLOW TRANSMITTER
	CURRENT TRANSMITTER
	CONDUCTIVITY TRANSMITTER
	SMOKE DETECTOR
	PRESSURE DIFFERENTIAL TRANSMITTER
	PRESSURE DIFFERENTIAL SWITCH
	HAND SWITCH (HAND-OFF-AUTO SWITCH)
	VALVE OR DAMPER POSITION CONTROLLER
	LOCAL RECORDING TIME CLOCK (RUNTIME)
	TEMPERATURE SWITCH, LOW (FREEZESTAT)
	TEMPERATURE SWITCH, HIGH (FREEZESTAT)
	LEVEL CONTROLLER
	LEVEL TRANSMITTER
	PRESSURE SWITCH HIGH
	PRESSURE SWITCH LOW
	ELECTRONIC TO PNEUMATIC TRANSDUCER
	CARBON DIOXIDE TRANSMITTER
	CARBON MONOXIDE TRANSMITTER
	OCCUPANCY SENSOR
	LOCAL TEMPERATURE CONTROL PANEL
	HVAC CONTROL PANEL
	VARIABLE SPEED MOTOR CONTROLLER
	INTEGRATE CONTROL POINT ON REMOTE GRAPHICS WORKSTATION AT ENERGY CONTROL CENTER
	TEMPERATURE CONTROLLER. SEE SEQUENCE OF OPERATION
	PRESSURE CONTROLLER. SEE SEQUENCE OF OPERATION
	SPEED CONTROLLER. SEE SEQUENCE OF OPERATION
	FLOW CONTROLLER. SEE SEQUENCE OF OPERATION
	FLOW SWITCH HIGH
	FLOW SWITCH LOW
	TIME CLOCK CONTROLLING EQUIPMENT ON A SCHEDULE
	TEMPERATURE SENSING ELEMENT FOR TRANSMITTING TEMPERATURE TO EMCS (PROVIDE 12 INCHES MINIMUM LENGTH IN DUCT WHEN SPACE PERMITS.)
	SENSOR WITH AVERAGING ELEMENT TO TRANSMIT TEMPERATURE TO EMCS MOTOR STARTER
	ELECTRIC OPERATED CONTROL
	DAMPER OR VALVE
	BUILDING AUTOMATION SYSTEM

DUCTWORK SYMBOLS

	SUPPLY DUCT (UP & DOWN)
	EXHAUST DUCT (UP & DOWN)
	RETURN DUCT (UP & DOWN)
	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
	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
	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

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

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
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HVAC PIPING SYMBOLS

	HIGH PRESSURE STEAM (60 PSIG AND ABOVE)
	HIGH PRESSURE STEAM CONDENSATE RETURN
	MEDIUM PRESSURE STEAM (16 PSIG THRU 59 PSIG)
	MEDIUM PRESSURE STEAM CONDENSATE RETURN
	LOW PRESSURE STEAM (15 PSIG AND BELOW)
	LOW PRESSURE STEAM CONDENSATE RETURN
	CONDENSATE PUMP DISCHARGE
	HEATING WATER SUPPLY
	HEATING WATER RETURN
	GLYCOL-WATER HEATING SUPPLY
	GLYCOL-WATER HEATING RETURN
	SOLAR WATER SUPPLY
	SOLAR WATER RETURN
	REFRIGERANT LIQUID
	REFRIGERANT SUCTION
	REFRIGERANT HOT GAS
	CONDENSER WATER SUPPLY (FROM TOWER)
	CONDENSER WATER RETURN (TO TOWER)
	CHILLED WATER SUPPLY
	CHILLED WATER RETURN
	CHILLED GLYCOL-WATER SUPPLY
	CHILLED GLYCOL-WATER RETURN
	MAKE-UP WATER
	DRAIN LINE
	VENT LINE
	GLYCOL-WATER RUN AROUND SUPPLY
	GLYCOL-WATER RUN AROUND RETURN
	EXISTING PIPE TO BE REMOVED
	FEEDWATER PUMP DISCHARGE
	FEEDWATER PUMP SUCTION
	CONDENSATE TRANSFER PUMP DISCHARGE
	CONDENSATE TRANSFER PUMP SUCTION
	VACUUM CONDENSATE RETURN
	TUBE CLEANER WATER SUPPLY
	BOILER BLOWOFF
	CONTINUOUS BLOWDOWN
	BOILER WATER SAMPLE
	FEEDWATER SAMPLE (FROM DEAERATOR)
	CHEMICAL FEED
	OVERFLOW
	COMPRESSED AIR
	NATURAL GAS MAIN FUEL
	NATURAL GAS IGNITER FUEL
	LIQUEFIED PETROLEUM GAS IGNITER FUEL
	FUEL OIL SUPPLY
	FUEL OIL RETURN
	COLD WATER (CITY WATER)
	SOFTENED WATER
	HOT WATER
	ROLLER-TYPE HANGER
	VARIABLE SPRING-TYPE HANGER (TYPE 51)*
	SPRING CUSHION-TYPE HANGER (TYPE 48 OR 49)*
	CLEVIS-TYPE HANGER
	TRAPEZE HANGER (PROVIDE U-BOLT PIPE ATTACHMENT TO TRAPEZE EXCEPT WHERE RH ARE INDICATED)
	FLOOR-SUPPORTED PIPE STAND
	RISER CLAMP (TYPE 42)*
	WALL BRACKET (TYPE 31, 32, 33)*
	CONSTANT SUPPORT HANGER (TYPE 54, 55, 56)*
	SLIDING SUPPORTS (TYPE 35)*

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

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)
	AUTOMATIC AIR VENT
	MANUAL AIR VENT
	QUICK-COUPLE HOSE CONNECTOR
	CONNECT TO EXISTING
	LIMIT OF DEMOLITION
	AIR SEPERATOR

VALVE SYMBOLS

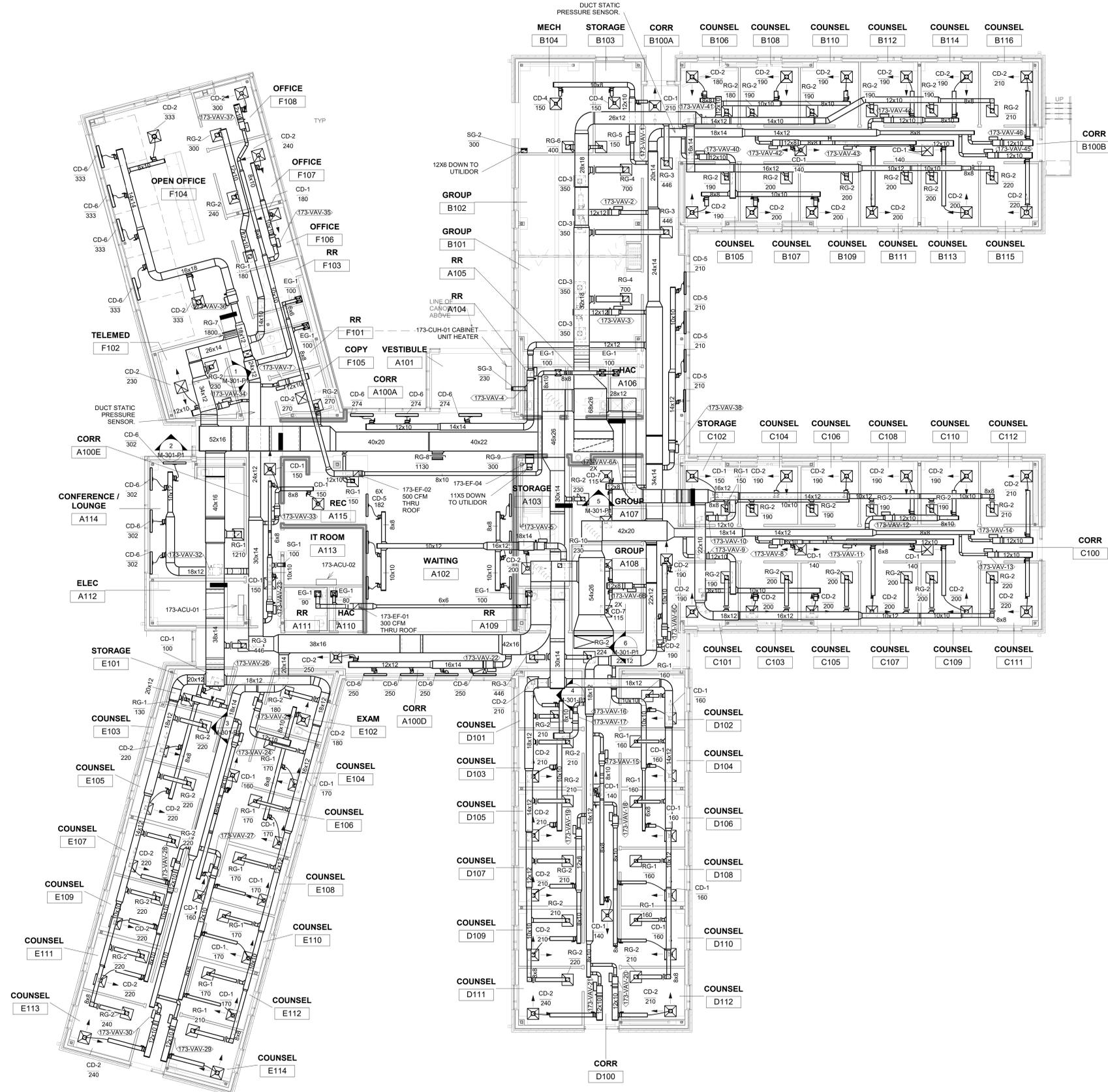
	GATE VALVE - THREADED/FLANGED
	GLOBE VALVE - THREADED/FLANGED
	GATE VALVE WITH 3/4" HOSE ADAPTER
	CHECK VALVE
	WYE STRAINER (WITH BALL VALVE & HOSE CONNECTION)
	WYE STRAINER WITH VALVED DRAIN AND QUICK-COUPLE
	FLEXIBLE CONNECTION
	ANGLE GLOBE VALVE
	BUTTERFLY VALVE
	BALL VALVE
	MODULATING CONTROL VALVE
	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

File Path

VA FORM 08-6231

<p>CONSULTANTS:</p>		<p>ARCHITECT/ENGINEERS:</p> <p>750 W HAMPDEN AVE SUITE #300 ENGLEWOOD CO 80110 (720) 550-8307 WWW.VALHALLAENGINEERING.COM</p>		<p>STAMP:</p>		<p>Drawing Title</p> <p>MECHANICAL SYMBOLS</p> <p>Approved: Project Director</p>		<p>Phase</p> <p>100% CONSTRUCTION DOCUMENTS</p>		<p>Project Title</p> <p>OUTPATIENT MENTAL HEALTH / EDUCATION ADDITION</p>		<p>Project Number</p> <p>436-114</p>	
<p>Issue Date</p> <p>08/05/2020</p>		<p>Checked</p> <p>DD</p>		<p>Drawn</p> <p>DN</p>		<p>Building Number</p> <p>173 / 154</p>		<p>Drawing Number</p> <p>M-002</p>		<p>Location</p> <p>3687 VETERANS DRIVE, FORT HARRISON, MT 59636</p>			

A B C D E F



NOTES:

1. COORDINATE NEW DIFFUSERS WITH CEILING GRID, LIGHTS, AND SPRINKLER HEADS. REFER TO REFLECTED CEILING PLAN. REF: A-103-P1.
2. REFER TO DETAILS 2, 3, 5, 6, AND 7 ON SHEET M-502 FOR DUCT CONNECTION DETAILS.
3. NOT ALL DUCT OFFSETS ARE SHOWN TO AVOID OBSTACLES. PROVIDE COORDINATION SHOP DRAWING FOR APPROVAL BEFORE CONSTRUCTION AS REQUIRED BY SPEC SECTION 23 05 11.
4. VAV INLET DUCT SIZE SHALL MATCH VAV INLET SIZE UNLESS NOTED OTHERWISE.
5. RETURN DIFFUSER DUCT SIZE SHALL MATCH NECK SIZE AS SHOWN ON THE MECHANICAL SCHEDULES UNLESS NOTED OTHERWISE.
6. MAXIMUM FLEX DUCT LENGTH PER DIFFUSER SHALL BE 5'-0".
7. ALL 90 DEGREE ELBOWS SHALL HAVE SINGLE THICKNESS TURNING VANES. REF: M-502
8. ALL ELBOWS OTHER THAN 90 DEGREES SHALL BE SMOOTH RADIUS. REF: M-502

1 MECHANICAL HVAC PLAN BLDG 173 - FIRST FLOOR
1/8" = 1'-0"



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CONSULTANTS:

HOEFER WYSOCKI
1840 TONAWANDA CREEK PARKWAY SUITE 400, LEAWOOD, KANSAS 66201

Protection Engineering

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STAMP:

VEG 4.11

U.S. Department of Veterans Affairs

Drawing Title
MECHANICAL HVAC PLAN - FIRST FLOOR

Approved: Project Director

Phase
100% CONSTRUCTION DOCUMENTS

Project Title
OUTPATIENT MENTAL HEALTH/ EDUCATION ADDITION

Location
3687 Veterans Drive, Fort Harrison, MT 59636

Issue Date
08/05/2020

Checked
DD

Drawn
DN

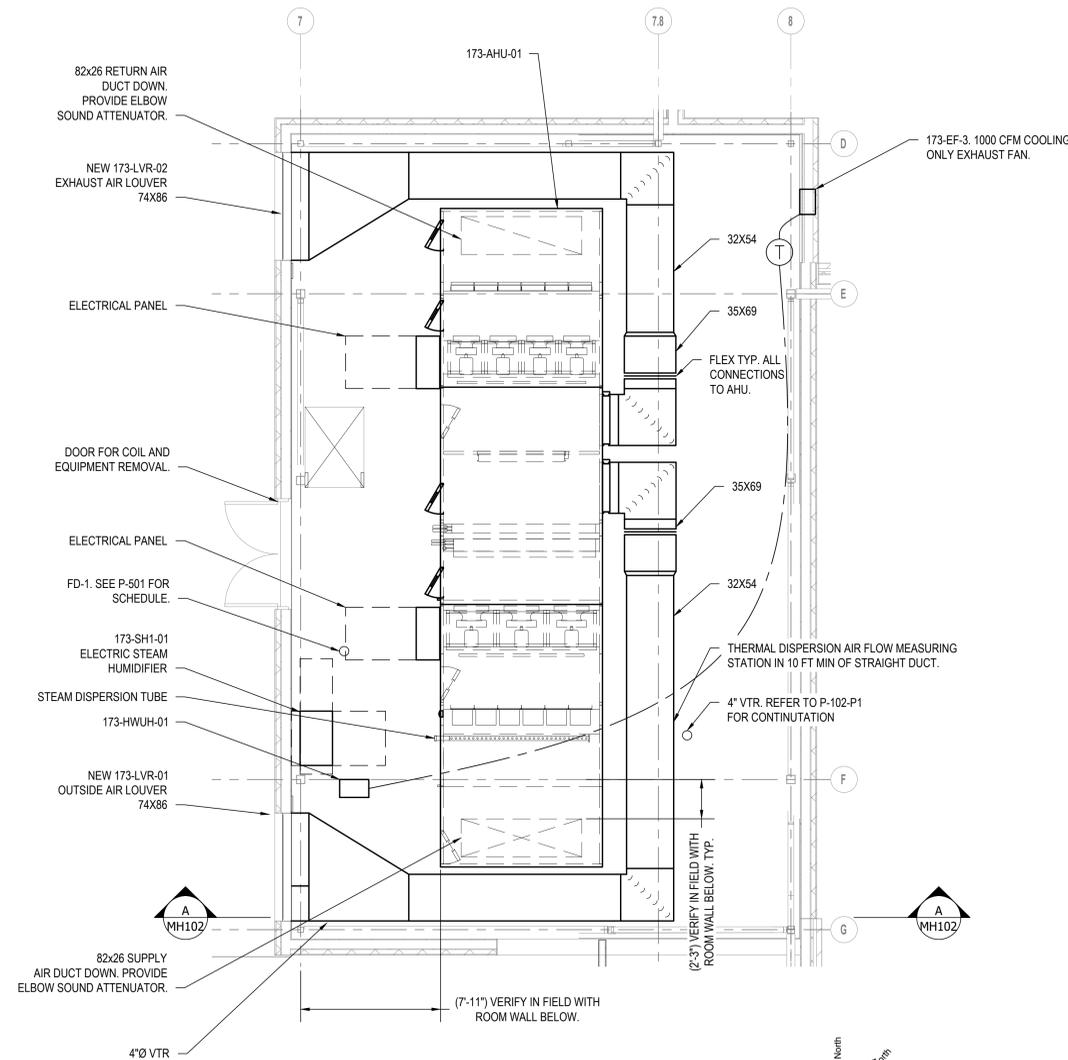
Project Number
436-114

Building Number
173

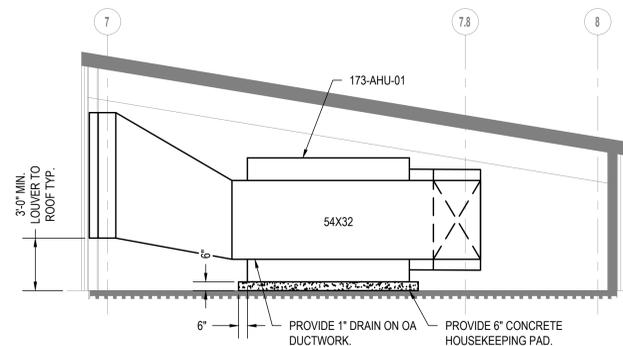
Drawing Number
MH101-P1

NOTES:

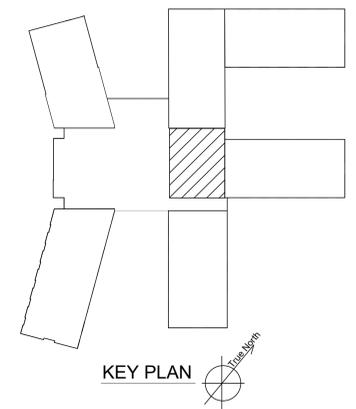
1. REFER TO MECHANICAL DETAILS AND SPECIFICATIONS FOR INSTALLATION REQUIREMENTS.
2. PROVIDE SPRING ISOLATORS ON ALL DUCTWORK AND PIPING IN PENTHOUSE.
3. PROVIDE FLEX CONNECTORS TO ALL DUCT CONNECTIONS TO AIR HANDLER.
4. OUTSIDE AIR AND EXHAUST AIR DAMPERS SHALL COMPLY WITH ASHRAE 90.1-2013 TABLE 6.4.3.4.3 MAXIMUM DAMPER LEAKAGE.



1 MECHANICAL HVAC PLAN BLDG 173 - PENTHOUSE
SCALE: 1/4" = 1'-0"

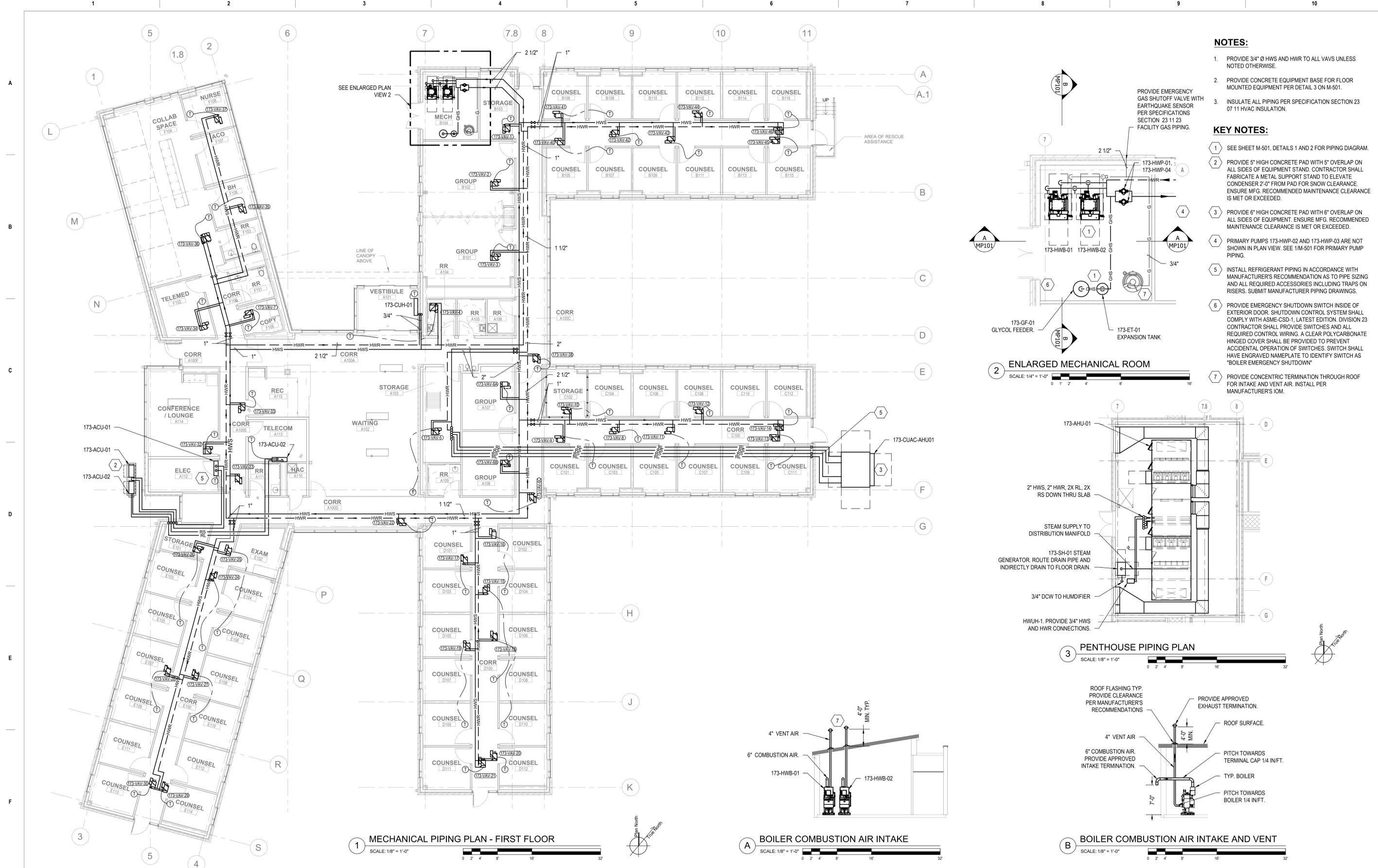


A AIR HANDLER AND LOUVER
SCALE: 1/4" = 1'-0"



KEY PLAN

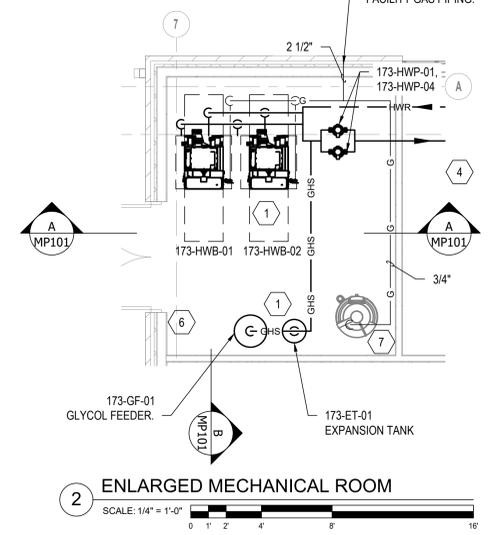
Issued: VA FORM 08-6231	Date:	CONSULTANTS:  		ARCHITECT/ENGINEERS: 		STAMP: 		Drawing Title MECHANICAL HVAC PLAN - PENTHOUSE		Phase 100% CONSTRUCTION DOCUMENTS		Project Title OUTPATIENT MENTAL HEALTH / EDUCATION ADDITION		Project Number 436-114	
		 		750 W HAMPDEN AVE SUITE #000 ENGLEWOOD CO 80110 (720) 550-6307 WWW.VALHALLAENGINEERING.COM				Approved: Project Director		Location 3687 VETERANS DRIVE, FORT HARRISON, MT 59636		Building Number 173		Drawing Number MH102-P1	



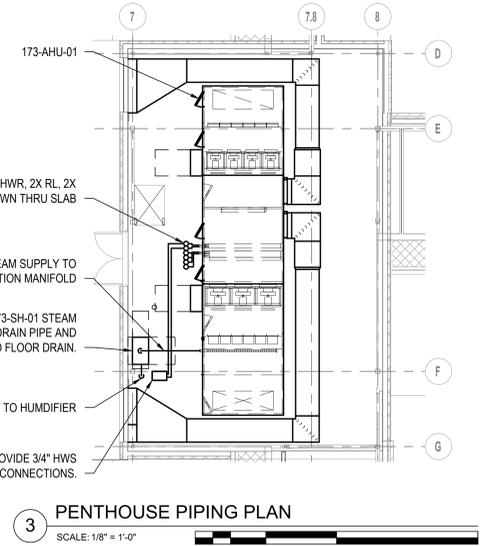
1 MECHANICAL PIPING PLAN - FIRST FLOOR
SCALE: 1/8" = 1'-0"

A BOILER COMBUSTION AIR INTAKE
SCALE: 1/8" = 1'-0"

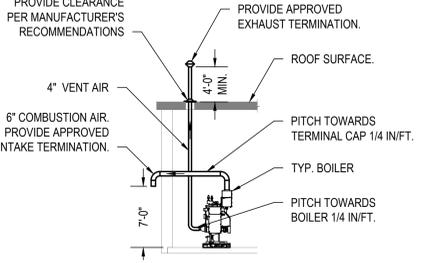
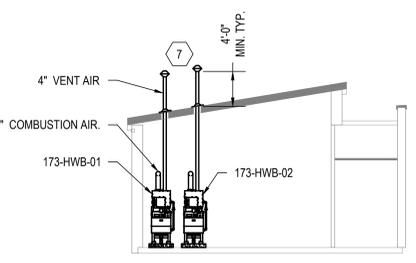
B BOILER COMBUSTION AIR INTAKE AND VENT
SCALE: 1/8" = 1'-0"



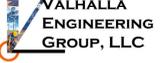
2 ENLARGED MECHANICAL ROOM
SCALE: 1/4" = 1'-0"



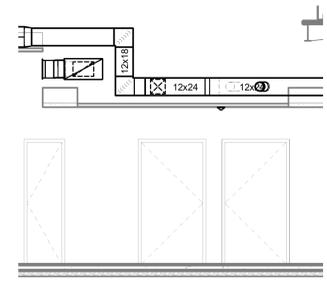
3 PENTHOUSE PIPING PLAN
SCALE: 1/8" = 1'-0"



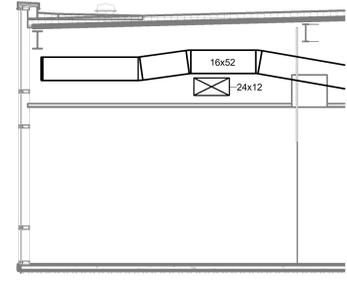
- NOTES:**
1. PROVIDE 3/4" Ø HWS AND HWR TO ALL VAVS UNLESS NOTED OTHERWISE.
 2. PROVIDE CONCRETE EQUIPMENT BASE FOR FLOOR MOUNTED EQUIPMENT PER DETAIL 3 ON M-501.
 3. INSULATE ALL PIPING PER SPECIFICATION SECTION 23 07 11 HVAC INSULATION.
- KEY NOTES:**
1. SEE SHEET M-501, DETAILS 1 AND 2 FOR PIPING DIAGRAM.
 2. PROVIDE 5" HIGH CONCRETE PAD WITH 5" OVERLAP ON ALL SIDES OF EQUIPMENT STAND. CONTRACTOR SHALL FABRICATE A METAL SUPPORT STAND TO ELEVATE CONDENSER 2'-0" FROM PAD FOR SNOW CLEARANCE. ENSURE MFG. RECOMMENDED MAINTENANCE CLEARANCE IS MET OR EXCEEDED.
 3. PROVIDE 6" HIGH CONCRETE PAD WITH 6" OVERLAP ON ALL SIDES OF EQUIPMENT. ENSURE MFG. RECOMMENDED MAINTENANCE CLEARANCE IS MET OR EXCEEDED.
 4. PRIMARY PUMPS 173-HWP-02 AND 173-HWP-03 ARE NOT SHOWN IN PLAN VIEW. SEE 1/M-501 FOR PRIMARY PUMP PIPING.
 5. INSTALL REFRIGERANT PIPING IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATION AS TO PIPE SIZING AND ALL REQUIRED ACCESSORIES INCLUDING TRAPS ON RISERS. SUBMIT MANUFACTURER PIPING DRAWINGS.
 6. PROVIDE EMERGENCY SHUTDOWN SWITCH INSIDE OF EXTERIOR DOOR. SHUTDOWN CONTROL SYSTEM SHALL COMPLY WITH ASME-CSD-1, LATEST EDITION. DIVISION 23 CONTRACTOR SHALL PROVIDE SWITCHES AND ALL REQUIRED CONTROL WIRING. A CLEAR POLYCARBONATE HINGED COVER SHALL BE PROVIDED TO PREVENT ACCIDENTAL OPERATION OF SWITCHES. SWITCH SHALL HAVE ENGRAVED NAMEPLATE TO IDENTIFY SWITCH AS "BOILER EMERGENCY SHUTDOWN".
 7. PROVIDE CONCENTRIC TERMINATION THROUGH ROOF FOR INTAKE AND VENT AIR. INSTALL PER MANUFACTURER'S IOM.

CONSULTANTS:  11400 TONAWANDA CREEK PARKWAY SUITE 400 LEANWOOD, MARYLAND 20631  Date:	ARCHITECT/ENGINEERS:  750 W HAMPSDEN AVE SUITE #300 ENGLEWOOD CO 80110 (720) 550-6307 WWW.VALHALLAENGINEERING.COM VEG.4.11	STAMP:  	Drawing Title MECHANICAL PIPING PLAN - FIRST FLOOR	Phase 100% CONSTRUCTION DOCUMENTS	Project Title OUTPATIENT MENTAL HEALTH / EDUCATION ADDITION	Project Number 436-114
			Approved: Project Director	Location 3687 VETERANS DRIVE, FORT HARRISON, MT 59636	Building Number 173	
Issued:	Date:	Issue Date 08/05/2020	Checked DD	Drawn DN	Location 3687 VETERANS DRIVE, FORT HARRISON, MT 59636	Drawing Number MP101-P1

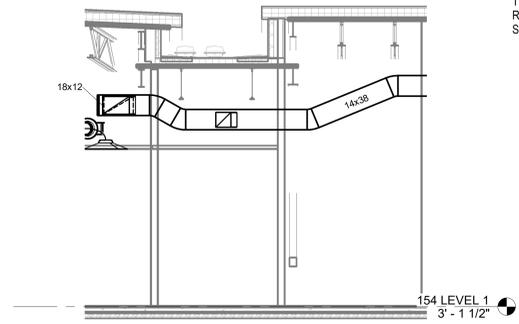
KEY NOTES:
 ① PROVIDE 2" THICK AP ARMAFLEX SA OR APPROVED EQUAL DUCT LINER. DUCT DIMENSION SHOWN IS TO THE INSIDE OF LINER. NO OUTSIDE INSULATION IS REQUIRED WHERE LINER IS PROVIDED. REFERENCE SPECIFICATION SECTION 23 07 11.



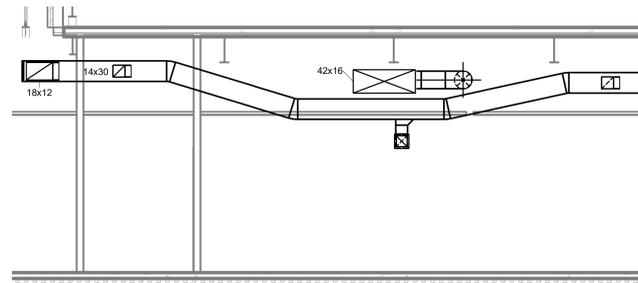
1 Section 1
1/4" = 1'-0"



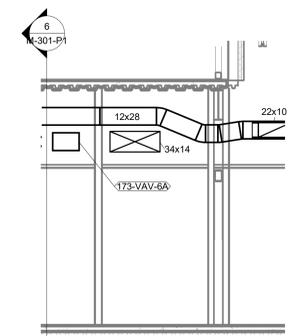
2 Section 2
1/4" = 1'-0"



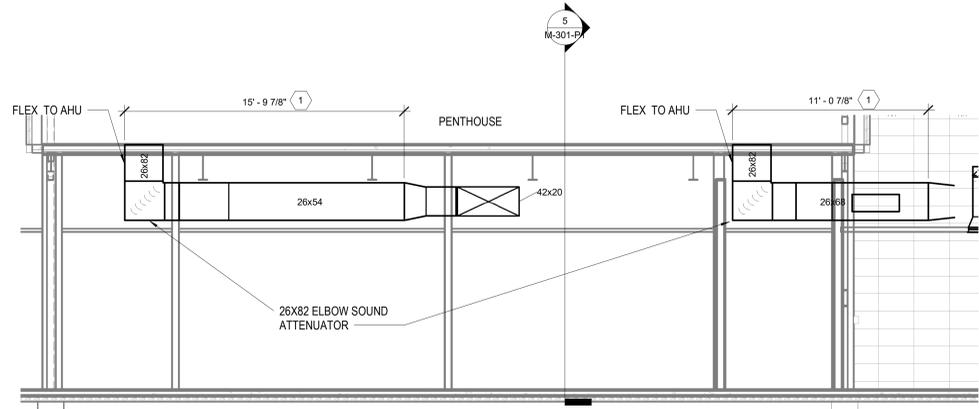
3 Section 3
1/4" = 1'-0"



4 Section 4
1/4" = 1'-0"



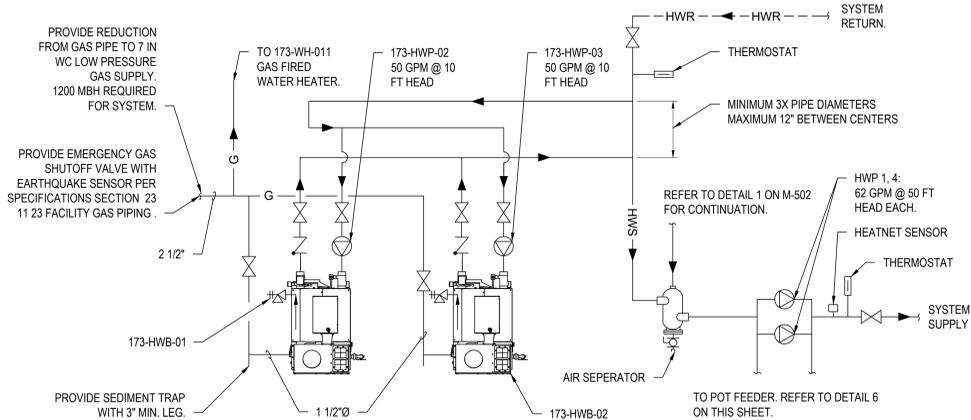
5 Section 5
1/4" = 1'-0"



6 Section 6
1/4" = 1'-0"

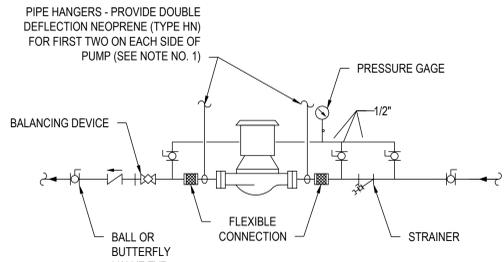
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CONSULTANTS:  HOEFER WYSOCKI <small>1840 TONAWANDA CREEK PARKWAY SUITE 400, LEANWOOD, KANSAS 66041</small>  Protection Engineering <small>CONSULTANTS</small>  JIRSA HEDRICK <small>Structural Engineers</small>		ARCHITECT/ENGINEER OF RECORD:  VALHALLA ENGINEERING GROUP, LLC <small>750 W HAMPTDEN AVE SUITE 300 ENGLEWOOD, CO 80110 (720) 550-6307 WWW.VALHALLAENGINEERING.COM</small> VEG 4.11		STAMP: 		 U.S. Department of Veterans Affairs		Drawing Title MECHANICAL SECTIONS Approved: Project Director		Phase 100% CONSTRUCTION DOCUMENTS		Project Title OUTPATIENT MENTAL HEALTH/ EDUCATION ADDITION		Project Number 436-114 Building Number 173 Drawing Number M-301-P1	
Issued: _____ Date: _____		Issue Date 08/05/2020		Checked DD		Drawn DN									



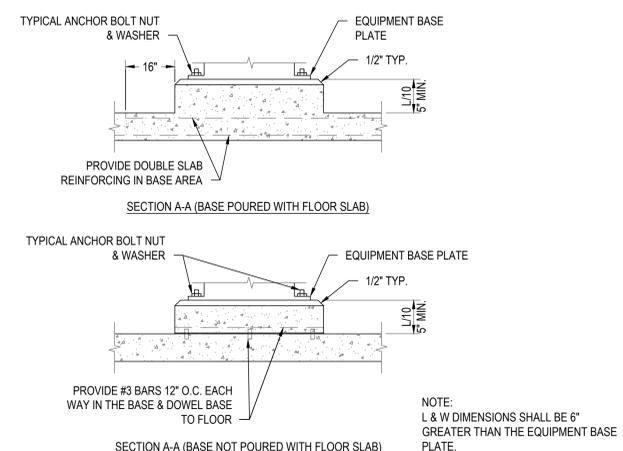
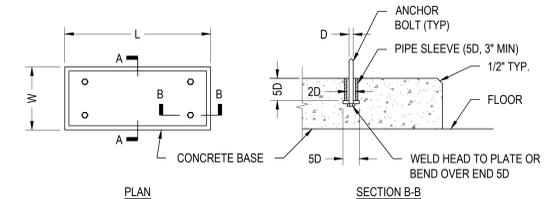
- NOTES:
1. PROVIDE DRAIN THROUGH ACID NEUTRALIZER. ROUTE AND DRAIN TO NEAREST FLOOR DRAIN.
 2. REFER TO DETAIL 2 FOR INLINE PUMP DETAIL.

1 BOILER PIPING DIAGRAM
SCALE: NO SCALE



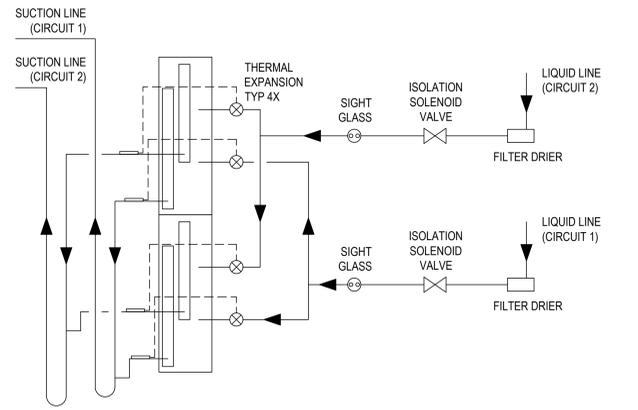
- NOTES:
1. SUPPORT PUMP FROM PIPING ONLY. DO NOT SUPPORT PUMP FROM MOTOR.
 2. SUBMIT STAMPED SEISMIC RESTRAINT SUBMITTAL FOR VHA COR REVIEW PER SPECIFICATION SECTIONS 23 05 41 AND 13 05 41.

2 INLINE PUMPS
SCALE: NO SCALE



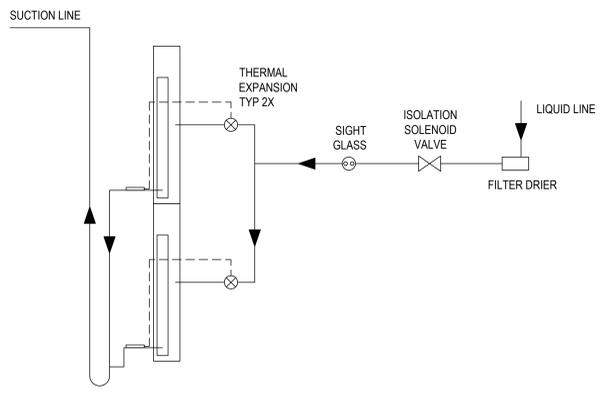
NOTE:
L & W DIMENSIONS SHALL BE 6" GREATER THAN THE EQUIPMENT BASE PLATE.

3 CONCRETE EQUIPMENT BASE
SCALE: NO SCALE



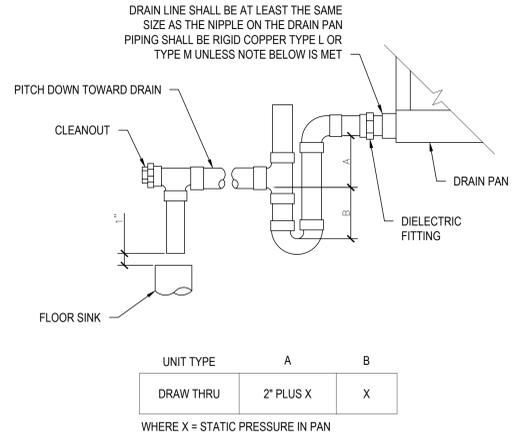
- NOTE:
1. FOR INFORMATION ONLY, INSTALL PER MANUFACTURER'S IOM.

4 173-AHU-01 DX INTERTWINED EVAPORATOR PIPING DIAGRAM
SCALE: NO SCALE

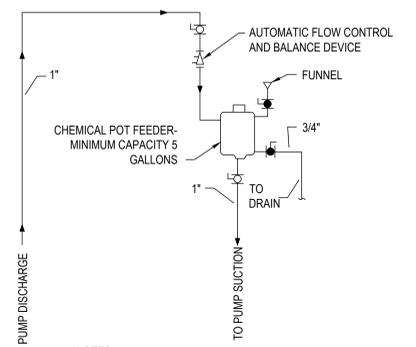


- NOTE:
1. FOR INFORMATION ONLY, INSTALL PER MANUFACTURER'S IOM.

5 154-AHU-01-EDU DX EVAPORATOR PIPING DIAGRAM
SCALE: NO SCALE



6 AIR HANDLING UNIT DRAIN TRAP DETAIL
SCALE: NO SCALE



- NOTES:
1. TOP OF CHEMICAL POT FEEDER TANK SHALL NOT BE MORE THAN 4'-0" ABOVE FINISHED FLOOR.

6 POT FEEDER DETAIL
SCALE: NO SCALE

Issued: _____ Date: _____ VA FORM 08-6231	CONSULTANTS: 	ARCHITECT/ENGINEERS: 	STAMP: 		Drawing Title MECHANICAL DETAILS	Phase 100% CONSTRUCTION DOCUMENTS	Project Title OUTPATIENT MENTAL HEALTH / EDUCATION ADDITION	Project Number 436-114
	Approved: Project Director	Location 3687 VETERANS DRIVE, FORT HARRISON, MT 59636	Issue Date 08/05/2020	Checked DD	Drawn DN	Building Number 173 / 154	Drawing Number M-501	

A

B

C

D

E

F

A

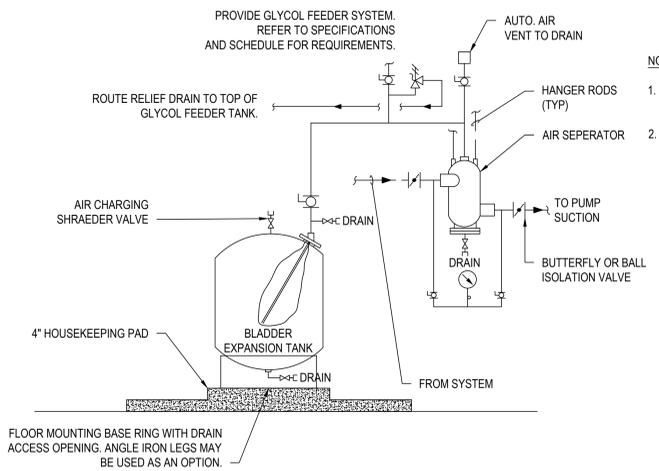
B

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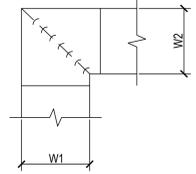


1 FLOOR MOUNTED EXPANSION TANK PIPING CONNECTIONS

SCALE: NO SCALE

NOTE:

1. SEE EXPANSION TANK SYSTEM SCHEDULE FOR COMPONENT SIZES.
2. SET SYSTEM MAKEUP PRESSURE FROM GLYCOL FEEDER AT 30 PSI.

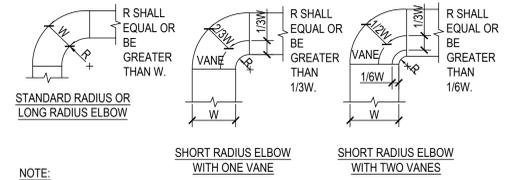


NOTES:

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

2 DUCTWORK SQUARE VANE ELBOWS

SCALE: NO SCALE

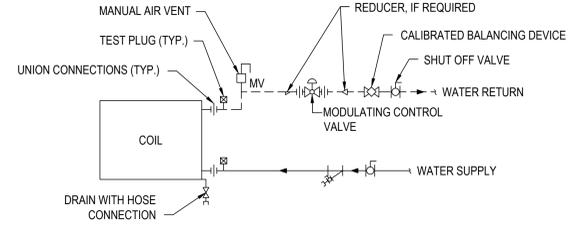


NOTE:

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.

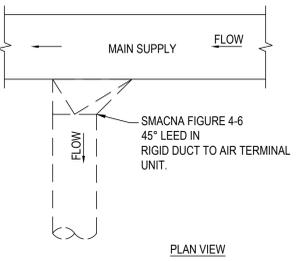
3 DUCTWORK ROUND RADIUS ELBOWS

SCALE: NO SCALE



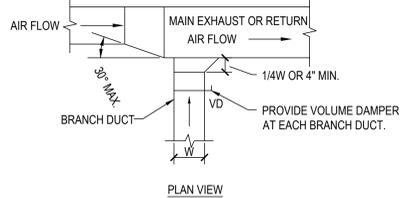
4 TERMINAL UNIT WATER COILS AND CABINET HEATER PIPING CONNECTIONS

SCALE: NO SCALE



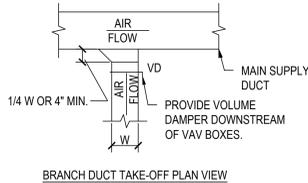
5 SUPPLY DUCT TAKEOFF AIR TERMINAL UNIT

SCALE: NO SCALE



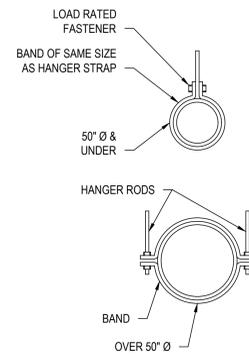
6 EXHAUST OR RETURN BRANCH DUCTWORK

SCALE: NO SCALE



7 SUPPLY DUCTWORK TAKE-OFFS

SCALE: NO SCALE



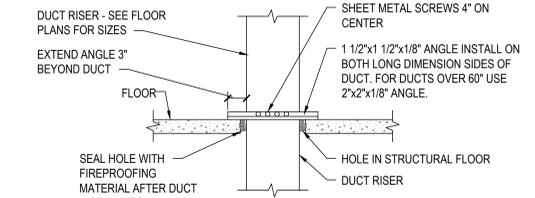
HANGER STRAPS OR RODS			
MAX. DUCT Ø (IN.)	QUANTITY/SIZE (IN.)	MAX. LOAD (LBS.)	MAX. SPACING (IN.)
26	ONE 1 X 22 GA STRAP	260	144
36	ONE 1 X 18 GA STRAP	420	144
50	ONE 1 X 16 GA STRAP	700	144
60	TWO 3/8 Ø RODS	1320	144
84	TWO 1/2 Ø RODS	2500	144

NOTE:

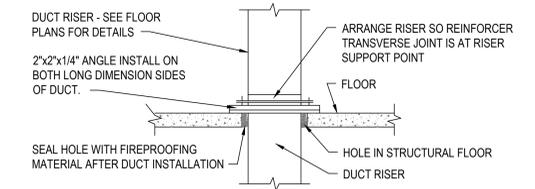
TABULATED DATA FROM SMACNA ALLOWS FOR DUCT REINFORCING AND INSULATION, BUT NO EXTERNAL LOAD.

8 ROUND DUCT HANGERS

SCALE: NO SCALE



0.5 INCH WG TO 2 INCHES WG DUCT RISER SUPPORT



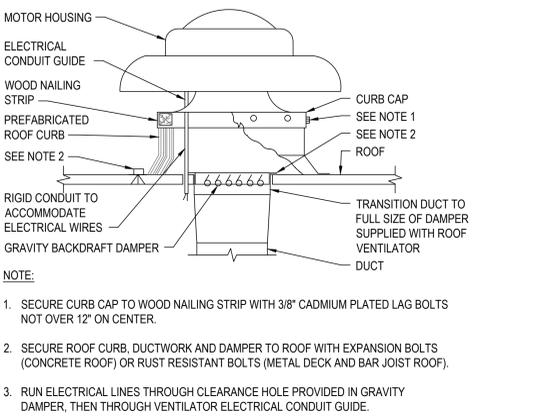
2 INCHES WG TO 4 INCHES WG DUCT RISER SUPPORT

NOTE:

ALL DUCT WORK RISERS WHICH ARE RUN EXPOSED, SUCH AS THRU ATTIC FLOORS AND FAN ROOM FLOORS SHALL BE PROVIDED WITH A 3" HIGH CONCRETE CURB AROUND OPENING FOR DUCT.

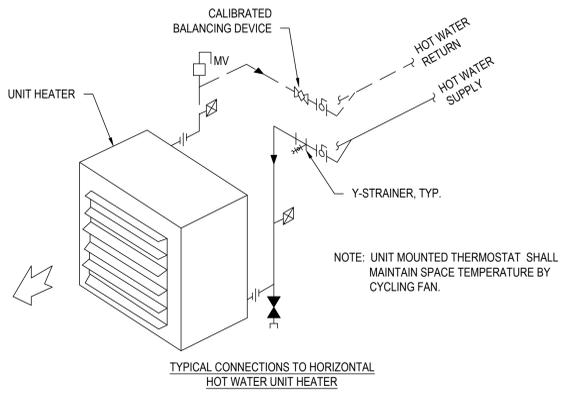
9 DUCT RISER SUPPORT

SCALE: NO SCALE



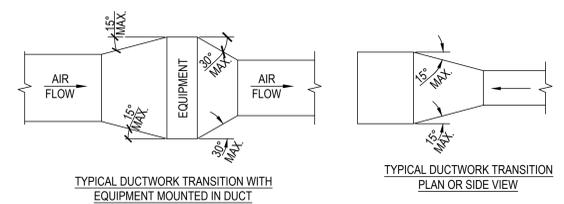
10 SUPPLY DUCT TAKEOFF POWER ROOF VENTILATOR

SCALE: NO SCALE



11 HOT WATER UNIT HEATER DETAIL

SCALE: NO SCALE

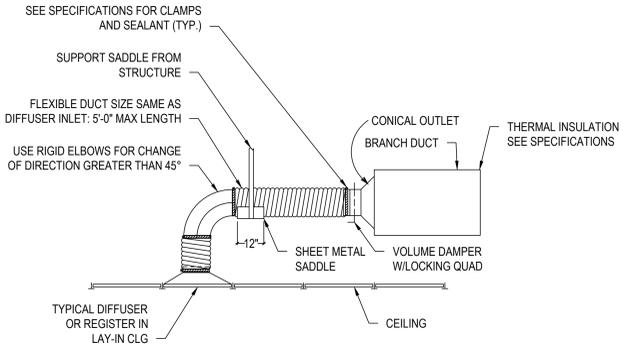


NOTE:

1. UNLESS OTHERWISE INDICATED ON PLANS, MAXIMUM ANGLES SHOWN SHALL APPLY.

12 DUCTWORK TRANSITIONS (WITH EQUIPMENT MOUNTED IN DUCT)

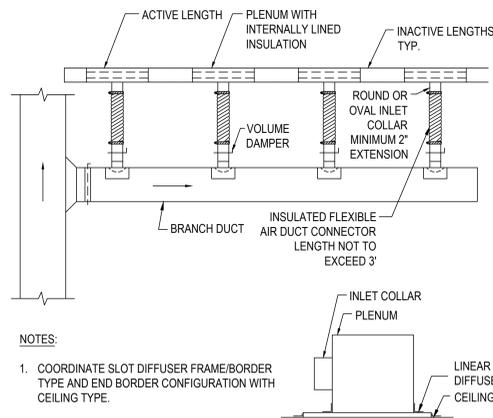
SCALE: NO SCALE



13 FLEXIBLE AIR DUCT CONNECTOR

SCALE: NO SCALE

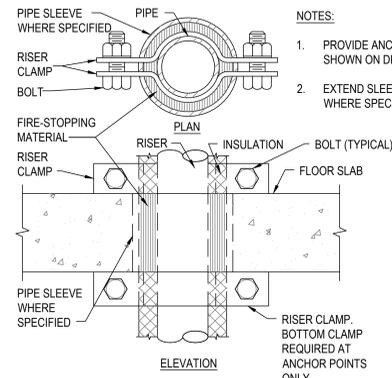
<p>CONSULTANTS:</p> <p>HOEFLER WYSOCKI</p> <p>11400 TONAWANDA CREEK PARKWAY SUITE 400 LEANWOOD, VA 24115</p> <p>LANDMARK ENGINEERING</p> <p>PROTECTION ENGINEERING</p> <p>JIRSA HEDRICK Structural Engineers</p>	<p>ARCHITECT/ENGINEERS:</p> <p>VALHALLA ENGINEERING GROUP, LLC</p> <p>750 W HAMPTDEN AVE SUITE #100 ENGLEWOOD CO 80110 (720) 550-6307 WWW.VALHALLAENGINEERING.COM</p>	<p>STAMP:</p> <p>U.S. Department of Veterans Affairs</p>	<p>Drawing Title</p> <p>MECHANICAL DETAILS</p>	<p>Phase</p> <p>100% CONSTRUCTION DOCUMENTS</p>	<p>Project Title</p> <p>OUTPATIENT MENTAL HEALTH / EDUCATION ADDITION</p>	<p>Project Number</p> <p>436-114</p>
			<p>Approved: Project Director</p>	<p>Location</p> <p>3687 VETERANS DRIVE, FORT HARRISON, MT 59636</p>	<p>Building Number</p> <p>173 / 154</p>	
<p>Issue Date</p> <p>08/05/2020</p>	<p>Checked</p> <p>DD</p>	<p>Drawn</p> <p>DN</p>	<p>Drawing Number</p> <p>M-502</p>			



- NOTES:
- COORDINATE SLOT DIFFUSER FRAME/BORDER TYPE AND END BORDER CONFIGURATION WITH CEILING TYPE.

1 LINEAR SLOT DIFFUSERS

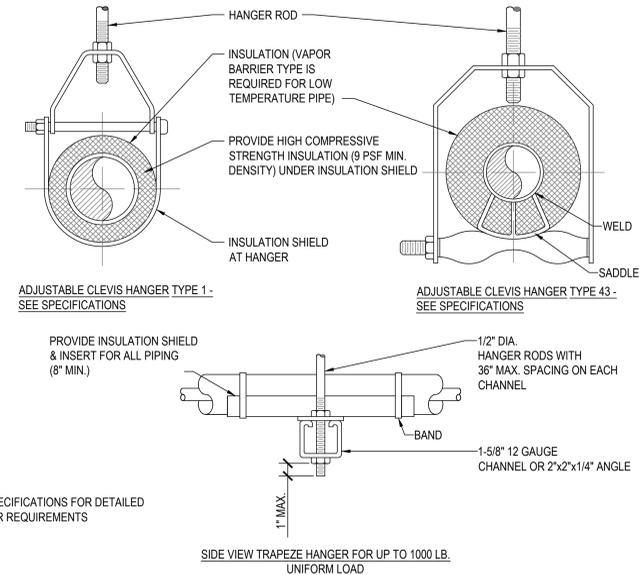
SCALE: NO SCALE



- NOTES:
- PROVIDE ANCHORS ONLY WHERE SHOWN ON DRAWINGS.
 - EXTEND SLEEVE ABOVE FLOOR WHERE SPECIFIED.

2 SUPPORT/ANCHOR FOR PIPE RISERS

SCALE: NO SCALE



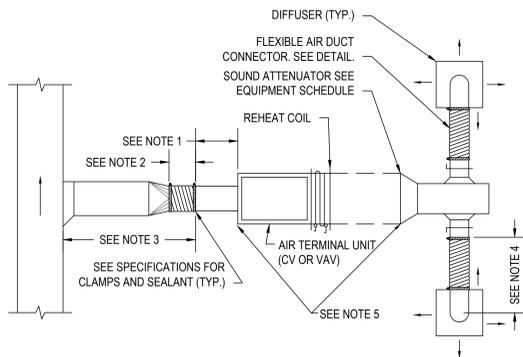
- NOTES:
- SEE SPECIFICATIONS FOR DETAILED HANGER REQUIREMENTS

MAXIMUM PIPE/TUBING SUPPORT SPACING																			
NOM. SIZE	IN.	THRU 3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12	14	16	18	20	24
PIPE	FT.	7	7	7	9	10	11	12	14	16	17	19	22	23	25	27	28	30	32
TUBING	FT.	5 FT	6	7	8	8	9	10	12	13	14	16	-	-	-	-	-	-	-

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

3 PIPE HANGERS

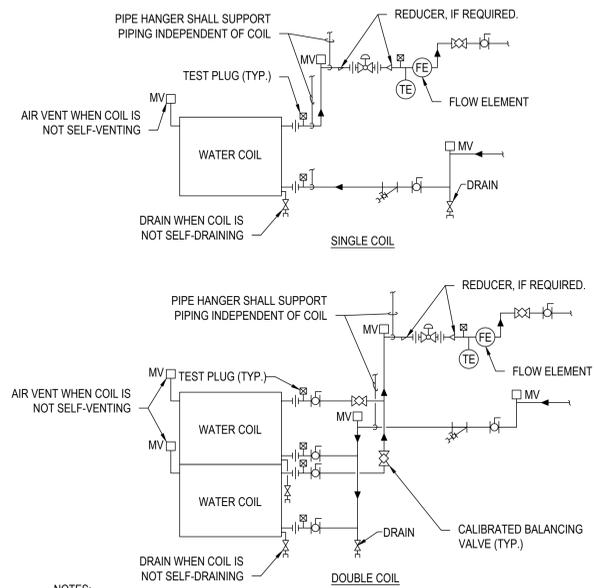
SCALE: NO SCALE



- NOTES:
- RIGID STRAIGHT TERMINAL UNIT INLET LENGTH SHALL BE A MINIMUM OF 3 TIMES THE DIAMETER OF INLET
 - A FLEXIBLE AIR DUCT CONNECTOR IS NOT MANDATORY FOR INLET TO THIS BOX, BUT ALLOWED TO ACCOMMODATE MINOR OFFSETS. MAXIMUM LENGTH 3'-0".
 - 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".
 - FLEXIBLE AIR DUCT CONNECTORS, WHEN USED FROM TERMINAL UNIT SUPPLY AIR DUCT TO DIFFUSER, SHALL NOT EXCEED 5'-0". 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.

4 DUCT CONNECTIONS - AIR TERMINAL UNITS

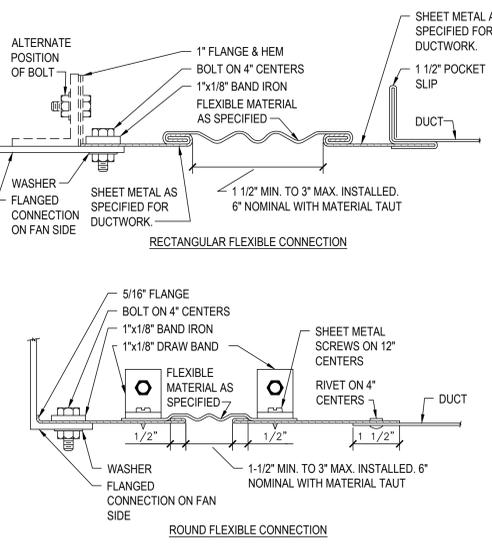
SCALE: NO SCALE



- NOTES:
- WHEN COIL IS INCLUDED IN CASING MOUNTED ON VIBRATION ISOLATORS THE FIRST 2 HANGERS FOR EACH PIPE SHALL BE SPRING & NEOPRENE TYPE. TYPE "H" FOR 4" PIPE & SMALLER. TYPE "H-P" FOR 5" PIPE & LARGER.
 - PIPING SHALL BE INSTALLED IN SUCH A MANNER THAT IT WILL NOT BLOCK THE SWING OR USE OF ACCESS DOORS OR PANELS; NEITHER SHALL IT BLOCK THE SERVICING OF FILTERS, VALVES, OR EQUIPMENT. ENSURE INSTALLATION ALLOWS FOR COIL PULL.
 - THE FLOW ELEMENT MAY BE INSTALLED IN THE SUPPLY PIPING IF THE REQUIRED MINIMUM UPSTREAM AND DOWNSTREAM DIMENSIONS CANNOT BE OBTAINED IN THE RETURN PIPING. MAINTAIN UPSTREAM AND DOWN STREAM DISTANCES RECOMMENDED BY METER MANUFACTURER.

5 WATER COILS - PIPING CONNECTIONS

SCALE: NO SCALE



6 FLEXIBLE DUCT CONNECTIONS

SCALE: NO SCALE

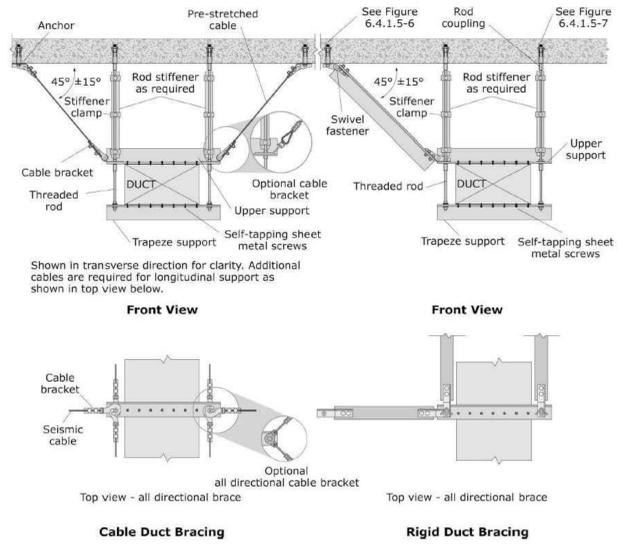


FIGURE 6.4.6.1-8
SUSPENDED DUCTWORK

- NOTES:
- SEE SHEET M-001 FOR SEISMIC RESTRAINT NOTES AND FACILITY-SPECIFIC SEISMIC DESIGN BASIS PARAMETERS.
 - SEE M-504 FOR CONTINUATION OF SEISMIC BRACING FIGURES.
 - FIGURES ARE FROM FEMA E-74 REDUCING THE RISKS OF NONSTRUCTURAL EARTHQUAKE DAMAGE - A PRACTICAL GUIDE, DECEMBER 2012.

CONSULTANTS: 	ARCHITECT/ENGINEERS: 	STAMP: 		Drawing Title	Phase	Project Title	Project Number
				MECHANICAL DETAILS	100% CONSTRUCTION DOCUMENTS	OUTPATIENT MENTAL HEALTH / EDUCATION ADDITION	436-114
Issued: _____ Date: _____				Approved: Project Director		Location	Drawing Number
						3687 VETERANS DRIVE, FORT HARRISON, MT 59636	173 / 154
						Issue Date	M-503
						Checked	
						Drawn	

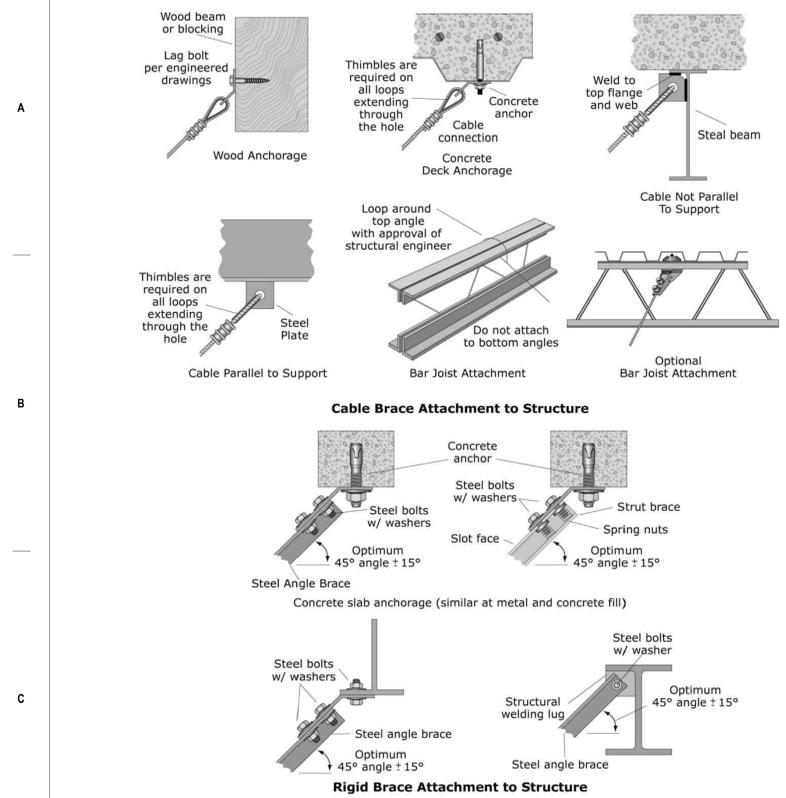


FIGURE 6.4.1.5-6
CABLE AND RIGID BRACE ATTACHMENTS TO STRUCTURE

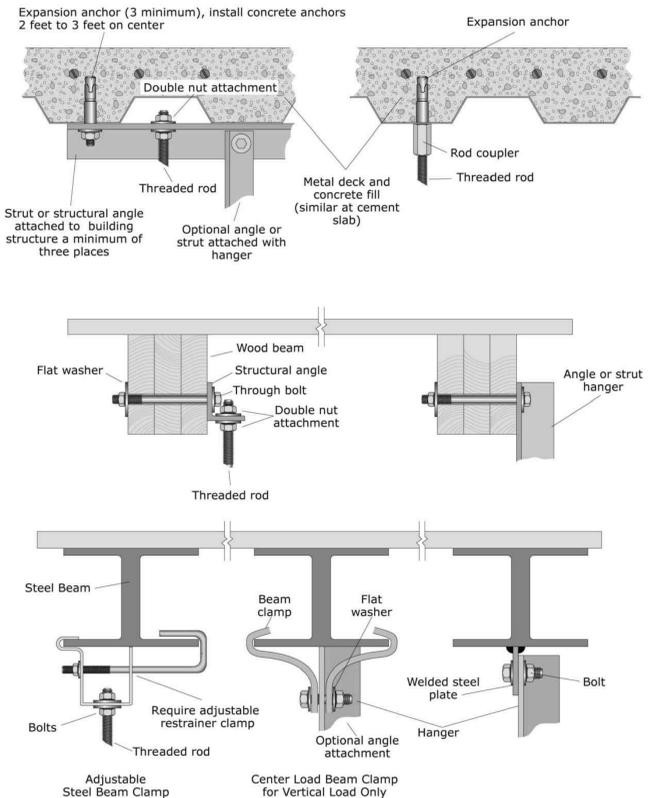


FIGURE 6.4.1.5-7
HANGER ATTACHMENT DETAILS

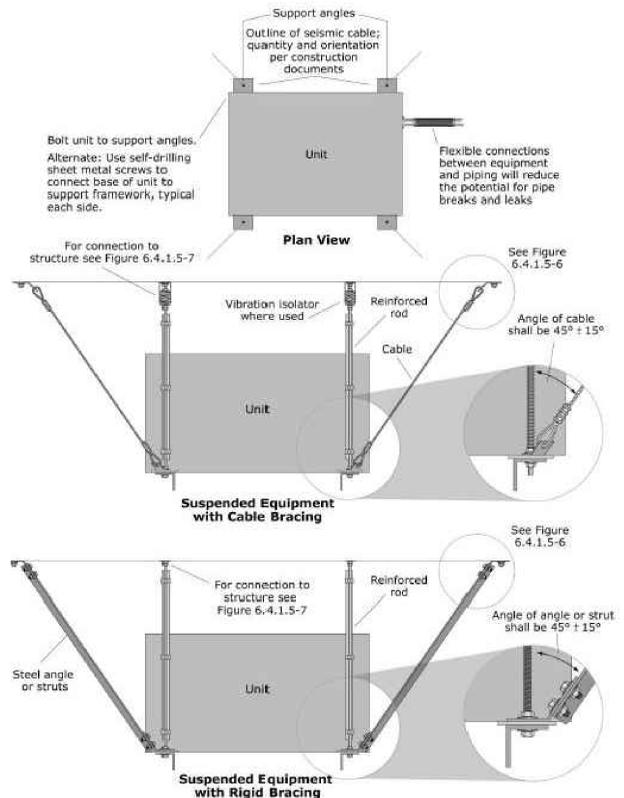


FIGURE 6.4.1.6-2
SUSPENDED EQUIPMENT

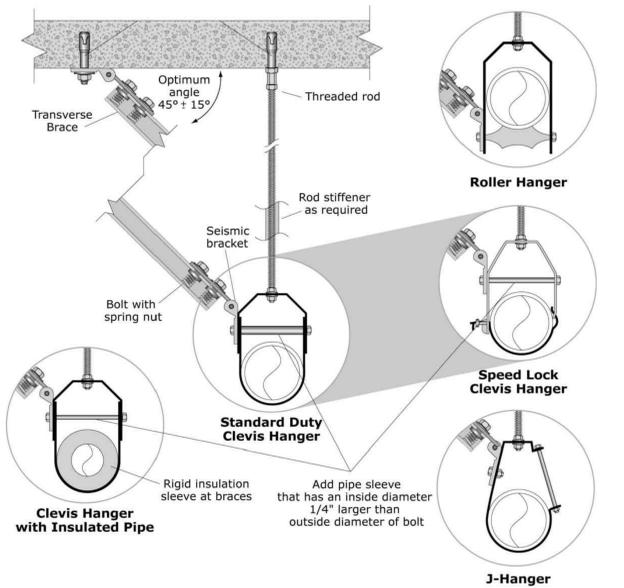


FIGURE 6.4.3.1-11
RIGID BRACING - SINGLE PIPE TRANSVERSE

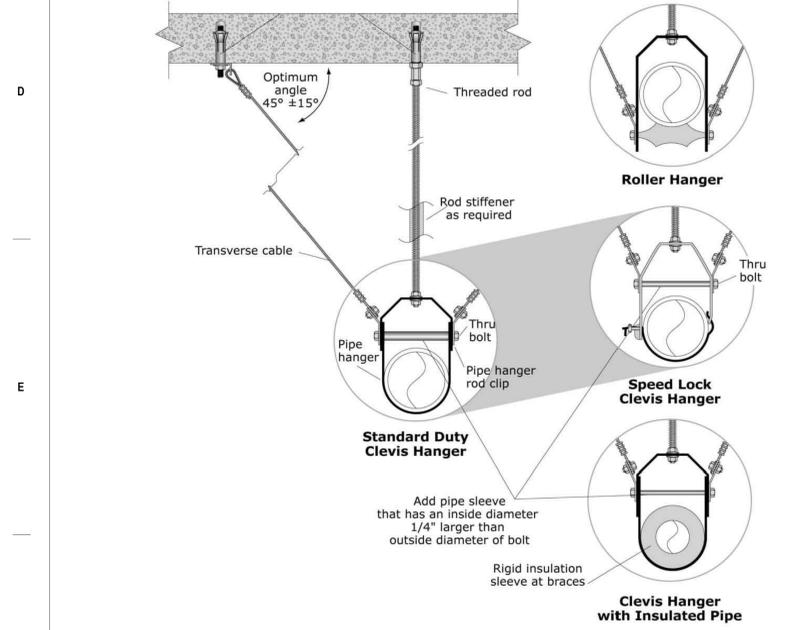


FIGURE 6.4.3.1-12
CABLE BRACING - SINGLE PIPE TRANSVERSE

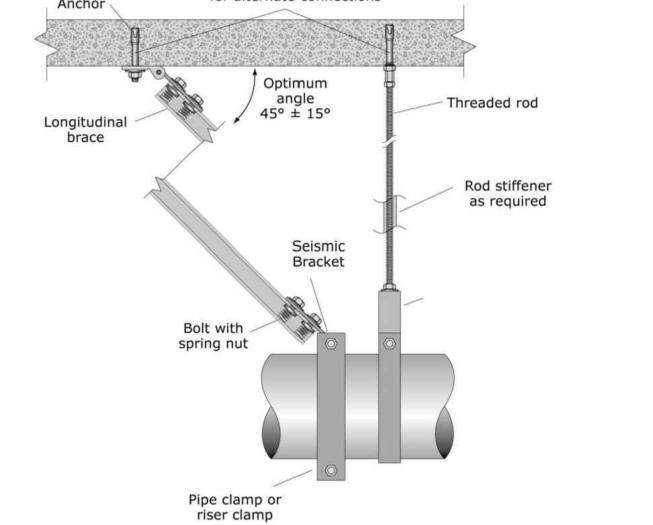


FIGURE 6.4.3.1-13
RIGID BRACING - SINGLE PIPE ALTERNATE TRANSVERSE

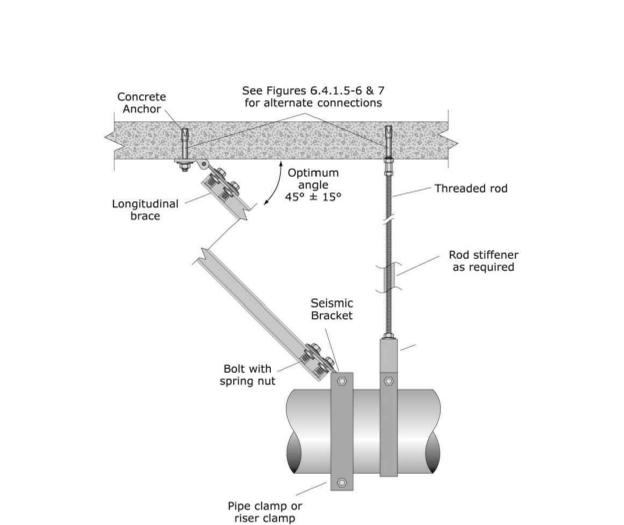


FIGURE 6.4.3.1-14
RIGID BRACING - SINGLE PIPE LONGITUDINAL

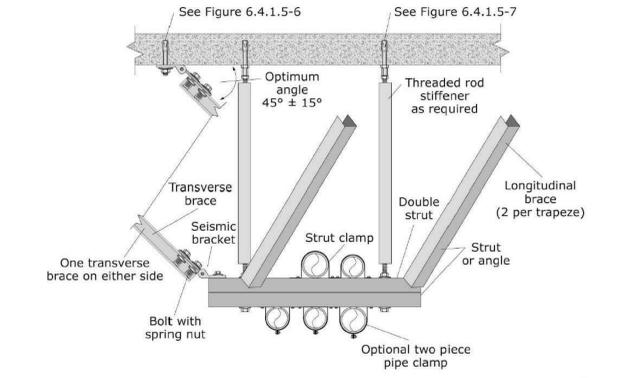


FIGURE 6.4.3.1-15
RIGID BRACING - TRAPEZE SUPPORTED PIPING

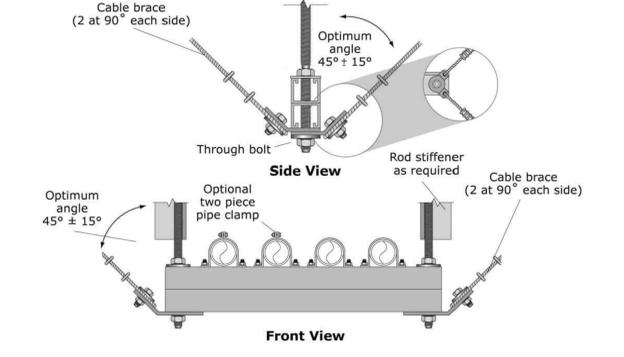


FIGURE 6.4.3.1-16
CABLE BRACING - TRAPEZE SUPPORTED PIPING

- NOTES:**
- SEE SHEET M-001 FOR SEISMIC RESTRAINT NOTES AND FACILITY-SPECIFIC SEISMIC DESIGN BASIS PARAMETERS.
 - FIGURES ARE FROM FEMA E-74 REDUCING THE RISKS OF NONSTRUCTURAL EARTHQUAKE DAMAGE - A PRACTICAL GUIDE, DECEMBER 2012.

Issued:	Date:	CONSULTANTS:	ARCHITECT/ENGINEERS:	STAMP:	Drawing Title	Phase	Project Title	Project Number
		   	 750 W HAMPDEN AVE SUITE #100 ENGLEWOOD CO 80110 (720) 550-8307 WWW.VALHALLAENGINEERING.COM	 	MECHANICAL DETAILS	100% CONSTRUCTION DOCUMENTS	OUTPATIENT MENTAL HEALTH / EDUCATION ADDITION	436-114
					Approved: Project Director		Location	Building Number
							3687 VETERANS DRIVE, FORT HARRISON, MT 59636	173 / 154
							Issue Date	Drawing Number
							08/05/2020	M-504
							Checked	
							DD	
							Drawn	
							DN	

AIR HANDLING UNIT SCHEDULE																															
MARK	MIN OA (CFM)	MAX LENGTH (IN)	MAX HEIGHT (IN)	MAX WIDTH (IN)	SUPPLY FAN										DX COOLING COIL								PREFILTER			MANUFACTURER AND MODEL					
					AIRFLOW (CFM)	T.S.P. (IN. W.G.)	E.S.P. (IN. W.G.)	WHEEL (TYPE)	DRIVE	VFD	FAN RPM	FAN QTY	MOTOR HP EACH	PH	Hz	V	MOTOR FLA EACH	MAX. F.V. (FT/MIN)	MAX. A.P.D. (IN.W.G.)	EAT-DB (°F)	EAT-WB (°F)	LAT-DB (°F)	LAT-WB (°F)	SMBH	TMBH		REF	SUCTION TEMP(°F)	MERV	THICKNESS (IN)	FINAL A.P.D. (IN. W.G.)
173-AHU-01	5100	452	85	110	19600	7.31	2.5	HPF-A100	DIRECT	Y	3,862	6	7	3	60	208	17	417	0.39	80	64	55	55	456	491	R-410A	45	8	2	0.7	HUNTAIR CSU-20K HW/DX OR APPROVED EQUAL
					RETURN FAN										HEATING COIL								PREFILTER #2			REMARKS					
AIRFLOW (CFM)	T.S.P. (IN. W.G.)	E.S.P. (IN. W.G.)	WHEEL (TYPE)	DRIVE	VFD	FAN RPM	FAN QTY	MOTOR HP EACH	PH	Hz	V	MOTOR FLA EACH	HEATING AIRFLOW (CFM)	MAX. F.V. (FT/MIN)	MAX. A.P.D. (IN.W.G.)	EAT-DB (°F)	LAT-DB (°F)	MBH	PROPYLENE GLYCOL CONTENT	EWT (°F)	LWT (°F)	FLOW RATE (GPM)	MERV	THICKNESS (IN)	FINAL A.P.D. (IN. W.G.)						
	18800	1.98	1.7	HPF-A100	DIRECT	Y	3,862	6	2	3	60	208	5.7	16650	353	0.03	45	69	378	40%	160	130	28	11	6	0.7	INCLUDE 100 LB/HR STEAM DISTRIBUTION MANIFOLD. SEE HUMIDIFIER SCHEDULE FOR STEAM GENERATOR.				
					AFTERFILTER																										

NOTES:
1. PREFILTER 1 AND PREFILTER 2 SHALL BE LOCATED BACK-TO-BACK AND UPSTREAM OF ALL COILS AND FANS.
2. AIR HANDLER FAN CONFIGURATION SHALL BE DRAWN-THRU.
3. INCLUDE STEAM HUMIDIFICATION MANIFOLD FOR AN ELECTRIC STEAM GENERATOR. SEE ELECTRIC STEAM HUMIDIFIER SCHEDULE.
4. ENSURE DX SEGMENT OF AHU CAN ACCOMMODATE WATER COIL FOR SIMILAR COOLING LOAD. PROVIDE RECOMMENDED COIL SELECTION IN SUBMITTAL.
5. AIR HANDLER SHALL BE SEISMICALLY CERTIFIED FROM THE FACTORY FOR SEISMIC DESIGN CATEGORY C. (SEE SEISMIC NOTE AND DSS EQUIPMENT TABULATION).
6. PERFORMANCE AT 4000 FT. ELEVATION.
7. DESIGN OUTDOOR CONDITIONS: SUMMER: 93 F DB AT 61.5 F WB; WINTER: -13 F DB
8. FAN SHALL BE DYNAMICALLY BALANCED TO BV-5. IF RATING IS NOT MET, AIR HANDLER SHALL INCLUDE SPRING VIBRATION ISOLATION BASE.
9. VFDs SHALL BE PROVIDED BY UNIT MANUFACTURER.

HEATING WATER BOILER SCHEDULE																			
MARK	SYSTEM AND/OR SERVICE	TYPE	FLUID				BOILER				NATURAL GAS SUPPLY PRESSURE	RELIEF VALVE SETTING	ELECTRICAL			MANUFACTURER AND MODEL	REMARKS		
			FLOW GPM	EWT °F	LWT °F	WPD FT	POWER MBH	OUTPUT GENERATED MBH	MAX HEAT INPUT % EFF	VOLT			PHASE	FLA					
173-HWB-01	HEATING HOT WATER	CONDENSING CAST IRON	50	130	160	1.85	16.3		552	600	92	7	NG	50	120	1	13.1	ADVANCED THERMAL HYDRONICS KN-6 OR APPROVED EQUAL	1, 2, 3
173-HWB-02	HEATING HOT WATER	CONDENSING CAST IRON	50	130	160	1.85	16.3		552	600	92	7	NG	50	120	1	13.1	ADVANCED THERMAL HYDRONICS KN-6 OR APPROVED EQUAL	1, 2, 3

NOTES:
1. UNIT SHALL BE RATED FOR SEISMIC DESIGN CATEGORY C (SEE SEISMIC NOTE AND DSS EQUIPMENT TABULATION).
2. PROVIDE ACID NEUTRALIZATION KIT FOR DRAIN.
3. PROVIDE DISCONNECT FOR UNIT. REFER TO E-601 AND E-602 FOR REQUIREMENTS.

EXPANSION TANK SCHEDULE															
MARK	SYSTEM AND/OR SERVICE	TYPE	APPROX SYSTEM VOLUME	SYSTEM TEMPERATURE RANGE		INITIAL PRESSURE IN TANK	MAX OPERATING PRESSURE	FILL PRESSURE AT TANK		MIN VOLUME TANK	MIN ACCEPTANCE VOLUME	PIPE SIZE TO TANK	MAKE-UP WATER FILL SIZE	MANUFACTURER AND MODEL	REMARKS
				MIN	MAX			RELIEF VALVE AT TANK	AT TANK						
173-ET-01	HEATING WATER	VERTICAL DIAPHRAGM	349	40	160	30	45	50	30	57	27	1"	1"	TACO CX215 OR APPROVED EQUAL	

HOT WATER UNIT HEATER SCHEDULE															
MARK	AREA AND/OR BLDG SERVED	TYPE UNIT	AIR FLOW CFM	MIN CAPACITY BTUH	TEMPERATURES		FLUID TYPE	MOTOR				MANUFACTURER AND MODEL	REMARKS		
					EAT °F	EWT °F		FLOW GPM	WPD FT	POWER HP	PHASE			VOLT	RPM
173-CUH-01	VESTIBULE	FLOOR MOUNTED	169	10000	55	160	40% PROPYLENE GLYCOL	1.08	6.43	0.13	1	208	831	TRANE FFBB020 OR APPROVED EQUAL	1, 2
173-HWU-01	PENTHOUSE	HORIZONTAL	730	14200	70	160	40% PROPYLENE GLYCOL	0.9	0.1	0.07	1	115	-	ZEHNDER RH-47 OR APPROVED EQUAL	1, 2

NOTES:
1. PERFORMANCE AT 4000 FT ELEVATION.
2. PROVIDE DISCONNECT FOR UNIT. REFER TO E-601 AND E-602 FOR REQUIREMENTS.

ELECTRIC STEAM HUMIDIFIER GENERATOR SCHEDULE															
MARK	SYSTEM AND/OR SERVICE	HUMIDIFIER TYPE	AIR FLOW CFM	EAT		LAT		HUMIDIFICATION LOAD (LBS/HR)	SOURCE	ELECTRICAL DATA				MANUFACTURER AND MODEL	REMARKS
				DB °F	DEWPOINT °F	DB °F	DEWPOINT °F			VOLTS	PHASE	HZ	FLA		
173-SH-01	173-AHU-01	ELECTRIC	16650	55	-20	55	34	100	DOMESTIC WATER	208	3	60	89	DRISTEEM VAPORSTREAM 32-2 OR APPROVED EQUAL	1, 2, 3

NOTE:
1. UNIT SHALL BE RATED FOR SEISMIC DESIGN CATEGORY C (SEE SEISMIC NOTE AND DSS EQUIPMENT TABULATION).
2. HUMIDIFICATION DESIGN CONDITION: MIN OUTSIDE AIR AT -11 F DB, -12.1 F WB. SPACE DESIGN: 72 F AT 25% RH.
3. PROVIDE DISCONNECT FOR UNIT. REFER TO E-601 AND E-602 FOR REQUIREMENTS.

AIR COOLED CONDENSING UNIT SCHEDULE														
MARK	SYSTEM AND/OR SERVICE	TYPE	MIN REFRIGERATION		REFRIGERANT	MAX SUCTION TEMP @ COMP °F	OA TEMP °F	MIN EER	ELECTRICAL DATA			MANUFACTURER AND MODEL	REMARKS	
			MBH	BTUH					VOLT	PHASE	MOP			
173-CUAC-AHU01	173-AHU-01	SCROLL	484		R410A	43	95	11.4	208	3	300	DAIKIN ROS045D OR APPROVED EQUAL	1, 2, 3, 4	

NOTE:
1) PERFORMANCE SHALL BE RATED FOR 4000 FT ALTITUDE.
2) UNIT SHALL BE RATED FOR SEISMIC DESIGN CATEGORY C (SEE SEISMIC NOTE AND DSS EQUIPMENT TABULATION).
3) UNIT SHALL INCLUDE DIGITAL COMPRESSOR.
4) PROVIDE DISCONNECT FOR UNIT. REFER TO E-601 AND E-602 FOR REQUIREMENTS.

SINGLE DUCT AIR TERMINAL UNIT SCHEDULE BLDG 173																	
MARK	SIZE	SYSTEM AND/OR SERVICE	AIR FLOW					REHEAT				MANUFACTURER AND MODEL	REMARKS				
			EAT °F	LAT °F	MIN INLET S.P. IN. W.C.	MAX CFM	MIN CFM	HEATING CFM	MAX TOTAL APD IN. W.C.	EWT (F)	LWT (F)			MBH	GPM		
173-VAV-1	7	HEATING WATER	55	86	1.00	510	410	510	0.5	160	131	15.31	1.07	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-2	8	HEATING WATER	55	84	1.00	700	420	420	0.5	160	128	11.61	0.73	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-3	8	HEATING WATER	55	83	1.00	700	380	380	0.5	160	126	10.46	0.62	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-4	10	HEATING WATER	55	87	1.00	1050	310	460	0.5	160	124	14.12	0.79	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-5	12	HEATING WATER	55	77	1.00	1280	890	890	0.5	160	113	18.96	0.81	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-6A	6	HEATING WATER	55	75	1.00	230	190	190	0.5	160	137	3.89	0.33	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-6B	6	HEATING WATER	55	74	1.00	230	190	190	0.5	160	139	3.89	0.36	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-6C	6	HEATING WATER	55	78	1.00	380	380	380	0.5	160	128	8.56	0.53	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-7	6	HEATING WATER	55	85	1.00	270	100	100	0.5	160	143	3.00	0.35	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-8	5	HEATING WATER	55	79	1.00	280	280	280	0.5	160	124	6.47	0.36	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-9	7	HEATING WATER	55	87	1.00	590	240	380	0.5	160	130	11.54	0.79	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-10	8	HEATING WATER	55	86	1.00	530	240	360	0.5	160	129	10.84	0.72	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-11	8	HEATING WATER	55	86	1.00	400	160	260	0.5	160	124	7.89	0.44	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-12	8	HEATING WATER	55	86	1.00	380	160	260	0.5	160	124	7.89	0.44	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-13	5	HEATING WATER	55	86	1.00	220	80	210	0.5	160	128	6.36	0.40	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-14	5	HEATING WATER	55	86	1.00	210	80	210	0.5	160	128	6.32	0.40	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-15	6	HEATING WATER	55	79	1.00	280	280	280	0.5	160	147	6.47	1.00	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-16	7	HEATING WATER	55	87	1.00	470	240	390	0.5	160	131	11.82	0.83	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-17	8	HEATING WATER	55	86	1.00	630	240	380	0.5	160	130	11.52	0.77	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-18	6	HEATING WATER	55	86	1.00	320	160	260	0.5	160	132	7.89	0.57	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-19	6	HEATING WATER	55	86	1.00	420	160	260	0.5	160	128	7.89	0.49	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-20	6	HEATING WATER	55	86	1.00	210	80	210	0.5	160	128	6.36	0.40	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-21	6	HEATING WATER	55	86	1.00	240	80	210	0.5	160	128	6.36	0.40	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-22	12	HEATING WATER	55	84	1.00	1250	460	780	0.5	160	121	21.88	1.12	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-23	9	HEATING WATER	55	82	1.00	400	280	280	0.5	160	136	7.42	0.63	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-24	6	HEATING WATER	55	78	1.00	320	320	320	0.5	160	125	7.18	0.42	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-25	8	HEATING WATER	55	87	1.00	520	250	410	0.5	160	132	12.43	0.90	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-26	8	HEATING WATER	55	86	1.00	540	220	350	0.5	160	128	10.46	0.66	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-27	7	HEATING WATER	55	87	1.00	510	240	390	0.5	160	131	11.83	0.83	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-28	8	HEATING WATER	55	86	1.00	660	240	390	0.5	160	131	11.78	0.81	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-29	6	HEATING WATER	55	86	1.00	210	80	210	0.5	160	128	6.36	0.40	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-30	6	HEATING WATER	55	86	1.00	240	80	210	0.5	160	128	6.36	0.40	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NOT USED	
173-VAV-32	12	HEATING WATER	55	87	1.00	1210	480	630	0.5	160	121	19.33	0.99	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-33	7	HEATING WATER	55	79	1.00	150	120	120	0.5	160	130	2.79	0.19	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-34	6	HEATING WATER	55	86	1.00	230	150	180	0.5	160	124	4.85	0.27	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-35	8	HEATING WATER	55	87	1.00	420	170	420	0.5	160	128	13.00	0.83	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-36	14	HEATING WATER	55	87	1.00	2000	1120	1270	0.5	160	126	38.46	2.32	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-37	6	HEATING WATER	55	87	1.00	350	90	350	0.5	160	133	10.69	0.81	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-38	10	HEATING WATER	55	87	1.00	840	220	640	0.5	160	131	19.66	1.37	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NOT USED	
173-VAV-40	8	HEATING WATER	55	86	1.00	590	240	380	0.5	160	130	11.54	0.77	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-41	8	HEATING WATER	55	86	1.00	560	240	380	0.5	160	126	11.51	0.68	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-42	6	HEATING WATER	55	79	1.00	280	280	280	0.5	160	124	6.46	0.36	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-43	6	HEATING WATER	55	86	1.00	400	160	260	0.5	160	132	7.89	0.57	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-44	7	HEATING WATER	55	86	1.00	380	160	260	0.5	160	124	7.89	0.44	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-45	6	HEATING WATER	55	86	1.00	220	80	210	0.5	160	128	6.36	0.40	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		
173-VAV-46	6	HEATING WATER	55	86	1.00	210	80	210	0.5	160	128	6.32	0.40	PRICE SDVQ OR APPROVED EQUAL	1, 2, 3		

NOTES:<

AIR DEVICE SCHEDULE BLDG 173							
MARK	TYPE	MOUNTING	PANEL/FRAME SIZE		FINISH	MANUFACTURER AND MODEL	REMARKS
			IN x IN	IN			
CD-1	LOUVERED FACE DIFFUSER	LAY-IN CEILING	24 x 24	6	WHITE	PRICE SMD OR APPROVED EQUAL	1,2,3
CD-2	LOUVERED FACE DIFFUSER	LAY-IN CEILING	24 x 24	8	WHITE	PRICE SMD OR APPROVED EQUAL	1,2,3
CD-3	SQUARE CONE DIFFUSER	LAY-IN CEILING	24 x 24	10	WHITE	PRICE SCD OR APPROVED EQUAL	1,2,3
CD-4	LOUVERED FACE DIFFUSER	EXPOSED	24 x 24	6	WHITE	PRICE SMD OR APPROVED EQUAL	1,2
CD-5	LINEAR SLOT PLENUM DIFFUSER	HARD CEILING	48", 2 SLOTS	6	WHITE	PRICE SDR100 OR APPROVED EQUAL	4
CD-6	LINEAR SLOT PLENUM DIFFUSER	HARD CEILING	48", 3 SLOTS	8	WHITE	PRICE SDR100 OR APPROVED EQUAL	4
CD-7	SQUARE CONE DIFFUSER	LAY-IN CEILING	24 x 24	6	WHITE	PRICE SCD OR APPROVED EQUAL	1,2,3
EG-1	PERFORATED EXHAUST DIFFUSER	HARD CEILING	12 x 12	6 x 6	WHITE	PRICE PDDE OR APPROVED EQUAL	2
RG-1	PERFORATED RETURN DIFFUSER	LAY-IN CEILING	24 x 24	6 x 6	WHITE	PRICE PDDR OR APPROVED EQUAL	2,3
RG-2	PERFORATED RETURN DIFFUSER	LAY-IN CEILING	24 x 24	8 x 8	WHITE	PRICE PDDR OR APPROVED EQUAL	2,3
RG-3	PERFORATED RETURN DIFFUSER	LAY-IN CEILING	24 x 24	10 x 10	WHITE	PRICE PDDR OR APPROVED EQUAL	2,3
RG-4	PERFORATED RETURN DIFFUSER	LAY-IN CEILING	24 x 24	12 x 12	WHITE	PRICE PDDR OR APPROVED EQUAL	2,3
RG-5	PERFORATED RETURN DIFFUSER	EXPOSED	24 x 24	6 x 6	WHITE	PRICE PDDR OR APPROVED EQUAL	---
RG-6	PERFORATED RETURN DIFFUSER	EXPOSED	24 x 24	10 x 10	WHITE	PRICE PDDR OR APPROVED EQUAL	---
RG-7	RETURN GRILLE	SIDE WALL	32 x 12	32 x 12	WHITE	PRICE 500 APPROVED EQUAL	5
RG-8	RETURN GRILLE	SIDE WALL	24 x 12	24 x 12	WHITE	PRICE 500 APPROVED EQUAL	5
RG-9	RETURN GRILLE	SIDE WALL	17 x 12	17 x 12	WHITE	PRICE 500 APPROVED EQUAL	6
RG-10	RETURN GRILLE	SIDE WALL	8 x 8	17 x 12	WHITE	PRICE 500 APPROVED EQUAL	6
SG-1	SUPPLY GRILLE	SIDE WALL	7 x 4	7 x 4	WHITE	PRICE 500 APPROVED EQUAL	5
SG-2	SUPPLY GRILLE	SIDE WALL	12 x 6	12 x 6	WHITE	PRICE 500 APPROVED EQUAL	5
SG-3	SUPPLY GRILLE	SIDE WALL	8 x 6	8 x 6	WHITE	PRICE 500 APPROVED EQUAL	6

NOTES:
 1. SEE PLANS FOR THROW DIRECTIONS. DIFFUSERS SHOWN WITH NO ARROWS ARE 4-WAY THROW.
 2. WHERE DAMPERS ARE NOT SHOWN ON DRAWINGS, DAMPER SHALL BE FURNISHED WITH AIR DEVICE AND ACCESSIBLE FROM THE ROOM.
 3. FRAME STYLE SHALL BE FOR REGULAR T-BAR CEILING GRID. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING SYSTEM.
 4. SLOT WIDTH SHALL BE 1 INCH.
 5. BLADE DEFLECTION ANGLE SHALL BE 0 DEGREES. BLADE SPACING SHALL BE 3/4".
 6. BLADE DEFLECTION ANGLE SHALL BE 45 DEGREES. BLADE SPACING SHALL BE 3/4".

PUMP SCHEDULE													
MARK	SYSTEM AND/OR SERVICE	TYPE	CIRCULATING FLUID			ELECTRICAL MOTOR				MANUFACTURER AND MODEL	REMARKS		
			FLUID	FLOW GPM	HEAD FT	TEMPERATURE °F	HP	PHASE	VOLT			MAX RPM	SPEED CONTROL
173-HWP-01	HEATING WATER SECONDARY	INLINE CIRCULATOR	40% PROPYLENE GLYCOL	62	50	160	2.00	3	208	1760	VFD	TACO 1919 W/ 7.6" IMPELLER OR APPROVED EQUAL	1
173-HWP-02	HEATING WATER PRIMARY	INLINE CIRCULATOR	40% PROPYLENE GLYCOL	50	10	160	0.50	1	115	1750	ECM	TACO VR15-3 OR APPROVED EQUAL	2,3
173-HWP-03	HEATING WATER PRIMARY	INLINE CIRCULATOR	40% PROPYLENE GLYCOL	50	10	160	0.50	1	115	1750	ECM	TACO VR15-3 OR APPROVED EQUAL	2,3
173-HWP-04	HEATING WATER SECONDARY	INLINE CIRCULATOR	40% PROPYLENE GLYCOL	62	50	160	2.00	3	208	1760	VFD	TACO 1919 W/ 7.6" IMPELLER OR APPROVED EQUAL	1

NOTES:
 1. PROVIDE UNIT WITH VFD.
 2. 0-10V INPUT FOR SPEED CONTROL INTERFACE WITH CONDENSING BOILER.
 3. PROVIDE DISCONNECT FOR UNIT. REFER TO E-601 AND E-602 FOR REQUIREMENTS.

FAN SCHEDULE														
MARK	SYSTEM AND/OR SERVICE	AIR FLOW CFM	ESP IN W.C.	FAN			MOTOR ELECTRICAL				MANUFACTURER AND MODEL	REMARKS		
				TYPE	DRIVE	FAN MAX RPM	CURB	HP	VOLT	PHASE			RPM	SPEED CONTROL
173-EF-01	RESTROOMS AND HAC EXHAUST	300	0.5	ROOF MOUNTED DOWNBLAST	DIRECT	1550	YES	1/8	115	1	1550	VARIABLE	COOK 100R15DH OR APPROVED EQUAL	1,2,3,5,6
173-EF-02	RESTROOMS EXHAUST	500	0.5	ROOF MOUNTED DOWNBLAST	DIRECT	1075	YES	1/6	115	1	1075	VARIABLE	COOK 150RH10D OR APPROVED EQUAL	1,2,3,5,6
173-EF-03	PENTHOUSE VENTILATOR	1000	0.125	WALL MOUNTED PROPELLER	DIRECT	1550	NO	1/8	208	1	1550	WALL MOUNTED CONTROL WITH THERMOSTAT	COOK 2XP40D15 OR APPROVED EQUAL	1,2,4,6
173-EF-04	UTILIDOR VENTILATION	300	0.5	INLINE	DIRECT	1313	NO	0.12	115	1	1313	VARIABLE	COOK GN-622 OR APPROVED EQUAL	1,2,5,6

NOTES:
 1. MUST BE SEISMICALLY CERTIFIED FOR SEISMIC DESIGN CATEGORY C. (SEE SEISMIC NOTE AND DSS EQUIPMENT TABULATION)
 2. PERFORMANCE AT 4000 FT ELEVATION.
 3. PROVIDE ROOF CURB AND BACKDRAFT DAMPER
 4. PROVIDE GRAVITY DISCHARGE SHUTTER AND WEATHER HOOD.
 5. PROVIDE FAN SPEED CONTROLLER
 6. PROVIDE DISCONNECT FOR UNIT. REFER TO E-601 AND E-602 FOR REQUIREMENTS.

GLYCOL FEEDER SCHEDULE												
MARK	SERVICE	GLYCOL TYPE	GLYCOL PERCENTAGE	TANK VOLUME (GAL)	PUMP CAPACITY	ELECTRICAL DATA					REMARKS	
						POWER HP	VOLT	PHASE	RPM	HZ		
173-GF-01	HEATING WATER	PROPYLENE	40%	50	1.5 GPM AT 100 PSI	1/3	115	1	1750	60	NEPTUNE G-50-1A OR APPROVED EQUAL	INCLUDE LOW LEVEL LIGHT AND AUDIBLE ALARM.

LOUVER SCHEDULE										
MARK	SYSTEM AND/OR SERVICE	TYPE	WIDTH	HEIGHT	AIR FLOW	FREE AREA	FREE AREA VELOCITY	APD	MANUFACTURER AND MODEL	REMARKS
			IN	IN	CFM	SQ FT	FPM	W.G.		
173-LVR-01	OUTSIDE AIR INTAKE	STATIONARY	74	86	19600	24.27	808	0.07	RUSKIN L375D OR APPROVED EQUAL	
173-LVR-02	RELIEF AIR	STATIONARY	74	86	18800	24.27	754	0.06	RUSKIN L375D OR APPROVED EQUAL	

ACTIVE/ENERGIZED DESIGNATED SEISMIC SYSTEMS (DSS) EQUIPMENT

REQUIRES ASCE 7 CH 13.2.2 SPECIAL SEISMIC CERTIFICATION (SSC) TO BE QUALIFIED EITHER BY ICC-ESS-AC156 SHAKE TABLE TESTING OR BY EXPERIENCE TO WITHSTAND AND CONTINUE TO BE FULLY FUNCTIONAL AFTER BEING SUBJECTED TO SITE SPECIFIC DESIGN-MAGNITUDE EARTHQUAKE GROUND MOTIONS. A "CERTIFICATE OF COMPLIANCE" MUST BE SUBMITTED PRIOR TO INSTALLATION.

DISCIPLINE	EQUIPMENT TAG	EQUIPMENT DESCRIPTION	LOCATION (Z/H=0)"	MOUNTING METHOD	ESTIMATED WEIGHT (LB)
MECHANICAL	173-AHU-01	AIR HANDLER	1	FLOOR	20,259
MECHANICAL	173-SH-01	ELECTRIC STEAM HUMIDIFIER GENERATOR	1	FLOOR	185
MECHANICAL	173-HWB-01	HOT WATER HEATING BOILER	0	FLOOR	1150
MECHANICAL	173-HWB-02	HOT WATER HEATING BOILER	0	FLOOR	1150
MECHANICAL	173-CJAC-AHU01	AIR COOLED CONDENSING UNIT	0	GROUND	2470
MECHANICAL	173-GF-01	GLYCOL FEEDER	0	FLOOR	606
MECHANICAL	173-CLH-01	CABINET UNIT HEATER	0	FLOOR	97
MECHANICAL	173-HWUH-01	HOT WATER UNIT HEATER	1	CEILING	60
MECHANICAL	173-ACU-01	SPLIT SYSTEM CONDENSER	0	GROUND	133
MECHANICAL	173-ACU-01	SPLIT SYSTEM EVAPORATOR	1	CEILING	38
MECHANICAL	173-ACU-02	SPLIT SYSTEM CONDENSER	0	GROUND	133
MECHANICAL	173-ACU-02	SPLIT SYSTEM EVAPORATOR	1	CEILING	38
MECHANICAL	173-EF-01	ROOF MOUNTED DOWNBLAST FAN	1	ROOF	60
MECHANICAL	173-EF-02	ROOF MOUNTED DOWNBLAST FAN	1	ROOF	105
MECHANICAL	173-EF-03	WALL MOUNTED PROPELLER FAN	1	WALL	72
MECHANICAL	173-VAV-5	VAV BOX	1	CEILING	98
MECHANICAL	173-VAV-22	VAV BOX	1	CEILING	98
MECHANICAL	173-VAV-36	VAV BOX	1	CEILING	116
PLUMBING	173-WH-01	GAS FIRED WATER HEATER	0	FLOOR	961

*NOTE: FOR DETERMINATION OF SEISMIC DESIGN FORCE FP PER ASCE 7 CHAPTER 13
 Z = INSTALLED HEIGHT ABOVE GROUND FLOOR
 H = MEAN ROOF HEIGHT OF BUILDING

SEISMIC NOTE:

FOR SEISMIC DESIGN PARAMETERS SEE: SEISMIC RESTRAINT & ANCHORAGE NOTES ON SHEET M-001 AND REFERENCE SPEC SECTION 13 05 41 - SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.

Issued:	Date:	CONSULTANTS:		ARCHITECT/ENGINEERS:		STAMP:		Drawing Title		Phase		Project Title		Project Number	
								PHASE 1 MECHANICAL SCHEDULES		100% CONSTRUCTION DOCUMENTS		OUTPATIENT MENTAL HEALTH / EDUCATION ADDITION		436-114	
								Approved: Project Director				3687 VETERANS DRIVE, FORT HARRISON, MT 59636		Building Number 173	
												Issue Date 08/05/2020		Drawing Number M-602	
												Checked DD		Drawn DN	

AIR HANDLING UNIT SCHEDULE																																
MARK	MIN OA (CFM)	MAX LENGTH (IN)	MAX HEIGHT (IN)	MAX WIDTH (IN)	SUPPLY FAN										DX COOLING COIL								PREFILTER			MANUFACTURER AND MODEL						
					AIRFLOW (CFM)	T.S.P. (IN. W.G.)	E.S.P. (IN. W.G.)	WHEEL (TYPE)	DRIVE	FAN RPM	FAN QTY	MOTOR HP EACH	PH	Hz	V	MOTOR FLA EACH	MAX. F.V. (F/TMIN)	MAX. A.P.D. (IN. W.G.)	EAT-DB (°F)	EAT-WB (°F)	LAT-DB (°F)	LAT-WB (°F)	SMBH	TMBH	REF		SUCTION TEMP(°F)	MERV	THICKNESS (IN)	FINAL A.P.D. (IN. W.G.)		
154-AHU-01-EDU	850	133	36	45	3000	4.34	1.6	-	DIRECT	2,546	1	3	2	60	208	7.33	476	0.34	79.7	64	55.1	53.1	69	84.5	R-410A	45	8	2	0.47	FACE PAI 36X45 OR APPROVED EQUAL		
															HEATING COIL								PREFILTER #2			REMARKS						
															HEATING AIRFLOW (CFM)	MAX. F.V. (F/TMIN)	MAX. A.P.D. (IN. W.G.)	EAT-DB (°F)	EAT-WB (°F)	MBH	PROPYLENE GLYCOL CONCENT	EWT (°F)	LWT (°F)	FLOW RATE (GPM)	MERV	THICKNESS (IN)	FINAL A.P.D. (IN. W.G.)					
															2050	325	0.01	35	67.8	63	40%	180	160	7.2	11	12	0.73					

NOTES:
 1. AIR HANDLER FAN CONFIGURATION SHALL BE DRAWN THRU.
 2. AIR HANDLER SHALL BE SEISMICALLY CERTIFIED FROM THE FACTORY FOR SEISMIC DESIGN CATEGORY C. (SEE SEISMIC NOTE AND DSS EQUIPMENT TABULATION)
 3. PERFORMANCE AT 4000 FT. ELEVATION
 4. DESIGN OUTDOOR CONDITIONS: SUMMER: 90 F DB AT 61 F WB; WINTER: -7 F DB
 5. SUPPLY FAN SHALL SPEED CONTROLLED VIA ECM FAN

ACTIVE/ENERGIZED DESIGNATED SEISMIC SYSTEMS (DSS) EQUIPMENT

REQUIRES ASCE 7 CH 13.2.2 SPECIAL SEISMIC CERTIFICATION (SSC) TO BE QUALIFIED EITHER BY ICC-ESS AC156 SHAKE TABLE TESTING OR BY EXPERIENCE TO WITHSTAND AND CONTINUE TO BE FULLY FUNCTIONAL AFTER BEING SUBJECTED TO SITE SPECIFIC DESIGN-MAGNITUDE EARTHQUAKE GROUND MOTIONS. A "CERTIFICATE OF COMPLIANCE" MUST BE SUBMITTED PRIOR TO INSTALLATION.

DISCIPLINE	EQUIPMENT TAG	EQUIPMENT DESCRIPTION	LOCATION (Z/H=0)*	MOUNTING METHOD	ESTIMATED WEIGHT (LB)
MECHANICAL	154-AHU-01-EDU	AIR HANDLER	0	GROUND	480
MECHANICAL	154-CUAC-AHU01	AIR COOLED CONDENSING UNIT	1/2	GROUND	390
MECHANICAL	154-ACU-01	SPLIT SYSTEM CONDENSER	0	GROUND	133
MECHANICAL	154-ACU-01	SPLIT SYSTEM EVAPORATOR	1/2	CEILING	38
MECHANICAL	154-EF-01	INLINE FAN	1	CEILING	101

*NOTE: FOR DETERMINATION OF SEISMIC DESIGN FORCE PP PER ASCE 7 CHAPTER 13
 Z = INSTALLED HEIGHT ABOVE GROUND FLOOR H = MEAN ROOF HEIGHT OF BUILDING

SEISMIC NOTE:

FOR SEISMIC DESIGN PARAMETERS SEE: SEISMIC RESTRAINT & ANCHORAGE NOTES ON SHEET M-001 AND REFERENCE SPEC SECTION 13 05 41 - SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.

SINGLE DUCT AIR TERMINAL UNIT SCHEDULE BLDG 154

MARK	SIZE	SYSTEM AND/OR SERVICE	AIR FLOW				REHEAT				MANUFACTURER AND MODEL	REMARKS		
			EAT °F	LAT °F	MIN IN. W.C.	MAX CFM	MIN CFM	HEATING CFM	MAX TOTAL APD IN. W.C.	EWTF (F)			LWTF (F)	MBH
VAV-2-1	7	HEATING WATER	55.89	1.00	450	240	370	0.5	180	139	12.00	0.59	PRICE SDV OR APPROVED EQUAL	1,2,3
VAV-2-2	6	HEATING WATER	55.85	1.00	300	240	240	0.5	180	167	6.80	1.13	PRICE SDV OR APPROVED EQUAL	1,2,3
VAV-2-3	6	HEATING WATER	55.85	1.00	300	240	240	0.5	180	167	6.80	1.13	PRICE SDV OR APPROVED EQUAL	1,2,3
VAV-2-4	6	HEATING WATER	55.72	1.00	280	250	250	0.5	180	147	3.80	0.26	PRICE SDV OR APPROVED EQUAL	1,2,3
VAV-2-5	6	HEATING WATER	55.72	1.00	280	280	280	0.5	180	150	4.00	0.30	PRICE SDV OR APPROVED EQUAL	1,2,3
VAV-2-6	6	HEATING WATER	55.74	1.00	300	110	110	0.5	180	140	1.54	0.09	PRICE SDV OR APPROVED EQUAL	1,2,3
VAV-2-7	7	HEATING WATER	55.70	1.00	610	550	550	0.5	180	150	7.68	0.54	PRICE SDV OR APPROVED EQUAL	1,2,3
VAV-2-8	7	HEATING WATER	55.71	1.00	450	400	400	0.5	180	145	5.58	0.35	PRICE SDV OR APPROVED EQUAL	1,2,3
VAV-2-9	9	HEATING WATER	55.70	1.00	690	230	230	0.5	180	136	3.21	0.16	PRICE SDV OR APPROVED EQUAL	1,2,3
VAV-2-10	6	HEATING WATER	55.88	1.00	380	80	190	0.5	180	165	6.12	1.06	PRICE SDV OR APPROVED EQUAL	1,2,3
VAV-2-11	8	HEATING WATER	55.88	1.00	550	210	250	0.5	180	165	8.10	1.13	PRICE SDV OR APPROVED EQUAL	1,2,3
VAV-2-12	6	HEATING WATER	55.87	1.00	360	220	220	0.5	180	168	6.73	1.17	PRICE SDV OR APPROVED EQUAL	1,2,3
VAV-2-13	8	HEATING WATER	55.74	1.00	590	330	350	0.5	180	149	6.20	0.41	PRICE SDV OR APPROVED EQUAL	1,2,3
VAV-2-14	6	HEATING WATER	55.73	1.00	300	270	300	0.5	180	152	5.02	0.37	PRICE SDV OR APPROVED EQUAL	1,2,3
VAV-2-15	4	HEATING WATER	55.73	1.00	80	70	70	0.5	180	135	0.98	0.06	PRICE SDV OR APPROVED EQUAL	1,2,3
VAV-2-16	4	HEATING WATER	55.73	1.00	80	70	70	0.5	180	135	0.98	0.06	PRICE SDV OR APPROVED EQUAL	1,2,3
VAV-2-17 (EXISTING)	6	HEATING WATER	55.70	1.00	370	90	90	0.5	180	133	1.26	0.06	TRANE (EXISTING)	1,2,3
VAV-2-18	4	HEATING WATER	55.73	1.00	80	70	70	0.5	180	135	0.98	0.06	PRICE SDV OR APPROVED EQUAL	1,2,3
VAV-2-19 (EXISTING)	10	HEATING WATER	55.79	1.00	860	700	780	0.5	180	160	18.00	1.90	TRANE (EXISTING)	1,2,3
VAV-2-20	7	HEATING WATER	55.75	1.00	470	470	470	0.5	180	158	8.86	0.84	PRICE SDV OR APPROVED EQUAL	1,2,3
VAV-2-21	6	HEATING WATER	55.72	1.00	310	280	280	0.5	180	150	4.60	0.32	PRICE SDV OR APPROVED EQUAL	1,2,3
VAV-2-22	4	HEATING WATER	55.80	1.01	70	60	60	0.5	180	141	0.84	0.07	PRICE SDV OR APPROVED EQUAL	1,2,3

NOTES:
 1. PERFORMANCE SHALL BE RATED FOR 4000 FT ALTITUDE.
 2. HEATING FLUID IS 40% GLYCOL HEATING WATER.
 3. MAX TOTAL APD INCLUDES PRESSURE LOSSES FROM WATER COIL, VAV BOX, AND ALL OTHER ACCESSORIES ASSOCIATED WITH THE TERMINAL UNIT.

AIR COOLED CONDENSING UNIT SCHEDULE

MARK	SYSTEM AND/OR SERVICE	TYPE	MIN REFRIGERATION		REFRIGERANT	MAX SUCTION TEMP @ COMP °F	OA TEMP °F	MIN EER	ELECTRICAL DATA			MANUFACTURER AND MODEL	REMARKS
			IN. W.C.	CFM					VOLT	PHASE	MOP		
154-CUAC-AHU01	BUILDING 154	SCROLL	MBH	89	R410A	45	92.3	12.8	208	3	45	OMNICORE 300 OD SPLIT SYSTEM OR APPROVED EQUAL	1, 2, 3, 4

NOTE:
 1. PERFORMANCE SHALL BE RATED FOR 4000 FT ALTITUDE.
 2. UNIT SHALL BE RATED FOR SEISMIC DESIGN CATEGORY C (SEE SEISMIC NOTE AND DSS EQUIPMENT TABULATION).
 3. UNIT SHALL INCLUDE DIGITAL COMPRESSOR.
 4. PROVIDE DISCONNECT FOR UNIT. REFER TO E-601 AND E-602 FOR REQUIREMENTS.

FAN SCHEDULE

MARK	SYSTEM AND/OR SERVICE	AIR FLOW CFM	ESP IN W.C.	FAN				MOTOR ELECTRICAL				MANUFACTURER AND MODEL	REMARKS	
				TYPE	DRIVE	FAN MAX RPM	CURB	HP	VOLT	PHASE	RPM			SPEED CONTROL
EF-2-1 (EXISTING)	RESTROOMS EXHAUST (EXISTING)	SEE DWG	1	INLINE	DIRECT	1105	NO	1/2	115	1	1105	CONSTANT	GREENHECK CSP-A700 (EXISTING)	REUSE EXISTING FAN. REBALANCE TO CFM SHOWN.
154-EF-01	154-AHU-01 RELIEF EXHAUST	2280	1	INLINE	DIRECT	2018	NO	1	208	3	1725	VARIABLE	COOK 135SQN17D OR APPROVED EQUAL	1,2,3,4

NOTES:
 1. MUST BE SEISMICALLY CERTIFIED FOR SEISMIC DESIGN CATEGORY C. (SEE SEISMIC NOTE AND DSS EQUIPMENT TABULATION)
 2. PERFORMANCE AT 4000 FT ELEVATION
 3. PROVIDE SEISMIC RESTRAINT KIT
 4. PROVIDE DISCONNECT FOR UNIT. REFER TO E-601 AND E-602 FOR REQUIREMENTS.

SPLIT SYSTEM AIR CONDITIONER SCHEDULE

MARK	LOCATION	AREA AND/OR BLDG SERVED	TYPE	COOLING CAPACITY					ELECTRICAL INPUT				MANUFACTURER AND MODEL	REMARKS		
				MAX INDOOR AIR FLOW CFM	MIN TOTAL CAPACITY MBH	MIN SENS CAPACITY MBH	MIN SEER	EAT DB °F	OSA WB °F	CONTROL	MCA	PHASE			VOLT	
154-ACU-01	GROUND	TELECOM 121	PACKAGED	890	30.4	21	17.5	80	67	95	THERMOSTAT	17	1	208	DAIKIN FTX30NVJU / RK30NMVJU OR APPROVED EQUAL	1, 2, 3

NOTES:
 1. UNIT SHALL BE RATED FOR SEISMIC DESIGN CATEGORY C (SEE SEISMIC NOTE AND DSS EQUIPMENT TABULATION).
 2. CONTRACTOR SHALL FABRICATE A 2 FT. STAND TO ELEVATE THE OUTDOOR CONDENSING UNIT FOR SNOW CLEARANCE.
 3. UNIT SHALL INCLUDE FIELD SETTINGS AND WIND BAFFLE FOR OPERATION DOWN TO -22 F AMBIENT TEMPERATURE.
 4. PROVIDE DISCONNECT FOR UNIT. REFER TO E-601 AND E-602 FOR REQUIREMENTS.

AIR DEVICE SCHEDULE BLDG 154

MARK	TYPE	MOUNTING	PANEL/FRAME SIZE		NECK SIZE		FINISH	MANUFACTURER AND MODEL	REMARKS
			IN X IN	IN	IN	IN			
CD-1	SQUARE CONE DIFFUSER	LAY-IN CEILING	24 x 24	6	8	WHITE	PRICE SCD OR APPROVED EQUAL	1	
CD-2	SQUARE CONE DIFFUSER	LAY-IN CEILING	24 x 24	8	6	WHITE	PRICE SCD OR APPROVED EQUAL	1	
CD-3	LOUVERED FACE DIFFUSER	LAY-IN CEILING	24 x 24	6	6	WHITE	PRICE SMD OR APPROVED EQUAL	1,2	
CD-4	LOUVERED FACE DIFFUSER	LAY-IN CEILING	24 x 24	8	6	WHITE	PRICE SMD OR APPROVED EQUAL	1,2	
EG-1	PERFORATED EXHAUST DIFFUSER	HARD CEILING	12 x 12	6	6	WHITE	PRICE PDDE OR APPROVED EQUAL	---	
EG-2	PERFORATED EXHAUST DIFFUSER	HARD CEILING	24 x 24	8	8	WHITE	PRICE PDDE OR APPROVED EQUAL	---	
RG-1	PERFORATED RETURN DIFFUSER	LAY-IN CEILING	24 x 24	6 x 6	6	WHITE	PRICE PDOR OR APPROVED EQUAL	---	
RG-2	PERFORATED RETURN DIFFUSER	LAY-IN CEILING	24 x 24	8 x 8	8	WHITE	PRICE PDOR OR APPROVED EQUAL	---	
RG-3	PERFORATED RETURN DIFFUSER	LAY-IN CEILING	24 x 24	10 x 10	10	WHITE	PRICE PDOR OR APPROVED EQUAL	---	
RG-4	PERFORATED RETURN DIFFUSER	LAY-IN CEILING	24 x 24	12 x 12	12	WHITE	PRICE PDOR OR APPROVED EQUAL	---	
TG-1	TRANSFER GRILLE	SIDE WALL	14 x 12	NA	NA	WHITE	PRICE ATG1 OR APPROVED EQUAL	---	

NOTES:
 1. SEE PLANS FOR THROW DIRECTIONS. DIFFUSERS SHOWN WITH NO ARROWS ARE 4-WAY THROW.
 2. WHERE DAMPERS ARE NOT SHOWN ON DRAWINGS, DAMPER SHALL BE FURNISHED WITH AIR DEVICE AND ACCESSIBLE FROM THE ROOM.

LOUVER SCHEDULE

MARK	SYSTEM AND/OR SERVICE	TYPE	WIDTH	HEIGHT	AIR FLOW	FREE AREA	FREE AREA VELOCITY	APD	MANUFACTURER AND MODEL	REMARKS
			IN	IN	CFM	SQ FT	FPM	W.G.		
154-LVR-01	OUTSIDE AIR INTAKE	STATIONARY	36	31	3000	3.71	809	0.07	RUSKIN L375D OR APPROVED EQUAL	
154-LVR-02	RELIEF AIR	STATIONARY	68	14	2282	2.58	884	0.09	RUSKIN L375D OR APPROVED EQUAL	

<p>CONSULTANTS:</p>		<p>ARCHITECT/ENGINEERS:</p>		<p>STAMP:</p>				<p>Drawing Title</p> <p>PHASE 2 MECHANICAL SCHEDULES</p>		<p>Phase</p> <p>100% CONSTRUCTION DOCUMENTS</p>		<p>Project Title</p> <p>OUTPATIENT MENTAL HEALTH / EDUCATION ADDITION</p>		<p>Project Number</p> <p>436-114</p>	
<p>Approved: Project Director</p>										<p>Location</p> <p>3687 VETERANS DRIVE, FORT HARRISON, MT 59636</p>		<p>Drawing Number</p> <p>M-603</p>			
<p>Issue Date</p> <p>08/05/2020</p>		<p>Checked</p> <p>DD</p>		<p>Drawn</p> <p>DN</p>											

I/O POINTS LIST BUILDING 173										
	QUANTITY	GRAPHICS REQUIRED	DO	AO	DI	AI	READ	WRITE	TREND	BACnet OBJECT
AIR HANDLING UNIT 173-AHU-01										
SUPPLY FAN START/STOP	1	X	X							HARDWIRED
SUPPLY FAN SPEED CONTROL	1	X		X						HARDWIRED
SUPPLY FAN STATUS	1	X			X					HARDWIRED
SUPPLY FAN VFD OUTPUT FREQUENCY	1	X				X				AV
SUPPLY FAN VFD OUTPUT CURRENT	1	X					X			AV
SUPPLY FAN VFD OUTPUT VOLTAGE	1	X					X			AV
SUPPLY FAN VFD ALARM	1	X						X		BY
SUPPLY AIR STATIC PRESSURE	2	X				X				HARDWIRED
SUPPLY AIR PRESSURE HIGH LIMIT	1	X			X					HARDWIRED
SUPPLY AIRFLOW	1	X				X				HARDWIRED
SUPPLY AIR TEMPERATURE	1	X				X				HARDWIRED
FILTER AIR PRESSURE HIGH LIMIT	2	X			X					HARDWIRED
HEATING COIL VALVE CONTROL	1	X		X						HARDWIRED
SMOKE DETECTOR ALARM	1	X			X					HARDWIRED
FREEZE STAT	1	X			X					HARDWIRED
MIXED AIR TEMPERATURE	1	X				X				HARDWIRED
MIXED & EXHAUST AIR DAMPER CONTROL	1	X		X						HARDWIRED
RETURN FAN START/STOP	1	X		X						HARDWIRED
RETURN FAN SPEED CONTROL	1	X			X					HARDWIRED
RETURN FAN VFD OUTPUT FREQUENCY	1	X				X				AV
RETURN FAN VFD OUTPUT CURRENT	1	X					X			AV
RETURN FAN VFD OUTPUT VOLTAGE	1	X					X			AV
RETURN FAN VFD ALARM	1	X						X		BY
RETURN FAN STATUS	1	X			X					HARDWIRED
RETURN AIRFLOW	1	X			X					HARDWIRED
RETURN AIR TEMPERATURE	1	X			X					HARDWIRED
OUTSIDE AIRFLOW	1	X			X					HARDWIRED
OUTSIDE AIR TEMPERATURE	1	X			X					HARDWIRED
OUTSIDE AIR HUMIDITY	1	X			X					HARDWIRED
RETURN AIR HUMIDITY	1	X			X					HARDWIRED
SUPPLY AIR HUMIDITY HIGH LIMIT	1	X			X					HARDWIRED
HUMIDIFIER CONTROL VALVE	1	X			X					HARDWIRED
SMOKE DETECTOR ALARM	1	X			X					HARDWIRED
CONDENSING UNIT 173-CUAC-01										
SCROLL COMPRESSOR ENABLE	3	X		X						HARDWIRED
DIGITAL COMPRESSOR CONTROL	1	X		X						HARDWIRED
CIRCUIT FAIL ALARM	2	X			X					HARDWIRED
AIRFLOW PROVING	2	X		X						HARDWIRED
VAV BOX										
VAV BOX DAMPER POSITION	45	X		X						HARDWIRED
VAV BOX INLET PRESSURE TRANSDUCER (FLOW)	45	X			X					HARDWIRED
VAV BOX HEATING WATER CONTROL VALVE	45	X		X						HARDWIRED
VAV BOX TEMPERATURE SET POINT	45	X		X						HARDWIRED
VAV BOX SUPPLY AIR TEMPERATURE SENSOR	45	X			X					HARDWIRED
SPACE TEMPERATURE SENSOR	45	X			X					HARDWIRED
EXHAUST FAN 173-EF-01/173-EF-02										
EXHAUST FAN START/STOP	2	X		X						HARDWIRED
EXHAUST FAN SPEED CONTROL	2	X			X					HARDWIRED
EXHAUST FAN STATUS	2	X			X					HARDWIRED
EXHAUST FAN 173-EF-03										
EXHAUST FAN START/STOP	1	X		X						HARDWIRED
EXHAUST FAN STATUS	1	X			X					HARDWIRED
SPLIT AIR CONDITIONER 173-ACU-01/173-ACU-02										
ON/OFF COMMAND	2	X					X			BO
STATUS	2	X					X			BI
ALARM	2	X					X			BI

173-AHU-01/173-CUAC-01 CONTROL SEQUENCE BLDG 173:

SUPPLY FAN START/STOP CONTROL: THE SUPPLY FAN SHALL HAVE A HAND-OFF-AUTO SWITCH IN THE VARIABLE FREQUENCY DRIVE. WHEN IN THE "HAND" POSITION THE FAN SHALL OPERATE. WHEN IN THE "OFF" POSITION THE FAN SHALL NOT OPERATE. WHEN IN THE "AUTO" POSITION, THE FAN SHALL BE CONTROLLED BY THE BAS AND VFD. SUPPLY FAN PRESSURE TRANSMITTER SHALL MODULATE THE FAN AND VARIABLE FREQUENCY DRIVE TO MAINTAIN PROPER DUCT STATIC SET POINT. AN AUXILIARY CONTACT ON THE VFD SHALL SEND A SIGNAL TO THE BAS FOR FAN STATUS. PROGRAM BAS TO SIGNAL AN ALARM CONDITION IF THE FAN FAILS TO PROVE STATUS. PROVIDE HARDWIRED INTERLOCKS TO SHUTDOWN FAN IF THE MOTOR OVERLOADS, SUPPLY AIR PRESSURE HIGH LIMIT IS REACHED, SMOKE DETECTOR CONTACTS OPEN, OR FREEZE STAT CONTACTS OPEN. PROGRAM BAS TO OPERATE THE SUPPLY FAN CONTINUOUSLY IN OCCUPIED MODE.

SUPPLY AIR PRESSURE HIGH LIMIT: WHEN THE SUPPLY SIDE OF THE AIR HANDLER REACHES SET DUCT STATIC PRESSURE (ADJ.), MANUAL RESET HIGH PRESSURE SWITCH SHALL SHUT DOWN THE AIR HANDLER.

HEATING WATER COIL CONTROL: THE HEATING COIL SHALL MODULATE TO MAINTAIN SUPPLY AIR SETPOINT TEMPERATURE.

COOLING CONTROL: A TEMPERATURE SENSOR LOCATED IN THE SUPPLY AIR DUCT SHALL, THROUGH THE DDC CONTROLLER, STAGE COMPRESSORS AS REQUIRED, TO MAINTAIN LEAVING AIR SETPOINT (ADJ.), TO MINIMIZE COMPRESSOR CYCLING, THERE SHALL BE A 5 MINUTE MINIMUM OFF TIME AND 5 MINUTE MINIMUM ON TIME FOR COMPRESSORS UNLESS AN ALARM OCCURS.

SUPPLY AIR TEMPERATURE RESET SCHEDULE: THE BAS SHALL RESET THE SUPPLY AIR TEMPERATURE BASED ON THE VAV BOX REQUIRING THE MOST AIRFLOW (CRITICAL VAV). THE SUPPLY AIR RESET TEMPERATURE SHALL BE BETWEEN 55°F AND 65°F AS THE CRITICAL VAV DAMPER MODULATES FROM 95% TO 65% WITH A STRAIGHT LINE RELATIONSHIP BETWEEN. DISCHARGE TEMPERATURE SHALL BE RESETTABLE IN THE SOFTWARE.

RETURN FAN START/STOP CONTROL: THE RETURN FAN SHALL HAVE A HAND-OFF-AUTO SWITCH IN THE VARIABLE FREQUENCY DRIVE. WHEN IN THE "HAND" POSITION THE FAN SHALL OPERATE. WHEN IN THE "OFF" POSITION, THE FAN SHALL NOT OPERATE. WHEN IN THE "AUTO" POSITION, THE FAN SHALL BE CONTROLLED BY THE BAS AND VFD. AN AUXILIARY CONTACT ON THE VFD SHALL SEND A SIGNAL TO THE BAS FOR FAN STATUS. PROGRAM BAS TO SIGNAL AN ALARM CONDITION IF THE FAN FAILS TO PROVE STATUS. PROVIDE HARDWIRED INTERLOCKS TO SHUTDOWN FAN IF THE MOTOR OVERLOADS, SMOKE DETECTOR, OR FREEZE STAT CONTACTS OPEN. PROGRAM BAS TO START RETURN FAN AFTER PROOF OF SUPPLY FAN STATUS.

RETURN FAN SPEED CONTROL: RETURN FAN SHALL BE MODULATED TO MAINTAIN A FIXED CFM DIFFERENTIAL BETWEEN SUPPLY AIRFLOW AND RETURN AIRFLOW. THE CFM DIFFERENTIAL WILL BE DETERMINED BY THE TAB CONTRACTOR TO MAINTAIN POSITIVE BUILDING PRESSURE.

MINIMUM OUTSIDE AIR: THE OUTSIDE AIR DAMPER SHALL MODULATE TO MAINTAIN THE SCHEDULED MINIMUM OUTSIDE AIR FLOW SETPOINT WITH A MIXED AIR TEMPERATURE OF 55°F (ADJ.). SIGNAL AN ALARM CONDITION IF MIXED AIR TEMPERATURE IS LESS THAN 40°F. RAD, EAD, AND OAD POSITIONS SHALL ALWAYS SUM TO 100 AND THE BUILDING SHALL REMAIN POSITIVELY PRESSURIZED.

ECONOMIZER CONTROL: OUTSIDE AIR AND RETURN AIR SECTIONS OF THE AIR HANDLING UNITS SHALL HAVE ENTHALPY SENSORS, VAISALA HMx8XH OR ENGINEERED APPROVED EQUIVALENT.

WHEN OUTSIDE AIR ENTHALPY IS ABOVE RETURN AIR ENTHALPY, ECONOMIZER IS DISABLED AND MIXING DAMPERS ARE AT MINIMUM POSITION. WHEN OUTSIDE AIR ENTHALPY IS BELOW RETURN AIR ENTHALPY, ECONOMIZER IS ENABLED AND OUTSIDE AIR TEMPERATURE IS 55°F OR ABOVE, MIXING DAMPERS ARE 100% OPEN TO OUTSIDE AIR. WHEN OUTSIDE AIR ENTHALPY IS BELOW RETURN AIR ENTHALPY AND OUTSIDE AIR TEMPERATURE IS BELOW 55°F, ECONOMIZER IS ENABLED AND MIXING DAMPERS MODULATE TO MAINTAIN MIXED AIR TEMPERATURE AT SETPOINT. MIXED AIR TEMPERATURE SETPOINT IS EQUAL TO SUPPLY AIR TEMPERATURE SETPOINT MINUS 2°F TO COMPENSATE FOR FAN HEAT.

THE ECONOMIZER SHALL CLOSE WHENEVER ONE (1) OF THE FOLLOWING CONDITIONS ARE MET:

- SUPPLY FAN OR RETURN FAN IS OFF.
- MIXED AIR TEMPERATURE IS LESS THAN 40° F.
- OA DEWPOINT IS BELOW 35 F (ADJ).
- LOSS OF FAN STATUS.
- SUPPLY AIR TEMPERATURE SENSOR HAS FAILED.

UNOCCUPIED MODE: THE AHU SET TO UNOCCUPIED MODE ON A USER DEFINABLE SCHEDULE VIA THE BAS WITH MANUAL OVERRIDE, AS REQUIRED, FROM THE VA ACCESSIBLE FRONT END. THE BAS SHALL ENABLE THE ASSOCIATED VAV BOXES TO OPERATE IN THEIR UNOCCUPIED MODE SETPOINTS. DURING UNOCCUPIED MODE, THE MINIMUM OUTSIDE AIR DAMPER SHALL BE ALLOWED TO CLOSE COMPLETELY IF ECONOMIZER CONDITIONS ARENT MET. THE SUPPLY FAN IS OFF WHENEVER SPACE TEMPERATURE IS BETWEEN THE UNOCCUPIED HEATING AND COOLING SETPOINTS.

MORNING WARMUP/COOLDOWN MODE: THE AHU IS SCHEDULED TO ENTER WARMUP/COOLDOWN MODE 1 HOUR (ADJ) PRIOR TO OCCUPIED MODE AS SET ON A USER DEFINABLE SCHEDULE VIA THE BAS WITH MANUAL OVERRIDE, AS REQUIRED, FROM THE VA ACCESSIBLE FRONT END. THE BAS SHALL KEEP OUTDOOR DAMPERS CLOSED IF ECONOMIZER CONDITIONS ARENT MET. THE BAS SHALL ENABLE THE ASSOCIATED VAV BOXES TO OPERATE IN THEIR OCCUPIED MODE SETPOINTS. AS THE SPACE TEMPERATURE APPROACHES WITHIN 2 F OF SPACE SETPOINT TEMPERATURE, OUTSIDE AIR DAMPER SHALL MODULATE TO THE SCHEDULED MINIMUM OUTSIDE AIR.

- THE ALARMS SHALL BE PROVIDED AS FOLLOWS:
- HIGH MIXED AIR TEMPERATURE: 5° F HIGHER THAN SETPOINT.
 - LOW MIXED AIR TEMPERATURE: 5° F LOWER THAN SETPOINT.
 - HIGH OR LOW SUPPLY AIR TEMPERATURE.

EXHAUST FAN CONTROL SEQUENCES BLDG 173:

173-EF-01 AND 173-EF-02

- EXHAUST FAN SHALL BE INTERLOCKED WITH AHU. THE FAN SPEED IS ADJUSTED DURING TAB THROUGH THE BAS. WHEN STATUS IS LOST, AN ALARM SHALL BE SENT TO THE BAS.

173-EF-03

- EXHAUST FAN SHALL BE CONTROLLED BY A LOCAL THERMOSTAT. FAN SHALL ENABLE WHEN TEMPERATURE IS ABOVE 80 F (ADJ). STATUS SHALL BE MONITORED BY THE BAS.

SPLIT AIR CONDITIONER SEQUENCES BLDG 173:

173-ACU-01 AND 173-ACU-02

- UNITS SHALL OPERATE CONTINUOUSLY VIA INTERNAL CONTROLS TO MAINTAIN ROOM SETPOINT TEMPERATURE OF 80 F (ADJ.). WHEN STATUS IS LOST OR UNIT SIGNALS AN ALARM, AN ALARM SHALL BE SENT TO THE BAS.

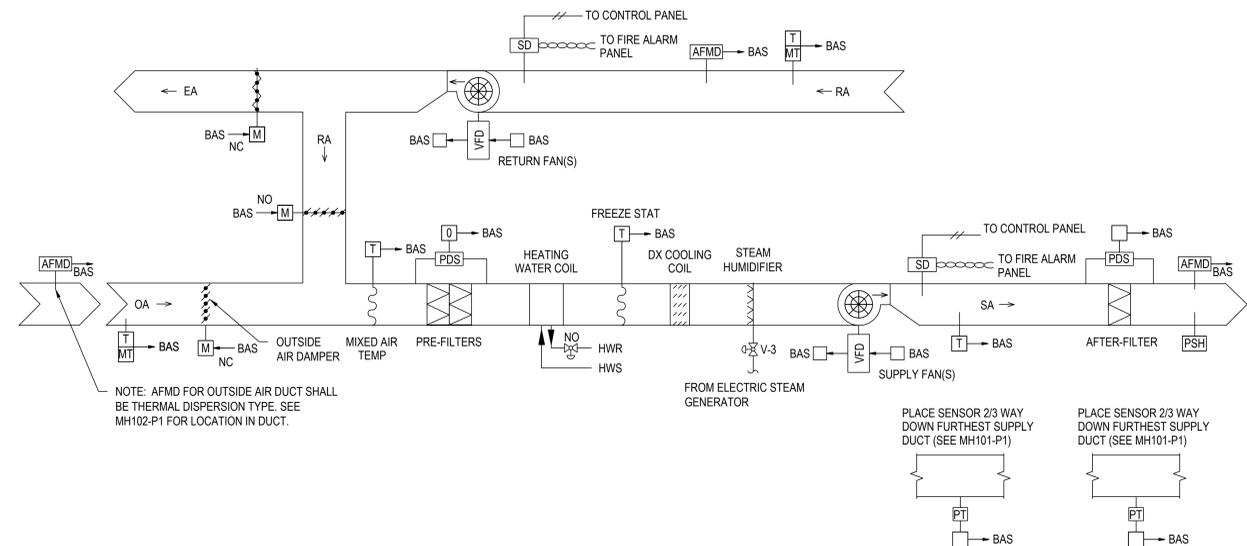
GENERAL NOTES:

- DDC SYSTEM SHALL COMMUNICATE WITH EXISTING CENTRAL BAS VIA ETHERNET. EXISTING BAS IS A SMART STRUCTURE CONTROL SYSTEM BY SCHNEIDER ELECTRIC.
- ALL EQUIPMENT CONTROLLED AND MONITORED BY THE BAS.

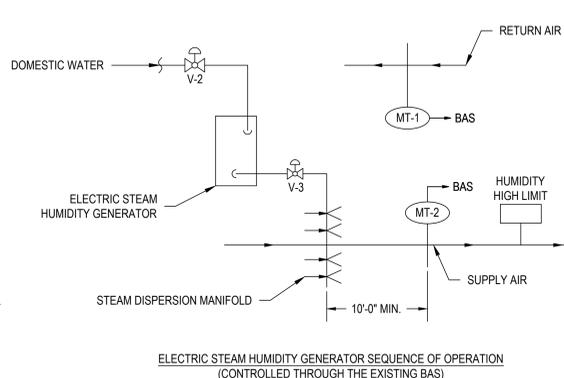
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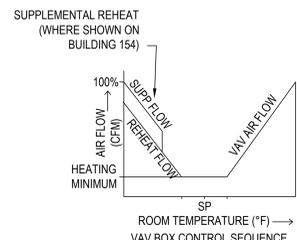


1 173-AHU-01 VARIABLE AIR VOLUME AIR HANDLING UNIT WITH MINIMUM OUTSIDE AIR CONTROLS DIAGRAM BLDG 173
SCALE: NO SCALE



- WHEN HUMIDIFIER IS FIRST ACTIVATED, FILL VALVE V-2 OPENS AND THE EVAPORATING CHAMBER FILLS WITH WATER TO OPERATING LEVEL. V-2 SHALL OPEN AS REQUIRED TO MAINTAIN WATER LEVEL UNDER THE HUMIDIFIER'S OWN CONTROLS.
- DUCT HUMIDISTAT, MT-1, SHALL ENABLE HUMIDIFIER WHEN AIR HUMIDITY IS BELOW ITS SETPOINT. V-3 SHALL MODULATE, AS REQUIRED, TO MAINTAIN MT-1 SETPOINT. HIGH LIMIT HUMIDISTAT SHALL DISABLE HUMIDIFIER IF SUPPLY DUCT HUMIDITY EXCEEDS 80% ADJUSTABLE. VALVE V-3 SHALL REMAIN CLOSED UNTIL STEAM IS AVAILABLE FROM HUMIDIFIER.
- HUMIDIFIER IS DISABLED WHEN AIR HANDLER IS INOPERATIVE.
- PROVIDE ALARM TO BAS IF HUMIDIFIER FAILS TO OPERATE.

2 ELECTRIC STEAM HUMIDIFIER CONTROLS DIAGRAM BLDG 173
SCALE: NO SCALE



TEMPERATURE SET POINTS SHALL BE SET AS FOLLOWS:

OCCUPIED COOLING 75°F (ADJ)	UNOCCUPIED COOLING 80°F (ADJ)
OCCUPIED HEATING 70°F (ADJ)	UNOCCUPIED HEATING 60°F (ADJ)

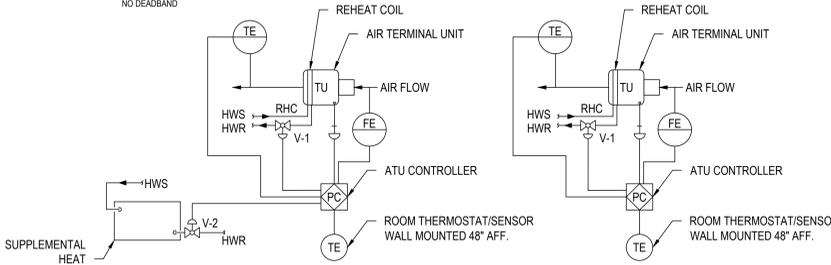
DEAD BAND OF 5° F BETWEEN HEATING AND COOLING SET POINTS WILL BE MAINTAINED. UPON FALL IN SPACE TEMPERATURE THE VAV DAMPER WILL MODULATE TO MINIMUM POSITION. VAV SHALL BE PRESSURE INDEPENDENT.

UPON FURTHER DROP IN SPACE TEMPERATURE, VALVE V-1 WILL MODULATE TO MAINTAIN SET POINT ± 5° F. THE ADJUSTABLE TOLERANCE OF ± 5° F HAS BEEN SELECTED TO PREVENT VALVE HUNTING.

FOR SUPPLEMENTAL REHEAT (WHERE SHOWN ON BUILDING 154); VALVE V-2 SHALL BE ENABLED WHEN OUTSIDE AIR FALLS BELOW 40° F (ADJ) AND VALVE V-1 HAS BEEN MODULATED OPEN ABOVE 30% (ADJ). VALVE V-2 SHALL MAINTAIN SET POINT ± 5° F. THE ADJUSTABLE TOLERANCE OF ± 5° F HAS BEEN SELECTED TO PREVENT VALVE HUNTING.

THE REVERSE SHALL OCCUR ON THE RISE IN SPACE TEMPERATURE.

V-1 SHALL BE A THREE-WAY VALVE AT THE VAV WITH THE LONGEST HOT WATER PIPE RUN (173-VAV-37 FOR BLDG 173, VAV-2-18 FOR BLDG 154).



3 VARIABLE AIR VOLUME TERMINAL UNIT CONTROLS DIAGRAM
SCALE: NO SCALE

<p>CONSULTANTS:</p>	<p>ARCHITECT/ENGINEERS:</p>	<p>STAMP:</p>	<p>Drawing Title</p> <p>MECHANICAL CONTROLS</p>	<p>Phase</p> <p>100% CONSTRUCTION DOCUMENTS</p>	<p>Project Title</p> <p>OUTPATIENT MENTAL HEALTH / EDUCATION ADDITION</p>	<p>Project Number</p> <p>436-114</p>
			<p>Approved: Project Director</p>	<p>Location</p> <p>3687 VETERANS DRIVE, FORT HARRISON, MT 59636</p>	<p>Building Number</p> <p>173 / 154</p>	
<p>Issue Date</p> <p>08/05/2020</p>	<p>Checked</p> <p>DD</p>	<p>Drawn</p> <p>DN</p>	<p>Drawing Number</p> <p>M-701</p>			

GENERAL NOTES:

- DDC SYSTEM SHALL COMMUNICATE WITH EXISTING CENTRAL BAS VIA ETHERNET. EXISTING BAS IS A SMART STRUCTURE CONTROL SYSTEM BY SCHNEIDER ELECTRIC.
- ALL EQUIPMENT CONTROLLED AND MONITORED BY THE BAS.

154-AHU-01-EDU/154-EF-01 CONTROL SEQUENCE BLDG 154:

SUPPLY FAN START/STOP CONTROL: THE SUPPLY FAN SHALL HAVE A HAND-OFF-AUTO SWITCH IN THE VARIABLE FREQUENCY DRIVE. WHEN IN THE "HAND" POSITION, THE FAN SHALL OPERATE. WHEN IN THE "OFF" POSITION, THE FAN SHALL NOT OPERATE. WHEN IN THE "AUTO" POSITION, THE FAN SHALL BE CONTROLLED BY THE BAS AND VFD. SUPPLY FAN PRESSURE TRANSMITTER SHALL MODULATE THE FAN AND VARIABLE FREQUENCY DRIVE TO MAINTAIN PROPER DUCT STATIC SET POINT. AN AUXILIARY CONTACT ON THE VFD SHALL SEND A SIGNAL TO THE BAS FOR FAN STATUS. PROGRAM BAS TO SIGNAL AN ALARM CONDITION IF THE FAN FAILS TO PROVE STATUS. PROVIDE HARDWIRED INTERLOCKS TO SHUTDOWN FAN IF THE MOTOR OVERLOADS. SUPPLY AIR PRESSURE HIGH LIMIT IS REACHED, SMOKE DETECTOR CONTACTS OPEN, OR FREEZE STAT CONTACTS OPEN. PROGRAM BAS TO OPERATE THE SUPPLY FAN CONTINUOUSLY IN OCCUPIED MODE.

SUPPLY AIR PRESSURE HIGH LIMIT: WHEN THE SUPPLY SIDE OF THE AIR HANDLER REACHES SET DUCT STATIC PRESSURE (ADJ.), MANUAL RESET HIGH PRESSURE SWITCH SHALL SHUT DOWN THE AIR HANDLER.

HEATING WATER COIL CONTROL: THE HEATING COIL SHALL MODULATE TO MAINTAIN SUPPLY AIR SETPOINT TEMPERATURE.

COOLING CONTROL: A TEMPERATURE SENSOR LOCATED IN THE SUPPLY AIR DUCT SHALL, THROUGH THE DDC CONTROLLER, STAGE COMPRESSORS, AS REQUIRED, TO MAINTAIN LEAVING AIR SETPOINT (ADJ.), TO MINIMIZE COMPRESSOR CYCLING, THERE SHALL BE A 5 MINUTE MINIMUM OFF TIME AND 5 MINUTE MINIMUM ON TIME FOR COMPRESSORS UNLESS AN ALARM OCCURS.

SUPPLY AIR TEMPERATURE RESET SCHEDULE: THE BAS SHALL RESET THE SUPPLY AIR TEMPERATURE BASED ON THE VAV BOX REQUIRING THE MOST AIRFLOW (CRITICAL VAV). THE SUPPLY AIR RESET TEMPERATURE SHALL BE BETWEEN 55°F AND 65°F AS THE CRITICAL VAV DAMPER MODULATES FROM 95% TO 65% WITH A STRAIGHT LINE RELATIONSHIP BETWEEN. DISCHARGE TEMPERATURE SHALL BE RESETTABLE IN THE SOFTWARE.

RETURN FAN START/STOP CONTROL: THE RETURN FAN SHALL HAVE A HAND-OFF-AUTO SWITCH IN THE VARIABLE FREQUENCY DRIVE. WHEN IN THE "HAND" POSITION, THE FAN SHALL OPERATE. WHEN IN THE "OFF" POSITION, THE FAN SHALL NOT OPERATE. WHEN IN THE "AUTO" POSITION, THE FAN SHALL BE CONTROLLED BY THE BAS AND VFD. AN AUXILIARY CONTACT ON THE VFD SHALL SEND A SIGNAL TO THE BAS FOR FAN STATUS. PROGRAM BAS TO SIGNAL AN ALARM CONDITION IF THE FAN FAILS TO PROVE STATUS. PROVIDE HARDWIRED INTERLOCKS TO SHUTDOWN FAN IF THE MOTOR OVERLOADS, SMOKE DETECTOR, OR FREEZE STAT CONTACTS OPEN. PROGRAM BAS TO START RETURN FAN AFTER PROOF OF SUPPLY FAN STATUS.

RETURN FAN SPEED CONTROL: RETURN FAN SHALL BE MODULATED TO MAINTAIN A FIXED CFM DIFFERENTIAL BETWEEN SUPPLY AIRFLOW AND RETURN AIRFLOW. THE CFM DIFFERENTIAL WILL BE DETERMINED BY THE TAB CONTRACTOR TO MAINTAIN POSITIVE BUILDING PRESSURE.

MINIMUM OUTSIDE AIR: THE OUTSIDE AIR DAMPER SHALL MODULATE TO MAINTAIN THE SCHEDULED MINIMUM OUTSIDE AIR FLOW SETPOINT WITH A MIXED AIR TEMPERATURE OF 55°F (ADJ.). THE MINIMUM OUTSIDE AIR CAN BE RESET BY THE CO2 CONTROL. SIGNAL AN ALARM CONDITION IF MIXED AIR TEMPERATURE IS LESS THAN 40°F. RAD, EAD, AND OAD POSITIONS SHALL ALWAYS SUM TO 100 AND THE BUILDING SHALL REMAIN POSITIVELY PRESSURIZED.

CO2 CONTROL: THE BAS SHALL RESET THE MINIMUM OUTSIDE AIR FROM THE MINIMUM SCHEDULED 850 CFM TO 1400 CFM AS THE CO2 SENSOR REPORTS FROM 1000 PPM TO 1400 PPM WITH A STRAIGHT LINE RELATIONSHIP BETWEEN.

ECONOMIZER CONTROL: OUTSIDE AIR AND RETURN AIR SECTIONS OF THE AIR HANDLING UNITS SHALL HAVE ENTHALPY SENSORS, VAISALA HM8X8H OR ENGINEERED APPROVED EQUIVALENT.

WHEN OUTSIDE AIR ENTHALPY IS ABOVE RETURN AIR ENTHALPY, ECONOMIZER IS DISABLED AND MIXING DAMPERS ARE AT MINIMUM POSITION. WHEN OUTSIDE AIR ENTHALPY IS BELOW RETURN AIR ENTHALPY, ECONOMIZER IS ENABLED AND OUTSIDE AIR TEMPERATURE IS 55°F OR ABOVE, MIXING DAMPERS ARE 100% OPEN TO OUTSIDE AIR. WHEN OUTSIDE AIR ENTHALPY IS BELOW RETURN AIR ENTHALPY AND OUTSIDE AIR TEMPERATURE IS BELOW 55°F, ECONOMIZER IS ENABLED AND MIXING DAMPERS MODULATE TO MAINTAIN MIXED AIR TEMPERATURE AT SETPOINT. MIXED AIR TEMPERATURE SETPOINT IS EQUAL TO SUPPLY AIR TEMPERATURE SETPOINT MINUS 2°F TO COMPENSATE FOR FAN HEAT.

THE ECONOMIZER SHALL CLOSE WHENEVER ONE (1) OF THE FOLLOWING CONDITIONS ARE MET:

- SUPPLY FAN OR RETURN FAN IS OFF.
- MIXED AIR TEMPERATURE IS LESS THAN 40° F.
- OA DEWPOINT IS BELOW 35 F (ADJ.).
- LOSS OF FAN STATUS.
- SUPPLY AIR TEMPERATURE SENSOR HAS FAILED.

THE ALARMS SHALL BE PROVIDED AS FOLLOWS:

- HIGH MIXED AIR TEMPERATURE: 5° F HIGHER THAN SETPOINT.
- LOW MIXED AIR TEMPERATURE: 5° F LOWER THAN SETPOINT.
- HIGH OR LOW SUPPLY AIR TEMPERATURE.

UNOCCUPIED MODE: THE AHU SET TO UNOCCUPIED MODE ON A USER DEFINABLE SCHEDULE VIA THE BAS WITH MANUAL OVERRIDE, AS REQUIRED. FROM THE VA ACCESSIBLE FRONT END. THE BAS SHALL ENABLE THE ASSOCIATED VAV BOXES TO OPERATE IN THEIR UNOCCUPIED MODE SETPOINTS. DURING UNOCCUPIED MODE, THE MINIMUM OUTSIDE AIR DAMPER SHALL BE ALLOWED TO CLOSE COMPLETELY IF ECONOMIZER CONDITIONS AREN'T MET. THE SUPPLY FAN IS OFF WHENEVER SPACE TEMPERATURE IS BETWEEN THE UNOCCUPIED HEATING AND COOLING SETPOINTS.

MORNING WARMUP/COOLDOWN MODE: THE AHU IS SCHEDULED TO ENTER WARMUP/COOLDOWN MODE 1 HOUR (ADJ.) PRIOR TO OCCUPIED MODE AS SET ON A USER DEFINABLE SCHEDULE VIA THE BAS WITH MANUAL OVERRIDE, AS REQUIRED, FROM THE VA ACCESSIBLE FRONT END. THE BAS SHALL KEEP OUTDOOR DAMPERS CLOSED IF ECONOMIZER CONDITIONS AREN'T MET. THE BAS SHALL ENABLE THE ASSOCIATED VAV BOXES TO OPERATE IN THEIR OCCUPIED MODE SETPOINTS. AS THE SPACE TEMPERATURE APPROACHES WITHIN 2 F OF SPACE SETPOINT TEMPERATURE, OUTSIDE AIR DAMPER SHALL MODULATE TO THE SCHEDULED MINIMUM OUTSIDE AIR.

EXHAUST FAN CONTROL SEQUENCE BLDG 154:

EF-2-1 (EXISTING)

- EXHAUST FAN SHALL RUN CONTINUOUSLY WITH MANUAL ON/OFF CONTROL THROUGH THE BAS. WHEN STATUS IS LOST, AN ALARM SHALL BE SENT TO THE BAS.

SPLIT AIR CONDITIONER SEQUENCES BLDG 154:

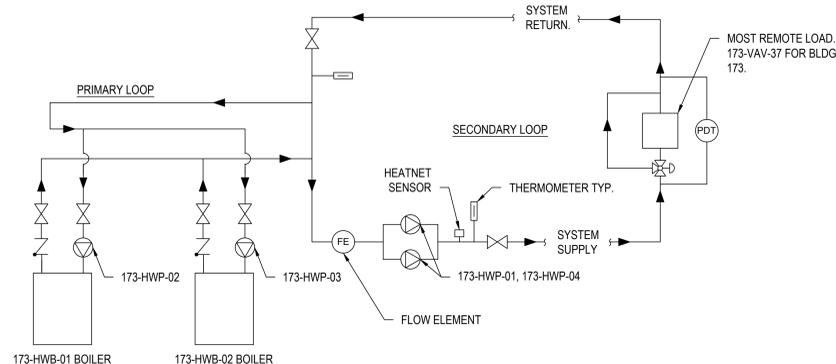
- 154-AJU-01 SHALL OPERATE CONTINUOUSLY VIA INTERNAL CONTROLS TO MAINTAIN ROOM SETPOINT TEMPERATURE OF 80 F (ADJ.). WHEN STATUS IS LOST OR UNIT SIGNALS AN ALARM, AN ALARM SHALL BE SENT TO THE BAS.

I/O POINTS LIST BUILDING 154

	QUANTITY	GRAPHICS REQUIRED	DO	AO	DI	AI	READ	WRITE	TREND	BACnet OBJECT
AIR HANDLER 154-AHU-01-EDU										
SUPPLY FAN START/STOP	1	X	X							HARDWIRED
SUPPLY FAN SPEED CONTROL	1	X		X				X		HARDWIRED
SUPPLY FAN STATUS	1	X			X				X	HARDWIRED
SUPPLY FAN VFD OUTPUT FREQUENCY	1	X					X	X		AV
SUPPLY FAN VFD OUTPUT CURRENT	1	X					X			AV
SUPPLY FAN VFD OUTPUT VOLTAGE	1	X					X			AV
SUPPLY FAN VFD ALARM	1	X						X		BV
SUPPLY AIR STATIC PRESSURE	1	X				X			X	HARDWIRED
SUPPLY AIR PRESSURE HIGH LIMIT	1	X			X					HARDWIRED
SUPPLY AIRFLOW	1	X			X			X		HARDWIRED
SUPPLY AIR TEMPERATURE	1	X				X		X		HARDWIRED
FILTER AIR PRESSURE HIGH LIMIT	1	X				X				HARDWIRED
SMOKE DETECTOR ALARM	1	X					X			HARDWIRED
FREEZE STAT	1	X			X					HARDWIRED
MIXED AIR TEMPERATURE	1	X				X		X		HARDWIRED
MIXED & EXHAUST AIR DAMPER CONTROL	1	X		X						HARDWIRED
OUTSIDE AIR TEMPERATURE	1	X				X		X		HARDWIRED
CONDENSING UNIT 154-CUAC-01-EDU										
SCROLL COMPRESSOR ENABLE	3	X	X							HARDWIRED
DIGITAL COMPRESSOR CONTROL	1	X		X						HARDWIRED
CIRCUIT FAIL ALARM	2	X			X					HARDWIRED
AIRFLOW PROVING	2	X	X							HARDWIRED
RETURN/EXHAUST FAN 154-EF-01										
RETURN FAN START/STOP	1	X	X							HARDWIRED
RETURN FAN SPEED CONTROL	1	X		X				X		HARDWIRED
RETURN FAN STATUS	1	X			X				X	HARDWIRED
RETURN FAN VFD OUTPUT FREQUENCY	1	X					X	X		AV
RETURN FAN VFD OUTPUT CURRENT	1	X					X			AV
RETURN FAN VFD OUTPUT VOLTAGE	1	X					X			AV
RETURN FAN VFD ALARM	1	X						X		BV
RETURN AIRFLOW	1	X				X		X		HARDWIRED
RETURN AIR TEMPERATURE	1	X				X		X		HARDWIRED
VAV BOX										
VAV BOX DAMPER POSITION	21	X		X				X		HARDWIRED
VAV BOX INLET PRESSURE TRANSDUCER (FLOW)	21	X			X	X			X	HARDWIRED
VAV BOX HEATING WATER CONTROL VALVE	21	X		X					X	HARDWIRED
VAV BOX TEMPERATURE SET POINT	21	X		X					X	HARDWIRED
VAV BOX SUPPLY AIR TEMPERATURE SENSOR	21	X				X		X		HARDWIRED
SPACE TEMPERATURE SENSOR	21	X				X		X		HARDWIRED
SPLIT AIR CONDITIONER 154-AJU-01										
ON/OFF COMMAND	1	X					X			BO
STATUS	1	X					X		X	BI
ALARM	1	X					X			BI

I/O POINTS LIST BUILDING 173

	QUANTITY	GRAPHICS REQUIRED	DO	AO	DI	AI	READ	WRITE	TREND	BACnet OBJECT
HEATING WATER BOILERS 173-HWB-01 (MASTER), 173-HWB-02 (SLAVE)										
HEAT DEMAND	1	X				X	X	X		BV
BOILER SETPOINT TEMPERATURE	1	X				X	X			BV
OUTSIDE AIR RESET ENABLE	1	X				X	X			AV
OUTSIDE AIR RESET SETPOINT	1	X				X	X			AV
OUTSIDE AIR RESET HIGH WATER TEMPERATURE	1	X				X	X			AV
OUTSIDE AIR RESET HIGH AIR TEMPERATURE	1	X				X	X			AV
OUTSIDE AIR RESET LOW WATER TEMPERATURE	1	X				X	X			AV
OUTSIDE AIR RESET LOW AIR TEMPERATURE	1	X				X	X			AV
OUTSIDE AIR TEMPERATURE	1	X				X		X		AI
SYSTEM SUPPLY WATER TEMPERATURE	1	X				X	X			AI
BOILER RUN STATUS	2	X				X	X			BV
BOILER SUPPLY WATER TEMPERATURE	2	X				X	X			AI
BOILER RETURN WATER TEMPERATURE	2	X				X	X			AI
BOILER ALARM	2	X				X				BV
BOILER MODULATION RATE	2	X				X	X			AI
BOILER RUNTIME	2	X				X				AI
BOILER CYCLES	2	X				X				AI
BOILER FAILED	2	X				X				BV
SECONDARY LOOP HEATING WATER PUMPS 173-HWP-01, 173-HWP-04										
PUMP STATUS	2	X			X				X	HARDWIRED
PUMP START/STOP	2	X	X							HARDWIRED
PUMP SPEED CONTROL	2	X		X				X		HARDWIRED
SUPPLY WATER TEMPERATURE	1	X			X			X		HARDWIRED
RETURN WATER TEMPERATURE	1	X			X			X		HARDWIRED
WATER DIFFERENTIAL PRESSURE	1	X			X			X		HARDWIRED
WATER FLOW	1	X			X			X		HARDWIRED
PUMP VFD OUTPUT FREQUENCY	2	X				X	X			AV
PUMP VFD OUTPUT CURRENT	2	X				X				AV
PUMP VFD OUTPUT VOLTAGE	2	X				X				AV
PUMP VFD ALARM	2	X				X				BV
173-CUH-01										
ON/OFF COMMAND	1	X	X			X				HARDWIRED
STATUS	1	X			X		X	X		HARDWIRED
ALARM	1	X			X		X			HARDWIRED
STORMWATER HEAT TRACING										
STATUS	1	X			X	X				HARDWIRED
DOMESTIC CIRCULATION PUMP 173-PP-01										
PUMP STATUS	1	X			X				X	HARDWIRED
PUMP START/STOP	1	X	X							HARDWIRED



SEQUENCE OF OPERATION:

BOILER/BOILER PUMP CONTROL (173-HWP-02, 173-HWP-03, 173-HWB-01, AND 173-HWB-02): BOILERS SHALL BE CONNECTED WITH 173-HWB-01 BEING MASTER AND 173-HWB-02 AS THE SLAVE BOILER. BOILERS AND BOILER PRIMARY PUMPS (173-HWP-02, 173-HWP-03) OPERATION SHALL BE CONTROLLED BY THE BOILER MANAGEMENT SYSTEM (BMS) VIA INPUT FROM THE BAS. BOILERS (AND ASSOCIATED PUMPS) SHALL OPERATE IN A LEAD/LAG CONFIGURATION. LEAD/LAG STATUS SHALL ROTATE MONTHLY BY BAS.

HEATING WATER SYSTEM TEMPERATURE CONTROL:

WHEN HEATING WATER SYSTEM PUMP (SECONDARY: 173-HWP-01 AND 173-HWP-04) IS OPERATING, BAS SHALL CONTROL BOILERS TO MAINTAIN SYSTEM HEATING WATER TEMPERATURE SETPOINT. TEMPERATURE SETPOINT SHALL BE AS FOLLOWS:

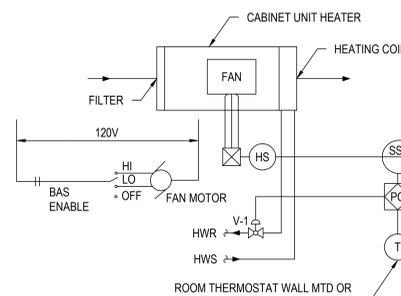
- 130°F WHEN OUTSIDE AIR TEMPERATURE IS ABOVE 55°F.
- 160°F WHEN OUTSIDE AIR TEMPERATURE IS BELOW 0° F.
- TEMPERATURE SETPOINT SHALL BE PROPORTIONAL BETWEEN 130°F AND 160°F WHEN OUTSIDE AIR IS BETWEEN 55°F AND 0°F.

WHEN OPERATING, BOILER PUMP SPEED SHALL BE CONTROLLED BY BMS TO MAINTAIN DIFFERENTIAL TEMPERATURE SETPOINT ACROSS BOILER OF 30° F (ADJ.). BOILER AND PUMP STATUS SHALL BE REPORTED TO BAS. BMS SHALL CONTROL BOILER STARTING AND FIRING TO MAINTAIN SETPOINT.

SECONDARY LOOP PUMP CONTROL (173-HWP-01 AND 173-HWP-04): PUMP OPERATION SHALL BE CONTROLLED VIA INPUT FROM THE BAS. PUMPS SHALL OPERATE IN A LEAD/STANDBY CONFIGURATION. LEAD/STANDBY STATUS SHALL BE ROTATED WEEKLY BY BAS. PUMP SPEED SHALL BE CONTROLLED VIA A PRESSURE DIFFERENTIAL SENSOR AT THE MOST REMOTE LOAD. A 3-WAY BYPASS VALVE SHALL ENSURE MINIMUM PUMP FLOW IS MET TO PREVENT PUMP DEADHEADING.

1 BOILER CONTROLS DIAGRAM BLDG 173

SCALE: NO SCALE

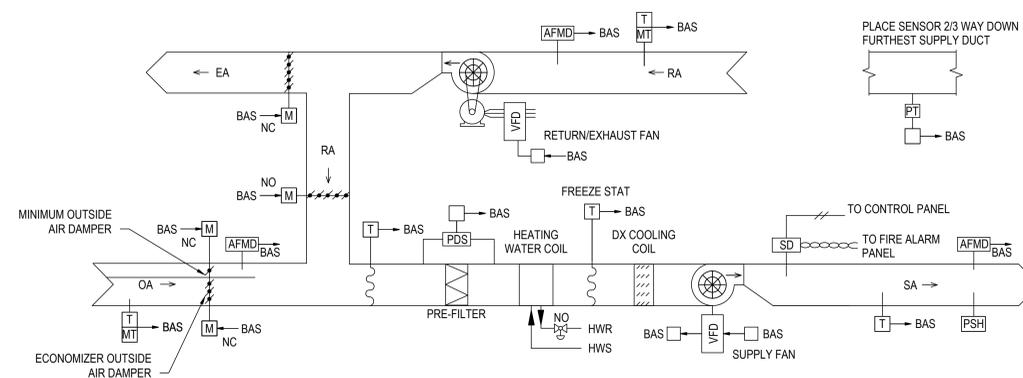


SEQUENCE OF OPERATION:

CABINET HEATER SHALL OPERATE ON A SCHEDULE AS SET BY THE BAS. FAN STATUS SHALL BE MONITORED AND AN ALARM MESSAGE GENERATED IN THE EVENT THE FAN FAILS TO RUN. THE ROOM TEMP SETPOINT WILL BE 50° (ADJ.). THE HEATING WATER VALVE AND FAN SHALL BE ENABLED, AS REQUIRED, TO MAINTAIN SPACE TEMP SETPOINT.

2 HOT WATER CABINET HEATER CONTROLS DIAGRAM BLDG 173

SCALE: NO SCALE



3 154-AHU-01-EDU AND 154-EF-01 CONTROLS DIAGRAM BLDG 154

SCALE: NO SCALE

CONSULTANTS: HOEFER WYSOCKI 11400 TOMAHAWK CREEK PARKWAY SUITE 400, LEANWOOD, MICHIGAN 48041 PROTECTION ENGINEERING JIRSA HEDRICK Structural Engineers	ARCHITECT/ENGINEERS: VALHALLA ENGINEERING GROUP, LLC 750 W HAMPDEN AVE SUITE #100 ENGLEWOOD CO 80110 (720) 550-6307 WWW.VALHALLAENGINEERING.COM	STAMP: 	U.S. Department of Veterans Affairs	Drawing Title MECHANICAL CONTROLS	Phase 100% CONSTRUCTION DOCUMENTS	Project Title OUTPATIENT MENTAL HEALTH / EDUCATION ADDITION	Project Number 436-114
				Approved: Project Director	Location 3687 VETERANS DRIVE, FORT HARRISON, MT 59636	Building Number 173 / 154	Drawing Number M-702
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