PIPING SYMBOLS

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

PIPING SYMBOLS

FWP	FEEDWATER PUMP DISCHARGE
FWS	FEEDWATER PUMP SUCTION
CTP	CONDENSATE TRANSFER PUMP DISCHARGE
CTPS	CONDENSATE TRANSFER PUMP SUCTION
VR	VACUUM CONDENSATE RETURN
TC	TUBE CLEANER WATER SUPPLY
BO	BOILER BLOWOFF
CBD	CONTINUOUS BLOWDOWN
BWS	BOILER WATER SAMPLE
FWS	FEEDWATER SAMPLE (FROM DEAERATOR)
CF	CHEMICAL FEED
OF	OVERFLOW
A	COMPRESSED AIR
G	NATURAL GAS MAIN FUEL
G(1)	NATURAL GAS IGNITER FUEL
LPG (A)	LIQUIFIED PETROLEUM GAS IGNITER FUEL
FOS	FUEL OIL SUPPLY
FOR	FUEL OIL RETURN
CW	COLD WATER (CITY WATER)
SW	SOFTENED WATER
HW	HOT WATER
RH	ROLLER-TYPE HANGER
SH	VARIABLE SPRING-TYPE HANGER (TYPE 51)*
SCH	SPRING CUSHION-TYPE HANGER (TYPE 48 OR 49)*
TH	CLEVIS-TYPE HANGER
PS	TRAPEZE HANGER (PROVIDE U-BOLT PIPE ATTACHMENT TO TRAPEZE EXCEPT WHERE RHARE INDICATED)
RC	FLOOR SUPPORTED PIPE STAND
WB	RISER CLAMP (TYPE 42)
CSH	WALL BRACKET (TYPE 31, 32, 33)*
SS	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

VALVE SYMBOLS

- GATE VALVE WITH 3/4" HOSE ADAPTER
- CHECK VALVE
- WYE STRAINER (WITH BALL VALVE & HOSE CONNECTION)
- WYE STRAINER WITH VALVED DRAIN AND QUICK-COUPLE HOSE CONNECTOR
- FLEXIBLE CONNECTION
- BALL VALVE
- MODULATING CONTROL 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
- PLUG VALVE
- CONTROL VALVE (CV) - FLOAT-OPERATED
- PRESSURE REDUCING VALVE (PRV)
- WATER LEVEL CONTROLLER
- FLOW METER

DUCTWORK SYMBOLS

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

DUCTWORK SYMBOLS

- SUPPLY DUCT (UP & DOWN)
- EXHAUST DUCT (UP & DOWN)
- RETURN DUCT (UP & DOWN)
- ROUND AND SQUARE 4-WAY CEILING DIFFUSERS
- SQUARE 3-WAY CEILING DIFFUSERS
- SQUARE 2-WAY CEILING DIFFUSERS
- SQUARE 1-WAY CEILING DIFFUSERS
- LINEAR SLOT DIFFUSER
- SUPPLY TOP REGISTER OR GRILLE (WALL TYPE)
- EXHAUST OR RETURN CEILING REGISTER OR GRILLE
- 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 ON LIMIT OF DEMOLITION
- INCLINED RISE, IN DIRECTION OF AIR FLOW
- INCLINED DROP, IN DIRECTION OF AIR FLOW
- LOCATION OF EXISTING TO REMAIN

MECHANICAL GENERAL PROJECT NOTES

A. FOR GENERAL DUCT CONSTRUCTION SEE DETAILS ON MECHANICAL DETAILS SHEETS.

B. ALL WORK SHALL BE IN ACCORDANCE WITH THE BEST QUALITY STANDARDS OF THE TRADE, AND SHALL CONFORM WITH ALL FEDERAL, STATE, AND LOCAL CODES AND STANDARDS.

C. CONSTRUCTION DOCUMENTS SHALL BE FOLLOWED AS CLOSELY AS POSSIBLE, HOWEVER, SYSTEMS HAVE BEEN SHOWN DIAGRAMMATICALLY AND IN SOME CASES, ENLARGED FOR CLARITY. ANY OFFSETS, ADDITIONAL FITTINGS, AND/OR APPURTENANCES REQUIRED TO PROVIDE A COMPLETE AND COORDINATED SYSTEM SHALL BE BORNE BY THE CONTRACTOR.

D. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATION OF CEILING MOUNTED MATERIALS INCLUDING ALL DIFFUSERS, GRILLES, AND REGISTERS THE HVC. SHALL COORDINATE DUCTWORK INSTALLATIONS WITH OTHER TRADES. LIGHTING AND DUCTWORK DESIGNS INDICATED ON CONTRACT DRAWINGS WERE COORDINATED, HOWEVER CONFLICTS WITH DUCT WORK AND LIGHTS MAY ARISE DUE TO GRID INSTALLATION. MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DUCTWORK MODIFICATIONS AND OFF SETS REQUIRED TO AVOID FIELD CONDITIONS.

E. BALANCE DAMPERS SHALL BE LOCATED AT BRANCH CONNECTION TO THE MAIN.

F. FLEXIBLE DUCTWORK IS LIMITED TO A MAXIMUM LENGTH OF 3 FEET, WITH NO DIPS, SAGS, OR TIGHT ELBOWS, AND ON SUPPLY DUCTWORK ONLY. FLEXIBLE DUCT WORK SHALL BE AN INSULATED, SEMI-RIGID AND LIGHT WEIGHT AIR DUCT, MANUFACTURED BY USING DEAD SOFT ALUMINUM STRIP WHICH IS SPIRALLY WOUND AND MECHANICALLY JOINED TO GETHER. FORMING AN AIR TIGHT-LEAKPROOF TRIPLE LOCK SEAM. DUCT TO BE SELF-SUPPORTING AND CORROSIVE RESISTANT UL-181 CLASS I PRODUCT, WITH A POLYETHYLENE VAPOR BARRIER. FLEXIBLE DUCT WORK TO BE LIKE MASTERFIT UPC-018 (ACOUSTICAL) OR AN APPROVED EQUAL.

G. PROVIDE NECK PLENUMS ON RETURN AND EXHAUST GRILLES AS REQUIRED. SEE DETAILS.

H. PROVIDE TURNING VANES IN ALL SQUARE ELBOWS. SEE DETAILS.

I. ALL EQUIPMENT INCLUDING BUT NOT LIMITED TO DUCTWORK, PIPING, UNIT HEATERS, ETC. SHALL BE HUNG FROM THE TOP CHORD OF THE STRUCTURAL STEEL.

J. EACH MAIN DUCT PASSING THROUGH FLOOR SPACES OR FIRE BARRIERS SHALL BE FIRE DAMPERED. SEE ARCHITECTURAL PLANS.

K. ALL EXTERIOR PENETRATIONS SHALL BE WEATHER AND WATER TIGHT.

L. CONTRACTOR S ARE TO REVIEW EXISTING STRUCTURAL AND PLANS, WITH ACTUAL LAYOUT OF BEAMS, JOISTS, ETC. TO AVOID CONFLICT BETWEEN DUCT. ADJUST DUCT ROUTING TO ACCEPT STRUCTURAL CONDITIONS.

M. ALL EXHAUST DISCHARGES AND GAS FLUES WHERE INDICATED SHALL BE LOCATED A MINIMUM OF 25-0" AWAY FROM OUTSIDE AND COMBUSTION AIR INTAKES UNLESS LOCAL AND STATE CODES MANDATE ADDITIONAL DISTANCE.

N. CONTRACTOR SHALL VERIFY ELECTRICAL CHARACTERISTICS OF ALL MECHANICAL EQUIPMENT WITH THE ELECTRICAL CONTRACTOR PRIOR TO PLACING EQUIPMENT ON ORDER

O. WHERE WALL TYPE LOUVERS ARE INDICATED, MECHANICAL CONTRACTOR SHALL SEAL WATER-TIGHT ALL AROUND LOUVER WITH SILICON CAULKING. CONTRACTOR SHALL COORDINATE PAINTING REQUIREMENTS FOR LOUVERS WITH GENERAL CONTRACTOR PRIOR TO SUBMITTING BID.

ABBREVIATIONS

A/E ARCHITECT / ENGINEER
AHX AIR TO AIR HEAT EXCHANGER
AB AIR BLENDER
AAV AUTOMATIC AIR VENT
ACC AIR COOLED CONDENSER
ACCH AIR COOLED CHILLER
ACCU AIR-COOLED CONDENSING UNIT
ACU AIR CONDITIONING UNIT
ACD AUTOMATIC CONTROL DAMPER MODULATING
ACD-TP AUTOMATIC CONTROL DAMPER TWO POSITION
AD ACCESS DOOR
AF AFTER FILTER
AFCV AIR FLOW CONTROL VALVE
AFF ABOVE FINISHED FLOOR
AFMD AIR FLOW MEASURING DEVICE
AFW AIR FOIL WHEEL (FAN)
AHU AIR HANDLING UNIT
AMP AMPERGE
AP ACCESS PANEL
APD AIR PRESSURE DROP
AR AIR CONDITIONING AND REFRIGERATION INSTITUTE
AS AIR SEPARATOR
ASME AMERICAN SOCIETY OF MECHANICAL ENGINEERS
AW AIR WASHER
AXF AXIAL FLOW

B BOILER
BD BUTTERFLY DAMPER
BDD BACKDRAFT DAMPER
BDR BASEBOARD RADIATOR
BFP BACKFLOW PREVENTER
BFT BOILER PLANT FIRE TUBE
BG BOTTOM GRILLE
BHP BRAKE HORSEPOWER
BHW HOT WATER HEATING BOILER
BHX BOILER BLOWDOWN HEAT EXCHANGER
BIW BACKWARD INCLINED WHEEL (FAN)
BMT BONE MARROW TRANSPLANT
BR BOTTOM REGISTER
BSC BIOLOGICAL SAFETY CABINETS
BT BLOWOFF TANK
BTC BLOWOFF TANK CONTROL VALVE
BTU BRITISH THERMAL UNIT
BTUH BRITISH THERMAL UNIT PER HOUR
BWT BOILER PLANT WATER TUBE

C CENTIGRADE (CELCIUS)
CC COOLING COIL
CCD COOLING COIL CONDENSATE DRAIN
CD CEILING DIFFUSER
CD-1 CONSTRUCTION DOCUMENTS (SUBMISSION1)
CD-2 CONSTRUCTION DOCUMENTS (SUBMISSION2)
CENT CENTRIFUGAL
CFH CUBIC FEET PER HOUR
CFM CUBIC FEET PER MINUTE
CFT CUBIC FEET
CFP CHEMICAL FEED PUMP
CG CEILING GRILLE
CH CHILLER
CHP CHILLED WATER PUMP
CHW CHILLER WATER
CHR CHILLED WATER RETURN
CHS CHILLED WATER SUPPLY
CI CAST IRON
CM CARBON MONOXIDE
CFM CUBIC METER
CMS CUBIC METER PER SECOND
CO CLEAN OUT
CO2 CARBON DIOXIDE
COMP COMPRESSOR UNIT
COP COEFFICIENT OF PERFORMANCE
CP CONDENSATE PUMP
CR CEILING REGISTER
CS CONDENSATE STORAGE TANK
CSG CLEAN STEAM GENERATOR
CT COOLING TOWER
CU CONDENSING UNIT
CUH CABINET UNIT HEATER
CV CONSTANT VOLUME
CW COLD WATER (POTABLE)
CWCC CHILLED WATER COOLING COIL
CWP CONDENSER WATER PUMP
CWR CONDENSER WATER RETURN (TO COOLING TOWER)
CWS CONDENSER WATER SUPPLY (FROM COOLING TOWER)
D DAMPER - AUTOMATIC
D-1 OUTDOOR AIR DAMPER
D-2 RETURN AIR DAMPER
D-3 RELIEF AIR DAMPER
DB DECIBELS
DB DRY BULB TEMPERATURE
DD-1 DESIGN DEVELOPMENT (SUBMISSION1)
DD-2 DESIGN DEVELOPMENT (SUBMISSION2)
DDC DIRECT DIGITAL CONTROLS
DEG DEGREE
DF DIFFUSER
DIA DIAMETER
DW DEIONIZED WATER
DP DEW POINT TEMPERATURE
DP DIFFUSER PLATE
DPA DIFFERENTIAL PRESSURE ASSEMBLY
DPS DIFFERENTIAL PRESSURE SENSOR
DX DIRECT EXPANSION
DXCC DIRECT EXPANSION COOLING COIL
EA EXHAUST AIR
EAT ENTERING AIR TEMPERATURE
EC EVAPORATIVE COOLER
ECC ENGINEERING CONTROL CENTER
ECU EVAPORATIVE CONDENSER UNIT
EDH ELECTRIC DUCT HEATER
EER ENERGY EFFICIENCY RATIO
EF EXHAUST FAN
EG EXHAUST GRILLE
EGS EMERGENCY GAS SHUTOFF
EGT ENTERING GLYCOL TEMPERATURE
EH EXHAUST HOOD
EJ EXPANSION JOINT
EMD END OF MAIN DRIP (STEAM)
ENT ENTERING
ER EXHAUST REGISTER
ERC ELECTRIC REHEAT COIL
ERP ELECTRICCRADIANT PANEL
ESP EXTERNAL STATIC PRESSURE
ET EXPANSION TANK
ETO ETHYLENE OXIDE
EUH ELECTRIC UNIT HEATER
EWC EVAPORATIVE WATER COOLER
EWT ENTERING WATER TEMPERATURE
EX EXISTING

F FAHRENHEIT
F&T FLOAT AND THERMOSTATIC
F&DPR COMBINATION FIRE SMOKE DAMPER
FA FREE AREA
FC FLEXIBLE CONNECTION
FCU FAN COIL UNIT (4 PIPE)
FCUC FAN COIL UNIT COOLING ONLY
FCUH FAN COIL UNIT HEATING ONLY
FCW FORWARD CURVED WHEEL (FAN)
FD FLOOR DRAIN
FD FIRE DAMPER
FF FINAL FILTER
FHX FLUE GAS FEED WATER HEAT EXCHANGER
FM FLOW METER
FOP FUEL OIL PUMP
FOT FUEL OIL TANK
FOHX FUEL OIL HEAT EXCHANGER
FPM FEET PER MINUTE
FPS FEET PER SECOND
FPTU FAN POWERED TERMINAL UNIT
FR FLOOR REGISTER
FRP FIBER REINFORCED POLYESTER
FS FLOW SWITCH
FS&T FREEZESTAT
FT FEET
FT LB FOOT-POUND
FTR FIN TUBE RADIATION
F/V FACE VELOCITY

GA GAUGE
GAL GALLONS
GH GRAVITY HOOD
GPD GALLONS PER DAY
GPH GALLONS PER HOUR
GPM GALLONS PER MINUTE
GPR GAS PRESSURE REGULATOR
GS GALVANIZED STEEL

H HUMIDIFIER
H&CW HOT & COLD WATER
HAC HOUSEKEEPING AID CLOSET
HB HOSE BIBB
HC HEATING COIL
HD HEAD
HO HOOD
HOA HANDOFF AUTOMATIC
HP HEAT PUMP
HP HORSEPOWER
HPDT HIGH PRESSURE DRIP TRAP
HPR HIGH PRESSURE RETURN (STEAM CONDENSATE)
HPS HIGH PRESSURE SUPPLY (STEAM)
HRC HEAT RECOVERY COIL
HRD HEAT RECOVERY DEVICE
HRP HORIZONTAL RADIANT CEILING PANEL
HRW HEAT RECOVERY WHEEL
HS&T HUMIDISTAT
HTM HUMIDIFIER TERMINAL
HUM HUMIDIFIER UNIT MOUNTED
HVU HEATING AND VENTILATING UNIT
HW HOT WATER
HWC HOT WATER COIL
HWHC HOT WATER HEATING COIL
HWP HEATING HOT WATER PUMP
HWR HEATING HOT WATER RETURN
HWS HEATING HOT WATER SUPPLY
HWUH HOT WATER UNIT HEATER
HVD HOIST WAY VENT DAMPER
HX HEAT EXCHANGER
HZ HERTZ

I.O. INPUT/OUTPUT
IAQ INDOOR AIR QUALITY
IBT INVERTED BUCKET TRAP
ICF IN LINE CENTRIFUGAL FAN
ICU INTENSIVE CARE UNIT
ID INSIDE DIAMETER
IFB INTEGRAL FACE AND BYPASS
IN INCHES
INHG INCHES OF MERCURY
IN WC INCH WATER COLUMN
INWG INCH WATER GAUGE
LB INCH POUND
IPLV INTERGRATED PART LOAD VALUE
IRH INFRARED HEATER
IS INSECT SCREEN
IU INDUCTION UNIT
IV INLET VANES

J INTENTIALLY LEFT BLANK

kg KILOGRAM
kg/HR KILOGRAM PER HOUR
kPa KILOPASCAL
kW KILOWATT
kWh KILOWATT HOUR

L LITER
L/h LITERS PER HOUR (OR LITERS/HOUR)
L/m LITERS PER MINUTE (OR LITERS/MINUTE)
L/s LITERS PER SECOND (OR LITERS/SECOND)
LAT LEAVING AIR TEMPERATURE
LBS/HR POUNDS PER HOUR
LF LINEAR FOOT (FEET)
LGT LEAVING GLYCOL TEMPERATURE
LH LATENT HEAT
LPG LIQUID PROPANE GAS
LPR LOW PRESSURE RETURN (STEAM CONDENSATE)
LPRC LOW PRESSURE STEAM RETURN (CLEAN)
LLHX LIQUID TO LIQUID HEAT EXCHANGER
LPS LOW PRESSURE STEAM
LPSC LOW PRESSURE STEAM (CLEAN)
LSD LINEAR SLOT DIFFUSER
LTCP LOCAL TEMPERATURE CONTROL PANEL
LVG LEAVING
LVR LOUVER
LWT LEAVING WATER TEMPERATURE

M METER, SI UNIT
M/s METERS PER SECOND (OR METERS/SECOND)
MA MIXED AIR
MAT MIXED AIR TEMPERATURE
MAU MAKE-UP AIR UNIT
MAV MANUAL AIR VENT
MAX MAXIMUM
MB MIXING BOX
MBH 1000 BTUH
MCA MINIMUM BRANCH CIRCUIT AMPACITY
MER MECHANICAL EQUIPMENT ROOM
MERV MINIMUM EFFICIENCY REPORTING VALUE
MH MANHOLE
MHP MOTOR HORSEPOWER
MIN MINIMUM
MM MILLIMETER
MOV MOTOR OPERATED VALVE
MPR MEDIUM PRESSURE RETURN (STEAM CONDENSATE)
MPS MEDIUM PRESSURE STEAM
MRI MAGNETIC RESONANCE IMAGING
MTD MEAN TEMPERATURE DIFFERENCE
MVD MANUAL VOLUME DAMPER
MZ MULTI-ZONE

NA NOT APPLICABLE
NC NOISE CRITERIA
NC NORMALLY CLOSED
NG NATURAL GAS
NGFM NATURAL GAS FLOWMETER
NO NORMALLY OPEN
NOAA NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NOM NOMINAL
NPLV NON STANDARD PART LOAD VALUE
NPSH NET POSITIVE SUCTION HEAD
NTS NOT TO SCALE

OA OUTSIDE AIR
OAG OUTSIDE AIR GRILLE
OAI OUTSIDE AIR INTAKE
OD OUTSIDE DIAMETER
OFM OIL FLOWMETER
OR OPERATING ROOM

P PUMP
PA PASCAL
PC PUMPED CONDENSATE
PCF POUNDS PER CUBIC FOOT (FEET)
PD PRESSURE DROP
PEF PROPELLER (TYPE) EXHAUST FAN
PF PRE-FILTER
PG PRESSURE GAGE
PGW PROPYLENE GLYCOL-WATER (SOLUTION)
PHC PREHEAT COIL
PPM PARTS PER MILLION
PRS PRESSURE REGULATING (VALVE) STATION
PRV PRESSURE REGULATING VALVE
PSI POUNDS PER SQUARE INCH
PSIA POUNDS PER SQUARE INCH – ABSOLUTE
PSIG POUNDS PER SQUARE INCH – GAGE
PSS PRIMARY SECONDARY SYSTEM
PSV PRESSURE SAFETY VALVE
PTAC PACKAGED TERMINAL AIR CONDITIONER

R/E RETURN OR EXHAUST
RA RETURN AIR
RAD REFRIGERANT AIR DRYER
RAF RADIO FREQUENCY
RAHX ROTARY AIR HEAT EXCHANGER
RAT RETURN AIR TEMPERATURE
RCCH REMOTE CONDENSER CHILLER
RCU RECIPROCATING CHILLER UNIT
RD REFRIGERANT DISCHARGE
RDS ROOM DATA SHEETS
REA RELIEF AIR
RF RETURN FAN
RG RETURN GRILLE
RH RELATIVE HUMIDITY
RHC REHEAT COIL
RHG REFRIGERANT HOT GAS
RL REFRIGERANT LIQUID LINE
RLA RUN LOAD AMPERE
RO REVERSE OSMOSIS
RPM REVOLUTIONS PER MINUTE
RR RETURN REGISTER
RS REFRIGERANT SUCTION
RTU ROOF TOP UNIT
RV RELIEF VALVE

SA SUPPLY AIR
SAD SOUND ATTENUATING DEVICE
SAT SUPPLY AIR TEMPERATURE
SC SHADING COEFFICIENT
SCFM STANDARD CUBIC FEET PER MINUTE
SCI SPINAL CORD INJURY
SCR SILICON CONTROLLED RECTIFIER
SD SMOKE DETECTOR
SD SUPPLY AIR DIFFUSER
SD-1 SCHEMATIC DESIGN (SUBMISSION1)
SD-2 SCHEMATIC DESIGN (SUBMISSION2)
SDPR SMOKE DAMPER
SDR SMOKE DAMPER (RETURN)
SDS SMOKE DAMPER (SUPPLY)
SEN SENSIBLE HEAT
SF SUPPLY FAN
SG SUPPLY AIR GRILLE
SH STEAM HUMIDIFIER
SHC STEAM HEATING COIL
SI SQUARE INCHES
SP STATIC PRESSURE
SP GR SPECIFIC GRAVITY
SPD SUPPLY PROCESS AND DISTRIBUTION
SPRV STEAM PRESSURE REDUCING VALVE
SPS STATIC PRESSURE SENSOR
SQ FT SQUARE FOOT (FEET)
SR SUPPLY AIR REGISTER
SS STAINLESS STEEL
SSHX STEAM TO STEAM HEAT EXCHANGER
SSR SOLID SEPERATOR
ST STEAM TRAP
SUH STEAM UNIT HEATER
SV STEAM PRESSURE REDUCING VALVE
SVS STEAM VENT SILENCER
SWHX STEAM TO WATER HEAT EXCHANGER

T & P CV TEMPERATURE AND PRESSURE CONTROL VALVE
TAB TESTING, ADJUSTING, BALANCE
TD TEMPERATURE DIFFERENCE
TDH TOTAL DYNAMIC HEAD
TDS TOTAL DISSOLVED SOLIDS
TG TRANSFER GRILLE
TP TRAP
TR TOP REGISTER
TSP TOTAL STATIC PRESSURE
TSTAT THERMOSTAT
TU TERMINAL UNIT
TWU THRU-WALL UNIT

UC UNDER CUT
UC UNIT COOLER
UH UNIT HEATER
UL UNDERWRITERS LABORATORY
URV UPBLAST UNIT VENTILATOR

V VALVE
VAF VANE AXIAL FAN
VAV VARIABLE AIR VOLUME
VD VOLUME DAMPER (MANUAL OPPOSED BLADE)
VFD VARIABLE FREQUENCY DRIVE
VHA VETERANS HEALTH ADMINISTRATION
VI VIBRATION ISOLATOR
VIV VARIABLE INLET VANES
VP VACUUM PUMP
VPS VARIABLE PRIMARY SYSTEM
VR VACUUM (STEAM CONDENSATE) RETURN
VSD VARIABLE SPEED DRIVE
VUH VERTICAL UNIT HEATER

W WATTS
WAG WASTE ANESTHESIA GAS
Wb WET BULB (TEMPERATURE)
WC WATER COOLER
WCCH WATER COOLED CHILLER
WCCU WATER COOLED CONDENSING UNIT
WCHP WATER COOLED HEAT PUMPS
WCPU WATER COOLED PACKAGED UNIT
WEF WALL EXHAUST FAN
WF WATER FILTER
WFCV WATER FLOW CONTROL VALVE
WFM WATER FLOWMETER
WFMD WATER FLOW MEASURING DEVICE
WG WATER GAGE
WPD WATER SIDE PRESSURE DROP

YR YEAR

AIR TERMINAL SYMBOLS

- TERMINAL UNIT WITH REHEAT COIL
- MB — DOUBLE DUCT MIXING BOX
- FAN POWERED VARIABLE VOLUME TERMINAL UNIT WITH HEATING COIL

DRAWING SYMBOLS

- 2 / H4 — DETAIL NUMBER / DRAWING NUMBER WHERE DRAWN
- A / H7 — SECTION LETTER / DRAWING NUMBER WHERE SHOWN
- E.T.R. — CROSS HATCHED AREAS ARE NOT IN CONTRACT AND ARE EXISTING TO REMAIN, UNLESS SPECIFICALLY NOTED OR SHOWN OTHERWISE.
- THIS SYMBOL SHOWS THE APPROXIMATE POINT WHERE NEW WORK STARTS AND EXISTING IS TO REMAIN. FOR DEMOLITION THIS SYMBOL SHOW THE APPROXIMATE POINT WHERE DEMOLITION STOPS AND EXISTING IS TO REMAIN FOR REVISED WORK.

GENERAL NOTES

1. ALL PIPING AND DUCTS IN FINISHED ROOMS OR SPACES SHALL BE CONCEALED IN A FURRED CHASE OR ABOVE THE HARD SUSPENDED CEILING.
2. THE FIRST FIGURE OF DUCT SIZE INDICATES DIMENSION OF FACE SHOWN OR INDICATED. DUCT SIZES ARE NET INSIDE DIMENSIONS
3. ACCESS PANELS IN HARD SUSPENDED CEILINGS ARE REQUIRED FOR ALL VALVES, TRAPS, DAMPERS, CLEANOUTS, CONTROLS, ETC. ACCESS PANELS SHALL BE FURNISHED AND INSTALLED UNDER THE ARCHITECTURAL SPECIFICATIONS.
4. TOTAL STATIC PRESSURE NOTED IN THE SCHEDULES INCLUDES DUCT SYSTEM, TERMINAL UNITS, FILTERS, COILS, ETC.
5. FOR TYPICAL STEAM AND WATER PIPING CONNECTIONS TO EQUIPMENT, SEE STANDARD EQUIPMENT DETAILS.
6. DIFFUSER, REGISTER AND GRILLE SIZES SHOWN ON FLOOR PLANS ARE NECK SIZES.
7. WATER PIPE CONNECTIONS TO AIR HEATING AND COOLING COILS SHALL BE MADE TO PROVIDE COUNTER FLOW BETWEEN WATER AND AIR.
8. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATIONS OF CEILING DIFFUSERS, REGISTERS, AND GRILLES.

DUCTWORK SYMBOLS

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

Sheet List

Sheet Number	Sheet Name	Sheet Order
MQ001	MECHANICAL DETAILS	
MQ002	MECHANICAL DETAILS	
MQ003	MECHANICAL DETAILS	
MQ005	MECHANICAL DETAILS	
MQ004	MECHANICAL DETAILS	
MQ006	MECHANICAL DETAILS	
MQ007	MECHANICAL DETAILS	
MQ008	MECHANICAL DETAILS	
MQ009	MECHANICAL DETAILS	
MQ010	MECHANICAL DETAILS	
MQ011	MECHANICAL DETAILS	
DM101	TUNNEL MECHANICAL - DEMOLITION PLAN	
MH101	LOWER LEVEL - HVAC DUCT PLAN	
MH102	FIRST FLOOR - SUPPLY DUCT PLAN	
MH103	SECOND FLOOR MEZZANINE - SUPPLY DUCT PLAN	
MH104	LOWER LEVEL - RETURN AND EXHAUST PLAN	
MH105	SECOND FLOOR MEZZANINE - SUPPLY DUCT PLAN	
MH106	HVAC ISOMETRICS	
MP101	LOWER LEVEL - HVAC PIPING PLAN	
MP102	FIRST FLOOR - HVAC PIPING PLAN	
MP103	SECOND FLOOR - HVAC PIPING PLAN	
MP201	MECHANICAL ROOF PLAN	

Bid Document

Revisions:	Date

CONSULTANTS:

Structural
McComas Engineers
1717 E 116th Street
Carmel, IN 46032
Tel 317.580.0402
317.582.0766
Fax

Civil
Asaturian Eaton & Assoc.
1440 Old West Main
Carbondale, IL 62901
Tel 618.529.3414
618.529.3423
Fax

Industrial Hygenist
John A Jurgiel & Assoc.
123 N. Main Street
St. Charles, MO 63301
Tel 636.757.3060
636.757.3064
Fax

Geotechnical
Holcomb Foundation
393 Wood Road
Carbondale, IL 62901
Tel 618.529.5262
618.457.8991
Fax

062-040274
REGISTERED
PROFESSIONAL
ENGINEER

ARCHITECT/ENGINEERS:

220 N College Ave
Indianapolis, IN 46202
Tel 317.464.9090
317.464.9393
Fax

1 Memorial Dr. STE 1800
Saint Louis, MO 63102
Tel 314.621.4343
314.621.0261
Fax

Drawing Title
MECHANICAL NOTES & ABBEVIATIONS

Approved: Associate Director
Approved: Chief Engineer
Approved: Chief of Staff
Approved: Safety Officer
Approved: Infection Control
Approved: Chief, Police & Security

Project Title
Expand & Upgrade Building 42 for Laboratory

Location Marion, IL

Project Number 657-502
Building Number 42-Addition
Drawing Number MQ-001

Date 12-20-17
Checked DH
Drawn BZ

Office of Facilities Management
VA | U.S. Department of Veterans Affairs

AIR CONDITIONING DESIGN DATA- DESIGN ALTITUDE 200 FT.

DESIGN AREA	SUMMER				WINTER			
	OUTSIDE		INSIDE		OUTSIDE		INSIDE	
	D.B.	W.B.	D.B.	%RH.	D.B.	W.B.	D.B.	%RH.
LAB AREAS	96	77	75	50	7.0	4.9	70	50
OFFICE AREAS	96	77	75	50	7.0	4.9	70	40

ENERGY EFFICIENT MOTORS

SCHEDULED HP	NOMINAL NEMA EFF.
1.0	82.5
1.5	84.0
2.0	84.0
3.0	86.5
5.0	88.5
7.5	89.5
10	89.5

NOTE:
REFER TO "MOTORS" SECTION OF THE SPECIFICATIONS. ALL MOTORS 1HP AND LARGER SHALL BE ENERGY EFFICIENT TYPE.

AIR FILTERS

FILTER NO.	C.F.M.	ROOM OR EQUIPMENT SERVED	LOCATION ROOM NO.	TYPE	RATED EFFICIENCY	FILTER MAX. FACE VELOCITY	MAXIMUM S.P. DROP		‡ CARTRIDGE			REMARKS
							INITIAL	FINAL	CART. SIZE H x W x D	NUMBER OF CART.	HOUSING TYPE *	
PF-1	5,000	AHU-1	MEZZANINE	PLEATED	30%	310	O.1	0.3	‡	‡	FMB,SAH	
FF-1	5,000	AHU-1	MEZZANINE	CARTRIDGE	85%	500	O.3	0.65	‡	‡	SAH	
PF-2	11,500	AHU-2	MEZZANINE	PLEATED	30%	310	O.1	0.3	‡	‡	FMB,SAH	
FF-2	11,500	AHU-2	MEZZANINE	CARTRIDGE	85%	500	O.3	0.65	‡	‡	SAH	

* SAH - SIDE ACCESS HOUSING
FMB - FILTER MIXING BOX
‡ NUMBER AND SIZE TO FIT AIR HANDLING UNIT MANUFACTURERS STANDARD FILTER MIXING BOX, VERIFY WITH AIR HANDLING UNIT MANUFACTURER.

VIBRATION ISOLATION FOR EQUIPMENT

UNIT. NO.	TYPE BASE	TYPE ISOLATOR	MIN. STATIC DEFL.	REMARKS
AHU-1	RAIL	D	--	
AHU-2	RAIL	D	--	

SAFETY VALVES & RELIEF VALVES

UNIT. NO.	SYSTEM	FLUID	TEMP. F	MIN. CAP. LBS/HR	SET PRESS. PSIG	SIZE		REMARKS
						INLET	OUTLET	
SV-1	PRV STATION	STEAM	238	2,076	35	2"	3"	1

NOTE:
1 PRV STATION LOCATED IN MECHANICAL ROOM BM-108

DUCT LEAKAGE CLASSIFICATION AND ALLOWABLE LEAKAGE

DUCT PRESSURE CLASS, W.G.	SEAL CLASS	APPLICABLE SEALINGS	SMACNA LEAKAGE CLASS	
			RECTANGULAR DUCT	ROUND DUCT
1/2", 1", 2"	C	TRAVERSE JOINTS ONLY	24	12
3"	B	TRAVERSE JOINTS AND SEAMS	12	6
4", 6", 10"	A	JOINTS, SEAMS AND ALL WALL PENETRATIONS	6	3

(FD) FIRE DAMPER SCHEDULE

LOCATION	CLASS	MAX. LEAKAGE @ 1" W.C.	MAX. LEAKAGE @ 4" W.C.	TEMPERATURE CLASSIFICATION	* MAX. LOSS IN INCHES WG	FUSIBLE LINK TEMP °F.	DAMPER TYPE	REMARKS
SUPPLY	1	4 CFM/ SQ. FT.	8 CFM/ SQ. FT.	350°F.	0.11 @ 2,500 FPM	165	AIRFOIL BLADES	ALL SUPPLY FSD'S * SEE PLANS FOR SIZE
RETURN	1	4 CFM/ SQ. FT.	8 CFM/ SQ. FT.	350°F.	0.05 @ 1,200 FPM	165	-	ALL RETURN FSD'S * SEE PLANS FOR SIZE

* INCREASE DAMPER SIZE IF REQUIRED TO MAINTAIN INDICATED STATIC PRESSURE LOSS.

PRESSURE REDUCING VALVES

PRV. NO.	LOCATION	STEAM PRESSURE PSIG		CAPACITY LBS/HR	BYPASS VALVE SIZE	PIPE SIZES		REMARKS
		INLET	OUTLET	REQUIRED		D1	D2	
PRV-1		110	25	2,076	1-1/2"	2"	3"	1

NOTE:
1. SEE PLAN FOR LOCATION OF PIPE SIZES.

AIR FLOW MEASURING DEVICES

UNIT NO.	LOCATION	DUCT SIZE		DUCT TYPE	CFM		S.P. DROP	FAN SYSTEM	REMARKS
		W	H		MIN.	MAX.			
AFM-S1	MEZZANINE	-	-	SUPPLY	5000	5000	.06	AHU-1	1
AFM-R1	MEZZANINE	-	-	RETURN	5000	5000	.06	AHU-1	1
AFM-OA1	MEZZANINE	-	-	O.A.	1300	5000	.06	AHU-1	1
AFM-S2	MEZZANINE	-	-	SUPPLY	11,500	11,500	.06	AHU-2	1
AFM-E2	MEZZANINE	-	-	EXHAUST	11,500	11,500	.06	AHU-2	1
AFM-OA2	MEZZANINE	-	-	O.A.	11,500	11,500	.06	AHU-2	1
AFM-R2	MEZZANINE	-	-	EXHAUST	11,500	11,500	.06	AHU-2	1

NOTE:
1. MOUNT AIR FLOW STATIONS AT INLETS TO FAN USING PROBE ARRAY DESIGNED FOR THE PURPOSE.

WATER FLOW MEASURING DEVICES

UNIT NO.	LOCATION	SYSTEM	TYPE	CAPACITY GPM	SIZE	REMARKS
WFMD-1	MEZZANINE	CHILLED WATER	ORIFICE	40.0	2"	1,2
WFMD-2	MEZZANINE	CHILLED WATER	ORIFICE	96.0	3"	1,2

1 DEVICE RANGE GPM SHALL EXCEED DESIGN CAPACITY BY 20%.
2 ALL WATER FLOW MEASURING DEVICES SHALL SEND SIGNAL TO EMCS.

DUCT PRESSURE CLASSES

EQUIPMENT	DUCT INVOLVED	POSITIVE (P) OR NEGATIVE (N) PRESSURE	MINIMUM PRESSURE CLASS W.G.
AIR HANDLERS	FROM OUTSIDE AIR LOUVER OR RETURN SMOKE DAMPER TO PREHEAT COIL.	N	1"
	FROM FAN DISCHARGE TO TERMINAL BOXES.	P	3"
	FROM TERMINAL BOXES TO ROOM OUTLETS.	P	1"
EXHAUST FANS	FROM ROOM OUTLETS TO EXHAUST FAN.	N	1"

Bid Document

Revisions:	Date

CONSULTANTS:

Structural
McComas Engineers
1717 E 116th Street
Carmel, IN 46032
Tel 317.580.0402
317.582.0766
Fax

Civil
Asaturian Eaton & Assoc.
1440 Old West Main
Carbondale, IL 62901
Tel 618.529.3414
618.529.3423
Fax

Industrial Hygenist
John A Jurgiel & Assoc.
123 N. Main Street
St. Charles, MO 63301
Tel 636.757.3060
636.757.3064
Fax

Geotechnical
Holcomb Foundation
393 Wood Road
Carbondale, IL 62901
Tel 618.529.5262
618.457.8991
Fax

062-046274
REGISTERED PROFESSIONAL ENGINEER

ARCHITECT/ENGINEERS:

SDVOSB DAE DESIGN ENGINEERS, INC.
220 N College Ave
Indianapolis, IN 46202
Tel 317.464.9090
317.464.9393
Fax

VOSB FoxArchitects
1 Memorial Dr. STE 1800
Saint Louis, MO 63102
Tel 314.621.4343
314.621.0261
Fax

Drawing Title
MECHANICAL SCHEDULES

Approved: Associate Director | Approved: Chief Engineer
Approved: Chief of Staff | Approved: Safety Officer
Approved: Infection Control | Approved: Chief, Police & Security

Project Title
Expand & Upgrade Building 42 for Laboratory

Location Marion, IL

Date 12-20-17 | Checked DH | Drawn BZ

Project Number 657-502
Building Number 42-Addition
Drawing Number MQ-002

Office of Facilities Management
VA | U.S. Department of Veterans Affairs

VA FORM 08-6231, OCT 1978

12/21/2017 12:36:31 AM

AIR HANDLING UNIT SCHEDULE WITH HEAT RECLAIM

TAG	SUPPLY FAN CFM	SUPPLY FAN E.S.P. IN W.C.	SUPPLY FAN T.S.P IN W.C.	SUPPLY FAN HP	SUPPLY FAN BHP	SUPPLY FAN RPM	SUPPLY FAN NOTES	EXHAUST FAN CFM	EXHAUST FAN E.S.P. IN W.C.	EXHAUST FAN T.S.P. IN W.C.	EXHAUST FAN HP	EXHAUST FAN BHP
AHU-1	5,000	1.5	4.01	8	5.34	2521	1,2,3,5	-	-	-	-	-
AHU-2	11,500	1.25	5.29	20	14.6	1760	1,2,3,4,5	11,500	2.07	2.07	7.5	5.91

TAG	CONDITIONS SUMMER AMBIENT DB	SUMMER AMBIENT WB	SUMMER RETURN DB	SUMMER RETURN WB	WINTER AMBIENT DB	WINTER AMBIENT WB	WINTER RETURN DB	WINTER RETURN WB
AHU-1	96.0	77.0	81.0	65.7	7.0	5.0	70.0	58.0
AHU-2	96.0	77.0	80.3	66.4	7.0	5.0	70.0	58.0

TAG	HEAT WHEEL COOLING PERFORMANCE TOTAL MBH	SENSIBLE MBH	EDB/EWB	LDB/LWB	HEATING PERFORMANCE TOTAL MBH	SENSIBLE MBH	EDB/EWB	LDB/LWB	HP	MODEL
AHU-1	-	-	-	-	-	-	-	-	-	-
AHU-2	271.4	115.9	96.0/77.0	86.9/71.4	667.8	455.1	96.0/77.0	86.9/71.4	1/4	ERC-68100C

TAG	COOLING PERFORMANCE TOTAL MBH	SENSIBLE MBH	EDB/EWB	LDB/LWB	GPM	FLUID PD FT	EWT	LWT	ROWS	FPI	FACE AREA SQFT
AHU-1	134.7	151.8	96.0/77.0	52.4/52.1	40.0	5.7	45.0	54.8	6.0	10	11.8
AHU-2	594.8	384.9	86.9/71.4	54.8/54.5	96.0	12.8	45.0	57.4	6.0	10	21.9

TAG	HEATING PERFORMANCE EDB/EWB	LDB/LWB	GPM	FLUID PD FT	EWT	LWT	ROWS	FPI	FACE AREA SQFT	UNIT POWER VOLTAGE	MCA	MOP	APPROX WEIGHT	MANUFACTURER AND MODEL NUMBER
AHU-1	77.0/40	60/47	12.0	1.5	140	120	1.0	6	11.8	460/60 /3PH	10.0	15	2,554	AAON M2-H-011-R-3-A-B-B-D-O
AHU-2	43.6/40.0	62.7/49.1	27.0	2.5	140	120	1.0	8	21.9	460/60 /3PH	46.0	70	6,957	AAON M2-H-022-R-3-B-B-E-D-X

NOTES:
1. Variable Air Volume unit.
2. SS Drain pan, phase and brown out protection, direct drive premium VFD motor(s), VFD.
3. Combination filter -2" 30% pleated, cartridge 90-95%, magnehelic gauge.
4. Heat Recovery Wheel with 2"30% pleated filter.
5. Double walled insulated unit.

VAV SCHEDULE

Qty	Model	Tag	Unit Size	Max Primary (CFM)	Min Primary (CFM)	Reheat (CFM)	LAT (°F)	Inlet SP (in wg)	VIC Capacity (MBH)	Rows	Downstream SP (in wg)	Terminal Liner	Max Dis NC	Max Rad NC	EAT (°F)	Fluid Flow (GPM)	FPD (ft wg)	Max Air PD (in wg)	Coil Type	EWT (°F)	LWT (°F)	Circuits	Coil	Weight (lbs)
1	SDVS	V10	6	300	183	183	72.60	1.00	3.60	1L	0.25	FF	20 (2)	-	55.00	1.2	0.07	0.09		140.00	116.30	1	Water	18
1	SDVS	V11	6	300	183	183	72.60	1.00	3.60	1L	0.25	FF	20 (2)	-	55.00	1.2	0.07	0.09		140.00	116.30	1	Water	18
1	SDVS	V12	9	600	419	419	74.80	1.00	9.70	1L	0.25	FF	35 (2)	-	55.00	2.4	0.31	0.14		140.00	125.30	2	Water	28
1	SDVS	V13	4	150	87	87	82.20	1.00	2.60	1L	0.25	FF	35 (2)	-	55.00	0.6	0.07	0.02		140.00	122.10	1	Water	19
1	SDVS	V14	4	150	87	87	82.20	1.00	2.60	1L	0.25	FF	35 (2)	-	55.00	0.6	0.07	0.02		140.00	122.10	1	Water	19
1	SDVS	V15	4	80	49	49	91.60	1.00	2.00	1L	0.25	FF	--	-	55.00	0.4	0.08	0.01		140.00	127.70	1	Water	19
1	SDVS	V16	4	80	49	49	91.60	1.00	2.00	1L	0.25	FF	--	-	55.00	0.4	0.08	0.01		140.00	127.70	1	Water	19
1	SDVS	V17	5	240	139	139	75.80	1.00	3.20	1L	0.25	FF	20 (2)	-	55.00	1.0	0.07	0.06		140.00	118.20	1	Water	19
1	SDVS	V18	4	75	49	49	91.60	1.00	2.00	1L	0.25	FF	--	-	55.00	0.4	0.08	0.01		140.00	127.70	1	Water	19
1	SDVS	V19	5	100	62	62	87.30	1.00	2.20	1L	0.25	FF	--	-	55.00	0.4	0.07	0.01		140.00	124.90	1	Water	19
1	SDVS	V110	5	200	139	139	75.80	1.00	3.20	1L	0.25	FF	20 (2)	-	55.00	0.8	0.07	0.06		140.00	118.20	1	Water	19
1	SDVS	V111	5	250	139	139	75.80	1.00	3.20	1L	0.25	FF	20 (2)	-	55.00	1.0	0.07	0.06		140.00	118.20	1	Water	19
1	SDVS	V112	9	700	439	439	74.80	1.00	9.70	1L	0.25	FF	35 (2)	-	55.00	2.5	0.31	0.14		140.00	125.30	2	Water	28
1	SDVS	V113	6	300	183	183	72.60	1.00	3.60	1L	0.25	FF	20 (2)	-	55.00	2.0	0.07	0.09		140.00	116.30	1	Water	18
1	SDVS	V114	8	480	310	310	68.90	1.00	4.80	1L	0.25	FF	20 (2)	-	55.00	1.2	0.10	0.14		140.00	107.70	1	Water	22
1	SDVS	V115	12	1500	1000	1000	82.60	1.00	30.40	2L	0.25	FF	--	-	55.00	5.9	1.17	0.70		140.00	107.40	1	Water	37
1	SDVS	V20	12	1750	986	986	82.60	1.00	30.40	2L	0.25	FF	--	-	55.00	8.0	1.17	0.70		140.00	107.40	2	Water	37
1	SDVS	V21	12	1750	986	986	82.60	1.00	30.40	2L	0.25	FF	--	-	55.00	8.0	1.17	0.70		140.00	107.40	2	Water	37
1	SDVS	V22	14	2600	1377	1377	68.10	1.00	20.10	1L	0.25	FF	--	-	55.00	12.0	0.46	0.31		140.00	108.90	2	Water	43
1	SDVS	V23	12	1700	986	986	82.60	1.00	30.40	2L	0.25	FF	--	-	55.00	7.9	1.17	0.70		140.00	107.40	2	Water	37
1	SDVS	V24	7	500	312	312	68.80	1.00	4.80	1L	0.25	FF	35 (2)	-	55.00	2.2	0.10	0.15		140.00	107.50	1	Water	22
1	SDVS	V25	14	2150	1377	1377	68.10	1.00	20.10	1L	0.25	FF	--	-	55.00	3.5	0.46	0.31		140.00	108.90	2	Water	43
1	SDVS	V26	5	150	70	70	78.60	1.00	3.2	1L	0.25	FF	--	-	55.00	0.4	0.08	0.01		140.00	127.70	1	Water	19
1	SDVS	V27	16	2150	1204	1204	95.00	1.00	53.70	2L	0.25	FF	--	-	55.00	5.5	2.78	0.42	HC	140.00	114.80	3	Water	56
1	SDVS	V28	6	300	183	183	72.60	1.00	3.60	1L	0.25	FF	20 (2)	-	55.00	1.31	0.07	0.09		140.00	116.30	1	Water	18

1. Dashes (-) indicate NC value less than 20.
2. NC values are calculated based on procedures outlined in AHRI Standard 885-2008, "A Procedure for Estimating Occupied Space Sound levels in the Application of Air Terminals and Air Outlets."
3. Sound power levels are given in decibels (dB).
4. "** Discharge sound power levels 2008" does not include duct end reflection. For the most current data based on ASHRAE Standard 130-2008 and AHRI Standard 880-2011 reference "Discharge sound power levels."
5. Dashes (-) indicate sound power levels below 36-29-26-22-19-17 for each octave band; values below these sound power levels are considered below significance per AHRI 880.
6. Minimum operating pressure is the minimum static pressure required to operate the terminal unit as an fully at maximum primary flow with a wide open damper.
7. Airflow is given in cubic feet per minute (cfm).
8. Air pressure drop is given in inches water gauge (in. wg.), and water pressure drop is given in feet of water gauge (ft. wg.).
9. NC values are derived from sound power levels obtained in accordance with ASHRAE Standard 130-2008 and AHRI Standard 880-2011, which include duct end reflection corrections.
10. * NC values are derived from sound power levels obtained in accordance with ASHRAE Standard 130-2008 and AHRI Standard 880-2008.
These values are NOT the most current method for estimating NC values because AHRI 880-2008 does not include duct end reflection corrections.
11. Water coil performance is rated and certified in accordance with the latest edition of AHRI Standard 410.

GRILLE AND DIFFUSER SCHEDULE

TAG	MAXIMUM CFM	MAX. N.C.	NECK SIZE	FACE SIZE	DAMPER Y / N	MANUFACTURER/ MODEL NO.	REMARKS	NOTES
A	120	21	6"□	24"x 24"	Y	PRICE AS CDA	SUPPLY, LAY-IN	1,2,4
B	250	26	8"□	24"x 24"	Y	PRICE AS CDA	SUPPLY, LAY-IN	1,2,4
C	300	24	10"□	24"x 24"	Y	PRICE AS CDA	SUPPLY, LAY-IN	1,2,4
D	450	34	12"□	24"x 24"	Y	PRICE AFRFDA	SUPPLY, LAY-IN	1,2,3
E	650	27	12"□	24"x 48"	Y	PRICE AFRFDA	SUPPLY, LAY-IN	1,2,3
F	350	25	10"□	24"x 24"	Y	PRICE AFRFDA	SUPPLY, LAY-IN	1,2,3
--	--	--	-	--	--	--	-	--
--	--	--	-	--	--	--	-	--
J	400	26	8"□	12"x 12"	N	PRICE 10A	RETURN, SURFACE	1,2,5,6
K	1100	28	22"x 10"	24"x 12"	N	PRICE 10A	RETURN, LAY-IN	1,2,5,6
L	1950	28	22"x 22"	24"x 24"	N	PRICE 10A	RETURN, LAY-IN	1,2,5,6

PLAN SYMBOL: TAG / CFM Value of Diffuser/Register

GENERAL NOTES:
A. Maximum N.C. values are based on Octave Band 1 through 8 sound power levels minus a room absorption of 10dB, ie. 10 is the -12 Watts.
B. Verify border requirements with all applicable architectural sheets, reflected ceiling plans, and room finish schedules.
C. All grilles, registers, and diffusers shall have visible sheet metal and ductwork painted flat black behind face.
D. All parts of diffuser behind perforated face will be painted flat black by manufacturer.
E. Provide square to round transitions, by manufacturer, as required. Also see plans.

NOTES:
1. Provide white baked enamel finish, color as selected by architect.
2. All diffusers shall be aluminum.
3. Flush face radial diffuser.
4. 4 cone fully adjustable air pattern diffuser.
5. Perforated face grille.
6. Provide neck plenum on all grilles.

SCHED3

CABINET HEATER SCHEDULE - Hot Water

TAG	CFM	MBH	GPM	DROP FT	EWT	LWT	EAT	HP	VOLTAGE	MANUFACTURER MODEL NO.	NOTES
CH-1	200	15.7	.5	.75	140	120	60	1/12	120 1	Modine FCHF1155GMA	ALL

NOTES:
1. UNIT TO BE SEMI-RECESSED. PROVIDE TRIM KIT AND FILTERS, AND INTEGRAL UNIT MOUNTED THERMOSTAT.

SCHED3

CONDENSING UNIT SCHEDULE

TAG	EER	AMB AIR TEMP.	COOLING MBH @ 95°F	COMPRESSOR QTY	COMPRESSOR REFRIGERANT	ELECTRICAL VOLTAGE	ELECTRICAL MCA	ELECTRICAL MOP	WEIGHT LBS.	MANUFACTURER AND MODEL NUMBER	NOTES
CU-1	CU-1	95	60.1 ø	4	R-410A	460/3PH	115	125	2941	AAON CFA-060-DASE2C01	ALL

NOTES:
WITH HOT GAS REHEAT, NON FUSED DISCONNECT, EMINTUE COMPRESSOR OFF TIME AND 20 SECOND COMPRESSOR STAGE DELAY, SINGLE POWER POINT CONNECTION.
VARIABLE CAPACITY COMPRESSORS, PHASE AND BROWN OUT PROTECTION, SIGHT GLASS AND COMPRESSOR ISOLATION VALVES.
CONVENIENCE RECEPTACLE FACTORY WIRED, CONDENSER COIL GUARDS, VFD CONTROLLED CONDENSER FANS.
Provide a SCCR per the Div 26. OCPD study.

EXHAUST FAN SCHEDULE

FAN DATA TAG	CFM	E.S.P.	TIP SPEED	RPM	SONES	MOTOR DATA HP	VOLTAGE	FLA	MANUFACTURER/ MODEL NO.	NOTES
EF-1	3600	0.25"	89	2241	---	2.0	460/3□	3.4	COOK 135TMX	2
EF-2	800	0.75"	---	1725	---	1/2	115/1□	---	COOK 120SQN17DEC	1,3
EF-3	400	0.75"	---	1550	---	1/6	115/1□	---	COOK 100SQN15D	1

NOTES:
1. Square inline, direct drive, unit mounted disconnect, speed control, backdraft damper, (4) rc-75 isolators.
2. Mixed flow horizontal inline fan, belt drive, arrangement 9, prem. eff. drive motor, disconnect, motor cover, isolation rails, (4) rc-125 isolators, inverter 2.0 hp vfd.
3. Electronically commutated vari-flow motor.

CONDENSATE PUMPS

PUMP NO.	LOCATION	TYPE UNIT	GPM	MOTIVE PRESSURE PSI	MOTOR N.OM. HP.	MOTOR VOLT-PHASE	RECEIVER SIZE GALLONS	MANUFACTURER / MODEL	REMARKS
CPU1	MEZZANINE	PRESSURE MOTIVE PUMP	6	5			15	WATSON MCD ANBEL WPT3	ALL

NOTES:
1. PUMP/TRAP COMBINATION S.S. BALL FLOAT AND CHECK VALVES.

PLATE AND FRAME HEAT EXCHANGER SCHEDULE

MARK	MANUFACTURER MODEL NO.	MBTU	CONN. SIZE	NUMBER OF PLATES	FOULING FACTOR	HOT SIDE DATA LB/HR	EWT °F	LWT °F	WPD PSI	COLD SIDE DATA GPM	EWT °F	LWT °F	WPD PSI	DIMENSIONS W	L	H	NOTES
HE-1	TACO PF 10-23-1-EH	1212.97	2"	23	43.59	1129.38	239.4	120.6	.75	123.5	120.0	140.0	---	12.2	16.4	29.8	ALL

NOTES:
1. 1 PASS IN SERIES, WEIGHT IS 201LBS.

CIRCULATING PUMPS

PUMP NO.	LOCATION	SYSTEM	CIRCULATING FLUID FLUID	GPM	PUMP HEAD FT. FLUID	TEMP F	SP. GR.	% EFF. (MIN)	PIPING CIRCUIT SERVED	TYPE	MOTOR NOM. HP.	VOLTS PHASE	RPM	NOTES	MANUFACTURER MODEL
HWP-1	MEZZANINE	HHW	WATER	123.5	45	140	--	48	--	VFD	3.0	460-3	3600	ALL	TACO 1185
HWP-2	MEZZANINE	HHW	WATER	123.5	45	140	--	48	--	VFD	3.0	460-3	3600	ALL	TACO 1185

NOTES: VFD RATED MOTOR AND VFD CONTROLLER MOUNTED TO PUMP.

Bid Document

Revisions:	Date

CONSULTANTS:

Structural
McComas Engineers
1717 E 116th Street
Carmel, IN 46032
Tel 317.580.0402
317.582.0766
Fax

Civil
Asaturian Eaton & Assoc.
1440 Old West Main
Carbondale, IL 62901
Tel 618.529.3414
618.529.3423
Fax

Industrial Hygenist
John A Jurgiel & Assoc.
123 N. Main Street
St. Charles, MO 63301
Tel 636.757.3060
636.757.3064
Fax

Geotechnical
Holcomb Foundation
393 Wood Road
Carbondale, IL 62901
Tel 618.529.5262
618.457.8991
Fax

062-044274
REGISTERED PROFESSIONAL ENGINEER

ARCHITECT/ENGINEERS:

SDVOB DAE DESIGN ENGINEERING, INC.
220 N College Ave
Indianapolis, IN 46202
Tel 317.464.9090
317.464.9393
Fax

VOSB FoxArchitects
1 Memorial Dr. STE 1800
Saint Louis, MO 63102
Tel 314.621.4343
314.621.0261
Fax

Drawing Title: MECHANICAL SCHEDULES

Approved: Associate Director | Approved: Chief Engineer
Approved: Chief of Staff | Approved: Safety Officer
Approved: Infection Control | Approved: Chief, Police & Security

Project Title: Expand & Upgrade Building 42 for Laboratory

Location: Marion, IL

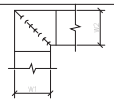
Date: 12-20-17 | Checked: DH | Drawn: BZ

Project Number: 657-502
Building Number: 42-Addition
Drawing Number: MQ-003

Office of Facilities Management
VA | U.S. Department of Veterans Affairs

VA FORM OB-1231, OCT 1978

12-20-2017 12:36:36 AM

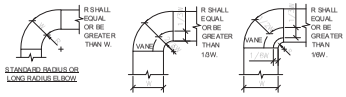


NOTE:

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" [50mm] RADIUS, 1 1/2" [40mm] MAXIMUM SPACE BETWEEN VANES AND A 3/4" [20mm] TRAILING EDGE.
4. WHEN W EQUALS W2 AND W1 IS GREATER THAN 20" [500mm] VANES SHALL BE DOUBLE VANE TYPE.

H MQ004 — NTS

DUCTWORK SQUARE VANE ELBOWS

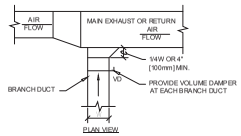


NOTE:

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.

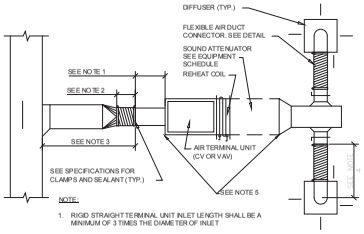
I MQ004 — NTS

DUCTWORK RADIUS ELBOWS



EXHAUST OR RETURN BRANCH DUCTWORK

J MQ004 — NTS

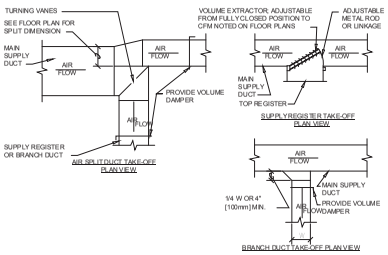


NOTE:

1. RIGID STRAIGHT TERMINAL UNIT INLET LENGTH SHALL BE A MINIMUM OF 3 TIMES THE DIAMETER OF INLET.
2. A FLEXIBLE AIR DUCT CONNECTOR IS NOT MANDATORY FOR INLET TO THIS BOX, BUT ALLOWED TO ACCOMMODATE MINOR OFFSETS. MAXIMUM LENGTH 3'-0" [900mm].
3. A BRANCH DUCT SERVING AN INDIVIDUAL BOX MAY BE THE SAME SIZE AS THE BOX INLET, PROVIDED THE EQUIVALENT LENGTH OF THE BRANCH DUCT, AS SHOWN, DOES NOT EXCEED 10 FEET (3 METERS). FOR LONGER LENGTHS, INCREASE THE DUCT SIZE AND PROVIDE A DUCT TRANSITION TO MAINTAIN THE DUCT STATIC PRESSURE DROP AT OR BELOW 0.2"/100' [1.6-Pa/m].
4. FLEXIBLE AIR DUCT CONNECTORS, WHEN USED FROM TERMINAL UNIT SUPPLY AIR DUCT TO DIFFUSER, SHALL NOT EXCEED 3'-0" [1000mm]. USE RIGID ELBOWS FOR CHANGE OF DIRECTION GREATER THAN 45°.
5. COMPONENT ARRANGEMENT MAY VARY BY MANUFACTURER. PROVIDE INSULATION W/VAPOR BARRIER FOR CONNECTING DUCT SECTIONS.
6. USE OF THE FLEXIBLE AIR DUCT CONNECTORS ARE NOT PERMITTED FOR THE DEDICATED AHU SERVING THE SURGICAL SUITE.

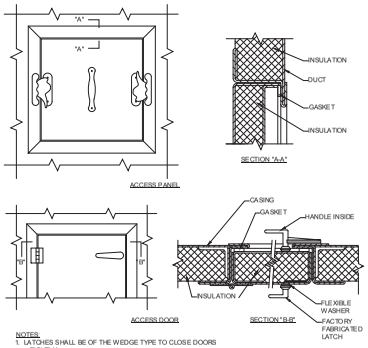
K MQ004 — NTS

DUCT CONNECTIONS - AIR TERMINAL UNITS



E MQ004 — NTS

SUPPLY DUCTWORK TAKE-OFFS

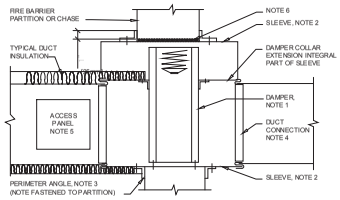


NOTES:

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

F MQ004 — NTS

ACCESS PANEL AND DOOR DETAIL



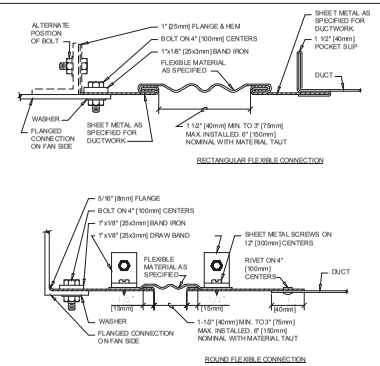
NOTE:

1. A VERTICAL DAMPER IS SHOWN. HORIZONTAL DAMPER INSTALLATION, IS SIMILAR. FOLLOW DAMPER MANUFACTURERS INSTRUCTIONS, INCLUDING FASTENER OPTIONS AND GAGES FOR SLEEVE AND PERIMETER ANGLES. FIRE DAMPERS MUST BE INSTALLED IN THE PARTITION OR FLOOR, AND NOT OUTSIDE THE PENETRATION.
2. GALVANIZED SLEEVE: GAGE NOT LESS THAN CONNECTING DUCT. FASTEN SLEEVE TO DAMPER FRAME AND TO PERIMETER ANGLES.
3. PERIMETER ANGLES: GALVANIZED STEEL, NOT LESS THAN 1-1/2"x1-1/2" [40x40mm], 14 GAGE, TO PROVIDE 1" [25mm] MINIMUM OVERLAP OF OPENING ON ALL 4 SIDES.
4. BREAKAWAY DUCT CONNECTION. CONTRACTOR'S OPTION OF TYPES SHOWN IN SMACNA. ACCESS PANELS: SIZE AND LOCATION TO PERMIT SERVICING THE FUSIBLE LINK OR LINKS.
5. PROVIDE 1/4" TO 1/2" [6 TO 15mm] CLEARANCE ON HEIGHT AND WIDTH.
6. FILL OPEN SPACE WITH ROCK WOOL FIRESTOP FIBER.
7. ALL DUCT WORK RISERS WHICH ARE RUN EXPOSED, SUCH AS THRU ATTIC FLOORS AND MECHANICAL ROOM FLOORS, SHALL BE PROVIDED WITH 3" [75mm] HIGH CONCRETE CURB AROUND OPENING FOR DUCT.

SECTION THRU

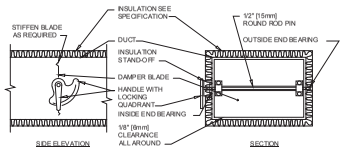
G MQ004 — NTS

FIRE DAMPER INSTALLATION



A MQ004 — NTS

FLEXIBLE DUCT CONNECTIONS

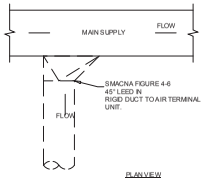


NOTE:

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

B MQ004 — NTS

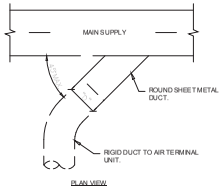
VOLUME DAMPER DETAIL



ALTERNATE SUPPLY DUCT TAKEOFF -

C MQ004 — NTS

AIR TERMINAL UNITS



SUPPLY DUCT TAKEOFF - AIR TERMINAL UNIT

D MQ004 — NTS

Bid Document

Revisions:	Date

CONSULTANTS:

Structural	Civil	Industrial Hygenist	Geotechnical
McComas Engineers	Asaturian Eaton & Assoc.	John A Jurgiel & Assoc.	Holcomb Foundation
1717 E 116th Street	1440 Old West Main	123 N. Main Street	393 Wood Road
Carmel, IN 46032	Carbondale, IL 62901	St. Charles, MO 63301	Carbondale, IL 62901
Tel 317.580.0402	Tel 618.529.3414	Tel 636.757.3060	Tel 618.529.5262
317.582.0766	618.529.3423	636.757.3064	618.457.8991
Fax	Fax	Fax	Fax

062-046274 REGISTERED PROFESSIONAL ENGINEER

ARCHITECT/ENGINEERS:

220 N College Ave
Indianapolis, IN 46202
Tel 317.464.9090
317.464.9393
Fax

FoxArchitects
1 Memorial Dr. STE 1800
Saint Louis, MO 63102
Tel 314.621.4343
314.621.0261
Fax

Drawing Title: MECHANICAL DETAILS

Approved: Associate Director | Approved: Chief Engineer
Approved: Chief of Staff | Approved: Safety Officer
Approved: Infection Control | Approved: Chief, Police & Security

Project Title: Expand & Upgrade Building 42 for Laboratory

Location: Marion, IL

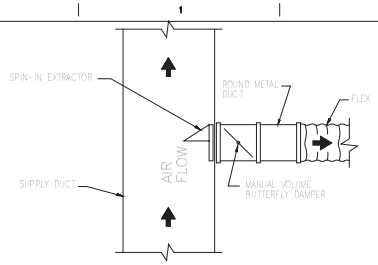
Date	Checked	Drawn
12-20-17	DH	BZ

Project Number: 657-502
Building Number: 42-Addition
Drawing Number: MQ-004

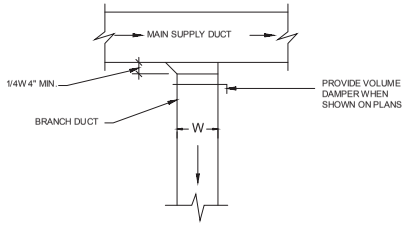
Office of Facilities Management
VA | U.S. Department of Veterans Affairs

SD FORM 08-6231, OCT 1978

12/21/2017 12:36:45 AM

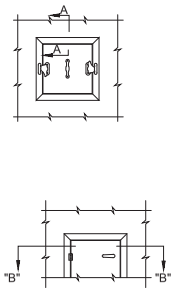


K MQ005 NO SCALE
SPIN-IN AIR EXTRACTOR DETAIL

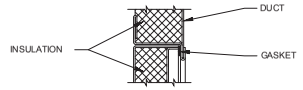


PLAN VIEW

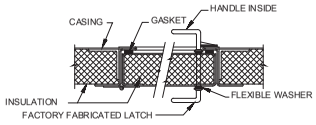
H MQ005 NO SCALE
BRANCH DUCT TAKE-OFF



ACCESS PANEL



SECTION "A-A"

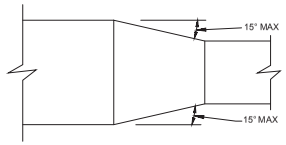


SECTION "B-B"

NOTES:

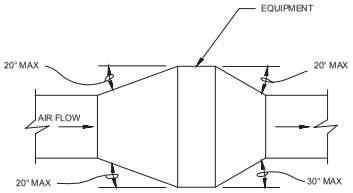
1. LATCHES SHALL BE OF THE WEDGE TYPE TO CLOSE DOORS TIGHTLY.
2. HINGES ON THE ACCESS DOORS SHALL HAVE NON-CORROSIVE PINS.

E MQ005 NO SCALE
ACCESS DOOR



PLAN OR SIDE VIEW

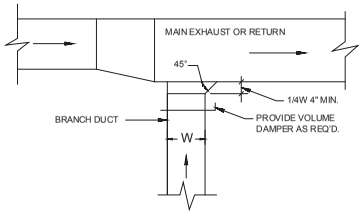
A MQ005 NO SCALE
DUCT TRANSITION



PLAN OR SIDE VIEW

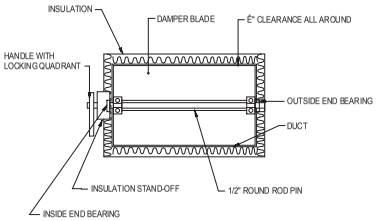
NOTE: UNLESS OTHERWISE INDICATED ON PLANS, MAXIMUM ANGLES SHOWN SHALL APPLY.

B MQ005 NO SCALE
DUCT TRANSFORMATION WITH EQUIPMENT IN DUCT

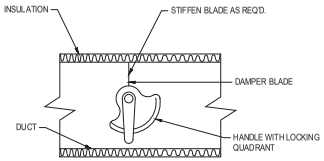


PLAN VIEW

C MQ005 NO SCALE
EXHAUST AND/OR RETURN BRANCH DUCT

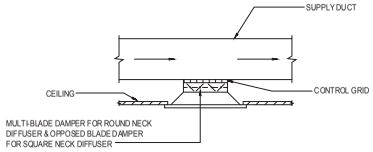


SECTION



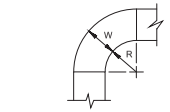
SIDE ELEVATION

F MQ005 NO SCALE
VOLUME DAMPER DETAIL



SIDE VIEW
ROUND AND/OR SQUARE NECK CEILING DIFFUSER TAKE-OFFS

J MQ005 NO SCALE
CEILING DIFFUSER TAKE-OFFS

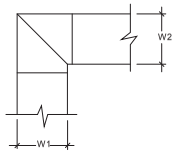


STANDARD RADIUS ELBOW

NOTES:

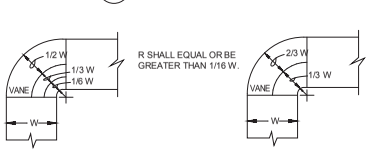
1. THE INTERIOR SURFACE OF ALL RADIUS ELBOWS SHALL BE MADE ROUND.
2. ALL STANDARD RADIUS ELBOWS SHOWN ON PLANS MAY BE MADE SHORT RADIUS ELBOWS. ALL SHORT RADIUS ELBOWS SHALL HAVE VANES. VANES SHALL BE CONSTRUCTED, SUPPORTED AND FASTENED AS RECOMMENDED BY SMACNA.

L MQ005 NO SCALE
RADIUS ELBOWS



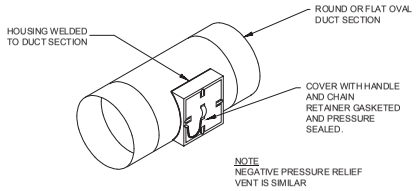
1. ALL VANED ELBOWS SHALL BE CONSTRUCTED AND INSTALLED AS DETAILED BY SMACNA
2. WHEN W1 DOES NOT EQUAL W2 VANE SHALL BE SINGLE VANE TYPE REGARDLESS OF W DIMENSION.
3. ALL SINGLE VANES SHALL HAVE A 2 INCH RADIUS, 1-1/2 INCH MAXIMUM SPACE BETWEEN VANES AND A 3/4 INCH TRAILING EDGE.
4. WHEN W1 EQUALS W2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

J MQ005 NO SCALE
SQUARE VANED ELBOWS



SHORT RADIUS ELBOW WITH TWO VANES

G MQ005 NO SCALE
SHORT RADIUS ELBOW WITH ONE VANE



NOTE
NEGATIVE PRESSURE RELIEF VENT IS SIMILAR

D MQ005 NO SCALE
ACCESS SECTION FOR ROUND/OVAL DUCT

Bid Document

Revisions:	Date

CONSULTANTS:

Structural	Civil	Industrial Hygenist	Geotechnical
McComas Engineers	Asaturian Eaton & Assoc.	John A Jurgiel & Assoc.	Holcomb Foundation
1717 E 116th Street	1440 Old West Main	123 N. Main Street	393 Wood Road
Carmel, IN 46032	Carbondale, IL 62901	St. Charles, MO 63301	Carbondale, IL 62901
Tel 317.580.0402	Tel 618.529.3414	Tel 636.757.3060	Tel 618.529.5262
317.582.0766	618.529.3423	636.757.3064	618.457.8991
Fax	Fax	Fax	Fax

062-0-46274 REGISTERED PROFESSIONAL ENGINEER

ARCHITECT/ENGINEERS:

DAE DESIGN ARCHITECTS ENGINEERS, INC.
220 N College Ave
Indianapolis, IN 46202
Tel 317.464.9090
317.464.9393
Fax

FoxArchitects
1 Memorial Dr. STE 1800
Saint Louis, MO 63102
Tel 314.621.4343
314.621.0261
Fax

Drawing Title: MECHANICAL DETAILS

Approved: Associate Director | Approved: Chief Engineer
Approved: Chief of Staff | Approved: Safety Officer
Approved: Infection Control | Approved: Chief, Police & Security

Project Title: Expand & Upgrade Building 42 for Laboratory

Location: Marion, IL

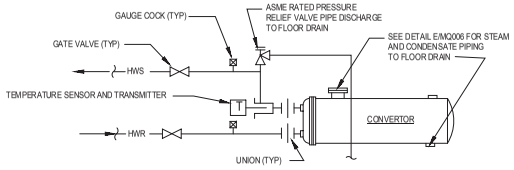
Date: 12-20-17 | Checked: DH | Drawn: BZ

Project Number: 657-502
Building Number: 42-Addition
Drawing Number: MQ-005

Office of Facilities Management
VA | U.S. Department of Veterans Affairs

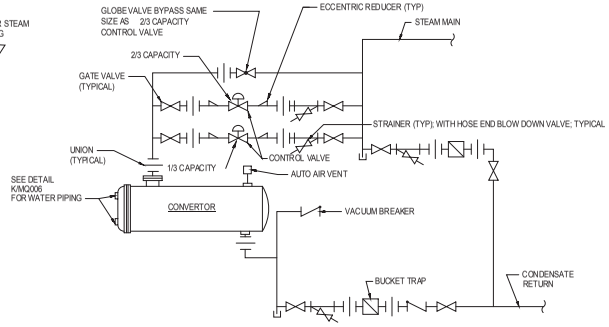
SD FORM 08-4231, OCT 1978

12-21-2017 12:39:31 AM



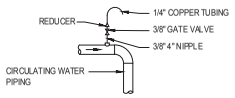
TYPICAL WATER CONNECTIONS TO H.W. HEATING CONVERTOR DETAIL

G MQ006 NO SCALE



TYPICAL STEAM CONNECTIONS TO H.W. HEATING CONVERTOR DETAIL

D MQ006 NO SCALE

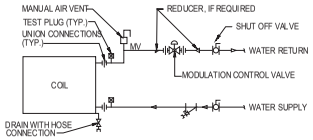


ELEVATION TYPICAL AIR VENT

A MQ006 NO SCALE

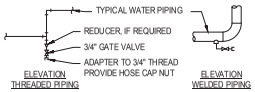
NOTES:

1. VENT ALL HIGH POINTS AS INDICATED ABOVE.
2. IF AUTOMATIC AIR VENTS ARE USED, PIPE DISCHARGE TO DRAIN.



TERMINAL UNIT WATER COILS - PIPING CONNECTIONS

H MQ006 NTS

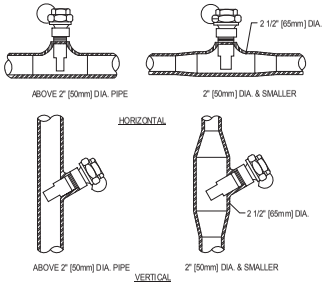


TYPICAL DRAIN VALVE CONNECTION

B MQ006 NO SCALE

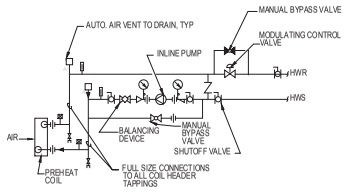
NOTES:

1. DRAIN ALL LOW POINTS AS INDICATED ABOVE.
2. WHERE SCALE POCKETS ARE SHOWN ON PIPE RISER DIAGRAMS AND/OR PLANS, LOCATE DRAIN AT BOTTOM OF SCALE POCKET.



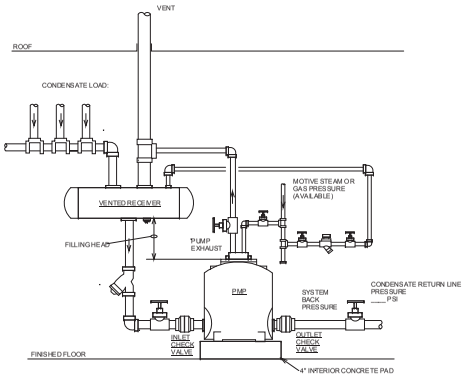
INSTALLATION OF THERMOMETER WELLS

E MQ006 NO SCALE



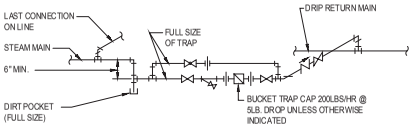
PREHEAT COIL (HOT WATER) - PIPING CONNECTIONS

C MQ006 NO SCALE



PMP CONDENSATE RETURN PUMPS

J MQ006 NO SCALE



END OF H.P. OR M.P. STEAM MAIN DRIP CONNECTION

F MQ006 NO SCALE

NOTE:

BASE OF RISER DRIPS SIMILAR TO ABOVE

Bid Document

Revisions:	Date

CONSULTANTS:

Structural	Civil	Industrial Hygienist	Geotechnical
McComas Engineers	Asaturian Eaton & Assoc.	John A Jurgiel & Assoc.	Holcomb Foundation
1717 E 116th Street	1440 Old West Main	123 N. Main Street	393 Wood Road
Carmel, IN 46032	Carbondale, IL 62901	St. Charles, MO 63301	Carbondale, IL 62901
Tel 317.580.0402	Tel 618.529.3414	Tel 636.757.3060	Tel 618.529.5262
317.582.0766	618.529.3423	636.757.3064	618.457.8991
Fax	Fax	Fax	Fax

ARCHITECT/ENGINEERS:

220 N College Ave
Indianapolis, IN 46202
Tel 317.464.9090
317.464.9393
Fax

1 Memorial Dr. STE 1800
Saint Louis, MO 63102
Tel 314.621.4343
314.621.0261
Fax

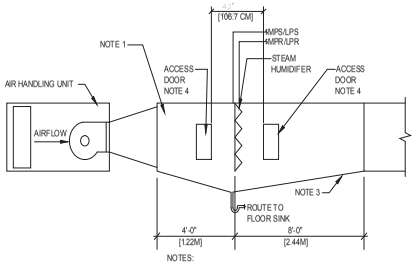
Drawing Title	Project Title	Project Number
MECHANICAL DETAILS	Expand & Upgrade Building 42 for Laboratory	657-502
Approved: Associate Director / Approved: Chief Engineer		Building Number: 42-Addition
Approved: Chief of Staff / Approved: Safety Officer	Location: Marion, IL	Drawing Number: MQ-006
Approved: Infection Control / Approved: Chief, Police & Security	Date: 12-20-17 / Checked: DH / Drawn: BZ	

Office of Facilities Management

VA | U.S. Department of Veterans Affairs

VA FORM 08-6231, OCT 1978

10/31/2017 12:30:38 AM

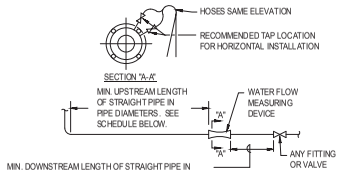


NOTES:

1. TRANSITION WELDED STAINLESS STEEL 4'[1.22M] UPSTREAM OF HUMIDIFIER AND 8' [2.44M] DOWNSTREAM OF HUMIDIFIER.
2. DETAIL ONLY APPLICABLE TO AHUS WITHOUT AFTER FILTER DOWNSTREAM OF THE SUPPLY AIR FAN.
3. INTEGRAL STAINLESS STEEL DRAIN PAN SLOPE FROM ALL DIRECTIONS TO DRAIN CONNECTION. SLOPE .125" PER 1'-0" [0.3CM PER 0.3 M].
4. PROVIDE MIN. 18" [45 CM] WIDE ACCESS DOOR, DIRECTLY UPSTREAM AND DOWNSTREAM OF HUMIDIFIER.

E / MQ007 DUCT MOUNTED HUMIDIFIER

NO SCALE



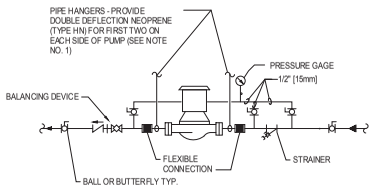
WATER FLOW MEASURING DEVICE INSTALLATION SCHEDULE			
TYPE	MIN. UPSTREAM LENGTH OF STRAIGHT PIPE IN PIPE DIAMETERS		MIN. DOWNSTREAM LENGTH OF STRAIGHT PIPE IN PIE DIAMETERS
	FOR SIDE TEE	FOR VALVE OR OTHER FITTING	
ORIFICE FLANGE OR FLOATING BALL WITH IMPACT TUBE.	20	10	5
VENTURI, AUTOMATIC BALANCING CONTROL VALVE OR INSERTION VELOCITY AVERAGING AND MEASURING TUBE	10	5	2

NOTES:

1. DIMENSIONS SHOWN IN SCHEDULE ARE MINIMUM REQUIRED. IF MANUFACTURER OF FURNISHED WATER FLOW MEASURING DEVICE RECOMMENDS A GREATER DIMENSION, USE THEIR RECOMMENDATION.
2. INSTALL THE WATER FLOW MEASURING DEVICE SO THE ARROW IS IN THE SAME DIRECTION AS THE FLOW.
3. THE WATER FLOW MEASURING DEVICE MAY BE INSTALLED IN EITHER HORIZONTAL OR VERTICAL PIPE. UNITS REQUIRING REMOTE METERS SHALL HAVE THE METER CONNECTIONS LOCATED ON OR NEAR THE SIDE WHEN INSTALLED IN HORIZONTAL PIPE. SEE SECTION "A-A". THE METER CONNECTIONS CAN BE INSTALLED IN ANY POSITION WHEN INSTALLED IN VERTICAL PIPE.

C / MQ007 WATER FLOW MEASURING DEVICE INSTALLATION DETAIL

NO SCALE

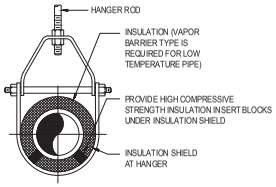


NOTES:

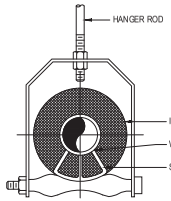
1. SUPPORT PUMP FROM PIPING ONLY. DO NOT SUPPORT PUMP FROM MOTOR.

A / MQ007 TYPICAL IN-LINE PUMPS - CONNECTIONS

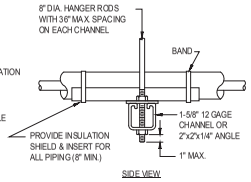
NO SCALE



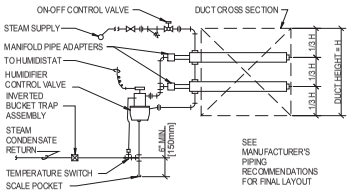
ADJUSTABLE CLEVIS HANGER TYPE 1 IN SPECIFICATIONS



ADJUSTABLE CLEVIS HANGER TYPE 1 IN SPECIFICATIONS

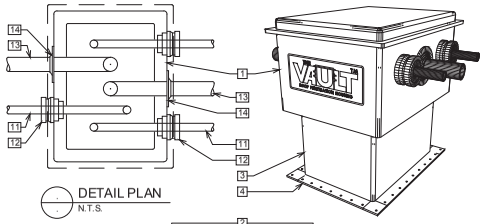


TRAPEZE HANGER FOR UP TO 1000 LB. UNIFORM LOAD



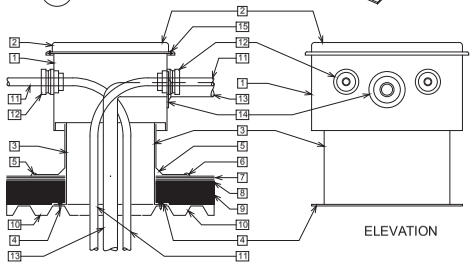
F / MQ007 STEAM HUMIDIFIER - PIPING CONNECTIONS (MULTIPLE DISPERSION TUBES)

NO SCALE



DETAIL PLAN

N.T.S.



SECTION

ELEVATION

D / MQ007 TYPICAL PIPE VAULT

NO SCALE

ROOF PENETRATION HOUSING

LEGEND

1. THE VAULT (SPECIFY MODEL)
2. MATCHING PREFAB ALUMINUM CAP
3. MATCHING ALUMINUM CURB 14" HIGH MIN. TO COMPLY WITH WIND RATING, CURB MUST BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS.
4. ALUM FLANGE, FASTEN TO ROOF DECK
5. SBS FLASHING MEMBRANE
6. CONTINUOUS CAULK WITH RUBBERIZED ASPHALT SEALANT
7. ROOFING SYSTEM
8. RECOVERY BOARD
9. RIGID INSULATION
10. METAL ROOF DECK
11. CONDUIT, PIPE, REFRIGERANT LINE, ETC. SIZES FROM 0.25" THRU 1.90" O.D.
12. EXIT SEAL FOR SIZES FROM 0.25" THRU 1.90" O.D.
13. CONDUIT, PIPE, REFRIGERANT LINE, ETC. SIZES FROM 1.90" THRU 15" O.D.
14. EXIT SEAL FOR SIZES FROM 1.90" THRU 15" O.D.
15. VANDAL RESISTANT STAINLESS SCREWS
16. FASTEN CURB FLANGE TO ROOF DECK

MAXIMUM PIPE/TUBING SUPPORT SPACING, FEET																
NOM. SIZE	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	7 FT	7	7	9	10	11	12	14	16	17	19	22	23	25	27	28	30	32
TUBING	5 FT	6	7	8	8	9	10	12	13	14	16	-	-	-	-	-	-	-
NOTE: FOR TRAPEZE HANGER TAKE SPACING OF SMALLEST SIZE ON TRAPEZE.																		

B / MQ007 TYPICAL PIPE HANGERS

NO SCALE

Bid Document

Revisions:	Date

CONSULTANTS:

Structural
McComas Engineers
1717 E 116th Street
Carmel, IN 46032
Tel 317.580.0402
317.582.0766 Fax

Civil
Asaturian Eaton & Assoc.
1440 Old West Main
Carbondale, IL 62901
Tel 618.529.3414
618.529.3423 Fax

Industrial Hygenist
John A Jurgiel & Assoc.
123 N. Main Street
St. Charles, MO 63301
Tel 636.757.3060
636.757.3064 Fax

Geotechnical
Holcomb Foundation
393 Wood Road
Carbondale, IL 62901
Tel 618.529.5262
618.457.8991 Fax

062-044274 REGISTERED PROFESSIONAL ENGINEER

ARCHITECT/ENGINEERS:

SDVOSB DAE DESIGN BUILD, INC.
220 N College Ave
Indianapolis, IN 46202
Tel 317.464.9090
317.464.9393 Fax

VOSB FoxArchitects
1 Memorial Dr. STE 1800
Saint Louis, MO 63102
Tel 314.621.4343
314.621.0261 Fax

Drawing Title: MECHANICAL DETAILS

Approved: Associate Director | Approved: Chief Engineer
Approved: Chief of Staff | Approved: Safety Officer
Approved: Infection Control | Approved: Chief, Police & Security

Project Title: Expand & Upgrade Building 42 for Laboratory

Location: Marion, IL

Date: 12-20-17 | Checked: DH | Drawn: BZ

Project Number: 657-502

Building Number: 42-Addition

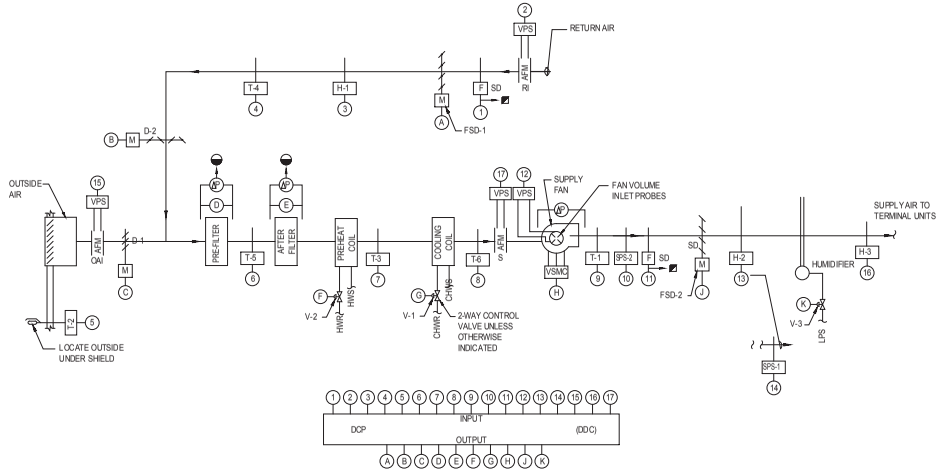
Drawing Number: MQ-007

Office of Facilities Management

VA | U.S. Department of Veterans Affairs

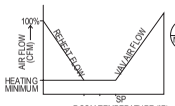
VA FORM 08-6231, OCT 1978

180 1091 1 131 101 AV



CONTROL SCHEMATIC AHU-1

A MQ008 NO SCALE



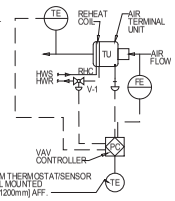
VAV BOX CONTROL SEQUENCE W/DEADBAND

A. SET POINTS SHALL BE SET AS FOLLOWS:
COOLING 75°F (ADJ)
HEATING 70°F(ADJ)
DEADBAND OF 5° F BETWEEN HEATING AND COOLING SET POINTS WILL BE MAINTAINED.

B. UPON FALL IN SPACE TEMPERATURE THE VAV DAMPER WILL MODULATE TO MINIMUM POSITION.

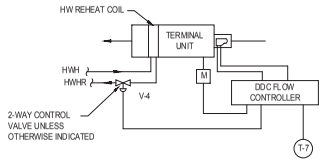
C. UPON FURTHER DROP IN SPACE TEMPERATURE VALVE V-1 WILL MODULATE TO MAINTAIN SET POINT ± .5° F. THE ADJUSTABLE TOLERANCE OF ± .5° F HAS BEEN SELECTED TO PREVENT VALVE HUNTING

D. THE REVERSE SHALL OCCUR ON THE RISE IN SPACE TEMPERATURE.



VARIABLE VOLUME AIR TERMINAL UNIT CONTROL DIAGRAM-DDC

B MQ008 NTS



TYPE "F" AIR TERMINAL UNIT CONTROL DIAGRAM VAV REHEAT OR CONSTANT VOLUME

C MQ008

ROOM THERMOSTAT T-7 SHALL CONTROL OPERATOR FOR VARIABLE AIR VOLUME ON CONSTANT VOLUME REHEAT BOX AND REHEAT COIL VALVE V-4. ON A DROP IN ROOM TEMPERATURE TO THE SET POINT ROOM THERMOSTAT T-7, THRU OPERATOR, SHALL REDUCE AIR FLOW TO THE ROOM TO THE BOXES MINIMUM SETTING. ON A FURTHER DROP IN ROOM TEMPERATURE BELOW THE SET POINT ROOM THERMOSTAT T-7 SHALL MODULATE VALVE V-4 AND INCREASE AIR FLOW TO THE BOXES SCHEDULED REHEAT COIL CFM TO MAINTAIN THE REQUIRED TEMPERATURE.

LEGEND

AFM	AIR FLOW MEASURING DEVICE	MONITORS AIR FLOW RATE PROVIDES VELOCITY PRESSURE FOR TRANSMITTAL TO DCP.
ΔP	DIFFERENTIAL PRESSURE SENSOR	TRANSMITS DIFFERENTIAL PRESSURE TO DCP TO INDICATE FILTER CONDITIONS AND STATUS OF FANS.
DCP	DISTRIBUTED CONTROL PANEL	CONTROLS OPERATION OF AIR HANDLING UNIT IN ACCORDANCE WITH THE SEQUENCE OF OPERATION.
D-1	OUTSIDE AIR DAMPER (MODULATING)	PROPORTIONS FLOW OF OUTSIDE AIR IN ECONOMISER MODE IN RESPONCE TO DCP.
D-2	RETURN AIR DAMPER MODULATING	PROPORTIONS FLOW OF RETURN AIR IN RESPONSE TO DCP.
ECC	ENGINEERING CONTROL CENTER	FOR MONITORING OF SYSTEM OPERATIONS.
F SD	DUCT SMOKE DETECTORS (FURNISHED AND WIRED TO FIRE ALARM PANEL BY ELECTRICAL)	SENSES AND TRANSMITS SMOKE CONDITION
G	PRESSURE GAUGE	FILTER CONDITION INDICATOR
H-1	RETURN AIR HUMIDITY SENSOR	SENSES AND TRANSMITS RETURN AIR HUMIDITY TO DCP FOR CONTROL AND INDICATION
H-2	SUPPLY AIR HUMIDITY SENSOR	SENSES AND TRANSMITS SUPPLY AIR HUMIDITY TO DCP FOR CONTROL AND INDICATION
H-3	SUPPLY AIR HUMIDITY SENSOR	SENSES AND TRANSMITS SUPPLY AIR HUMIDITY TO DCP FOR CONTROL AND INDICATION
FSD-1	RETURN AIR FIRE/SMOKE DAMPER	CLOSES WHEN UNIT IS SHUT OFF OR WHENEVER SMOKE IS DETECTED BY F SD.
FSD-2	SUPPLY AIR FIRE/SMOKE DAMPER	CLOSES WHEN UNIT IS SHUT OFF OR WHENEVER SMOKE IS DETECTED BY F SD.
SPS-1	STATIC PRESSURE SENSOR (SEE FLOOR PLANS FOR LOCATION)	SENSES AND TRANSMIT DUCT STATIC PRESSURE TO DCP.
SPS-2	HIGH LIMIT STATIC PRESSURE SENSOR	SENSES AND TRANSMITS DUCT STATIC PRESSURE NEAR AHU TO DCP.
T-1	SUPPLY AIR TEMPERATURE SENSOR	SENSES AND TRANSMITS SUPPLY AIR DRY BULB TEMPERATURE TO DCP FOR CONTROL AND INDICATION.
T-2	OUTSIDE AIR TEMPERATURE SENSOR	SENSES AND TRANSMITS OUTSIDE AIR DRY BULB TEMPERATURE TO DCP FOR CONTROL AND INDICATION.
T-3	LEAVING PREHEAT COIL AIR TEMPERATURE SENSOR (FREEZE PROTECTION)	SENSES AND TRANSMITS PREHEAT AIR DRY BULB TEMPERATURE TO DCP FOR CONTROL AND INDICATION.
T-4	RETURN AIR TEMPERATURE SENSOR	SENSES AND TRANSMITS RETURN AIR DRY BULB TEMPERATURE TO DCP FOR INDICATION ONLY.
T-5	MIXED AIR TEMPERATURE SENSOR	SENSES AND TRANSMITS MIXED AIR DRY BULB TEMPERATURE TO DCP FOR INDICATION ONLY.
T-6	LEAVING COOLING COIL AIR TEMPERATURE SENSOR	SENSES AND TRANSMITS COOLING COIL DRY BULB TEMPERATURE TO DCP FOR INDICATION ONLY.
T-7	SPACE AIR TEMPERATURE SENSOR	SENSES AND TRANSMITS SPACE TEMPERATURE TO TERMINAL BOX FLOW CONTROLLER.
V-1	CHILLED WATER CONTROL VALVE TWO WAY MODULATING TYPE	PROPORTIONS FLOW OF CHILLED WATER TO COOLING COIL IN RESPONSE TO DCP.
V-2	HEATING WATER CONTROL VALVE MODULATING TWO WAY	PROPORTIONS FLOW OF HEATING WATER TO PREHEAT COIL IN RESPONSE TO DCP.
V-3	STEAM CONTROL VALVE MODULATING HUMIDIFIER	PROPORTIONS FLOW OF STEAM TO HUMIDIFIER IN RESPONSE TO DCP.
V-4	HEATING WATER CONTROL VALVES MODULATING TWO WAY	PROPORTIONS FLOW OF HEATING WATER TO TERMINAL UNIT
VPS	VELOCITY PRESSURE SENSOR	SENSES AND TRANSMITS VELOCITY PRESSURE TO DCP.
VSMC	VARIABLE SPEED MOTOR CONTROLLER WITH MOTOR STARTER	CONTROLS SUPPLY AND RETURN FANS MOTOR SPEED IN RESPONSE TO DCP.

AHU SEQUENCE OF OPERATION

1. GENERAL
   1.1 UNIT IS NORMALLY STARTED AND STOPPED BY THE DCP OR REMOTELY AT THE ECC. H-O-A SWITCH SHALL BE KEPT IN THE "AUTO" POSITION. "HAND" AND "OFF" SHALL BE USED ONLY FOR MAINTENANCE. WHEN UNIT IS "OFF" D-1, FSD-1 AND FSD-2 SHALL BE FULLY CLOSED. WHEN UNIT IS "ON" FSD-1 AND FSD-2 SHALL BE FULLY OPEN. D-1 AND D-2 SHALL MODULATE IN ACCORDANCE WITH THE FOLLOWING SEQUENCE:

2. TEMPERATURE CONTROL
   2.1 THE SUPPLY AIR TEMPERATURE, SENSED BY T-1, SHALL BE MAINTAINED AT SETPOINT BY DCP MODULATING V-1 OR D-1, D-2 AND V-2 IN SEQUENCE.

   2.2 WHEN THE TEMPERATURE OF THE OUTSIDE AIR, SENSED BY T-2, IS ABOVE 65°F, THE DCP SHALL OPEN D-1M TO MINIMUM POSITION, D-2 SHALL BE FULLY OPEN, D-1 SHALL BE CLOSED. THE DCP SHALL MODULATE V-1 TO MAINTAIN THESUPPLY AIR TEMPERATURE, SENSED BY T-1.

   2.3 WHEN THE TEMPERATURE OF THE OUTSIDE AIR, SENSED BY T-2, IS BETWEEN 65°F AND THE SUPPLY AIR TEMPERATURE SETPOINT T-1, DAMPER D-2 SHALL BE FULLY CLOSED AND D-1, D-1M SHALL BE FULLY OPENED (MAXIMUM OUTSIDE AIR POSITION). THE DCP SHALL MODULATE V-1 TO MAINTAIN THE SUPPLY AIR TEMPERATURE, SENSED BY T-1.

   2.4 WHEN THE TEMPERATURE OF THE OUTSIDE AIR, SENSED BY T-2, IS BELOW THE SUPPLY AIR TEMPERATURE, SENSED BY T-1, THEN DAMPERS D-1M SHALL BE FULLY OPEN, DAMPERS D-1 AND D-2 SHALL MODULATE TO MAINTAIN THE SCHEDULED SUPPLY AIR TEMPERATURE. IF D-2 IS OPEN, D-1 AND D-3 ARE CLOSED THEN V-2 SHALL MODULATE OPEN TO MAINTAIN THE SUPPLY AIR TEMPERATURE. SET POINT AS SENSED BY T-1.

3. AIR FLOW CONTROL
   3.1 THE SUPPLY AIR FLOW SHALL BE CONTROLLED BY THE DCP MODULATING SUPPLY FAN VARIABLE SPEED MOTOR CONTROLLER (VSMC) TO MAINTAIN THE DUCT STATIC PRESSURE SETPOINT (SET AT 0.75 INCHES STATIC PRESSURE) AS SENSED BY SPS STATIC PRESSURE SENSOR (SEE PLANS FOR LOCATION).

   3.2 THE DCP USING TOTAL SUPPLY AIR AND RETURN AIR FLOW SIGNALS SHALL RESET THE RETURN FAN VSMC TO MAINTAIN A CONSTANT CFM DIFFERENCE BETWEEN THE CFM FOR THE SUPPLY FAN AND THE CFM FOR THE RETURN FAN.

   3.3 THE DCP USING HIGH PRESSURE SENSOR SPS-2 LOCATED AT THE SUPPLY FAN DISCHARGE SHALL PREVENT THE SUPPLY FAN FROM DEVELOPING OVER THREE INCHES OF STATIC PRESSURE. IF STATIC PRESSURE AT SPS-2 EXCEEDS THREE INCHES SUPPLY FAN SHALL SHUT "OFF".

   3.4 OUTSIDE AIR FLOW SHALL BE MEASURED BY AN AIR FLOW MEASURING STATION LOCATED IN THE MINIMUM OUTSIDE AIR DUCT.

4. FREEZE PROTECTION
   4.1 IF THE AIR TEMPERATURE AS SENSED BY T-3 FALLS BELOW 45°F, AN ALARM SIGNAL SHALL BE INDICATED AT THE DCP AND ECC. IF THIS TEMPERATURE FALLS BELOW 40°F, THE UNIT SUPPLY AND RETURN FANS SHALL SHUT "OFF" AND A CRITICAL ALARM SHALL BE INDICATED AT THE DCP AND ECC.

5. AUTOMATIC SHUTDOWN/RESTART
   5.1 WHEN SMOKE IS DETECTED BY DUCT SMOKE DETECTORS F SD SHOWN ABOVE, THE SUPPLY AND RETURN FANS SHALL SHUT "OFF" AND AN ALARM SIGNAL SHALL BE TRANSMITTED TO THE FIRE ALARM SYSTEM. FOR ALARM PURPOSES ONLY ALL FIRE/SMOKE DAMPERS IN THE SUPPLY AND RETURN DUCTS SHALL CLOSE. EXHAUST FANS SERVING SPACE OF SUPPLY FAN SHALL CONTINUE TO RUN. SUPPLY AND RETURN FANS SHALL RESTART AND FIRE/SMOKE DAMPERS SHALL OPEN WHEN FIRE ALARM CIRCUIT IS RESET.

6. EMERGENCY CONSTANT SPEED OPERATION
   6.1 ON ALL VSMC FANS IN VAV SYSTEMS UPON FAILURE OF THE VSMC THE FANS SHALL BE STARTED/STOPPED MANUALLY AT THE DCP OR THE ECC THROUGH THE BY-PASS STARTER. FANS SHALL THEN BE OPERATED AT CONSTANT DESIGN SPEED.

Bid Document

Revisions:	Date

CONSULTANTS:

Structural
McComas Engineers
1717 E 116th Street
Carmel, IN 46032
Tel 317.580.0402
317.582.0766
Fax

Civil
Asaturian Eaton & Assoc.
1440 Old West Main
Carbondale, IL 62901
Tel 618.529.3414
618.529.3423
Fax

Industrial Hygenist
John A Jurgiel & Assoc.
123 N. Main Street
St. Charles, MO 63301
Tel 636.757.3060
636.757.3064
Fax

Geotechnical
Holcomb Foundation
393 Wood Road
Carbondale, IL 62901
Tel 618.529.5262
618.457.8991
Fax

052-0-04274 REGISTERED PROFESSIONAL ENGINEER

ARCHITECT/ENGINEERS:

SDVOSB DAE DESIGN-ARCHITECTURE, INC.
220 N College Ave
Indianapolis, IN 46202
Tel 317.464.9090
317.464.9393
Fax

VOSB FoxArchitects
1 Memorial Dr. STE 1800
Saint Louis, MO 63102
Tel 314.621.4343
314.621.0291
Fax

Drawing Title: MECHANICAL DETAILS

Approved: Associate Director | Approved: Chief Engineer
Approved: Chief of Staff | Approved: Safety Officer
Approved: Infection Control | Approved: Chief, Police & Security

Project Title: Expand & Upgrade Building 42 for Laboratory

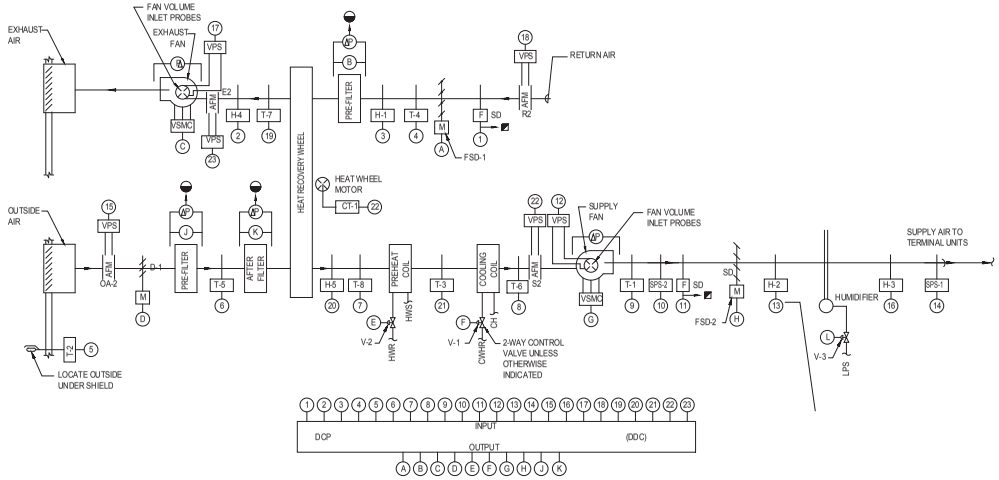
Location: Marion, IL

Date: 12-20-17 | Checked: DH | Drawn: BZ

Project Number: 657-502
Building Number: 42-Addition
Drawing Number: MQ-008

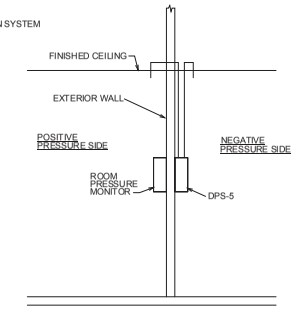
Office of Facilities Management
VA U.S. Department of Veterans Affairs

VA FORM 08-6231, OCT 1978



A MQ009 CONTROL SCHEMATIC AHU-2
NO SCALE

BAS BUILDING AUTOMATION SYSTEM



NOTE:

1. IF DIFFERENTIAL PRESSURE SENSOR, DPS-5 SENSES A LOSS OF NEGATIVE PRESSURE IN THE ROOM RELALTE TO THE ADJACENT SPACE, AFTER A DELAY OF 10 SECONDS (ADJUSTABLE), MONITOR SHALL ALARM AT LOCAL MONITOR AND TO THE BAS.
2. ALARM SHALL BE MANUALLY RESET.
3. APPLICABLE TO DECONTAMINATION, DETERGENT AND AND WATER TREATMENT AND ENDO-PROCESSING.
4. PROVIDE AT END DOOR INTO SPACE.

B MQ009 NEGATIVE PRESSURIZATION ALARMS
NO SCALE

INPUT / OUTPUT SUMMARY

SYSTEM		INDICATION							ALARM				CONTROL					
ROOM PRESSURIZATION (NEGATIVE)	GRAPHIC	STATUS	TEMPERTURE	RELATIVE HUMIDITY	POSITION	DIFF. PRESSURE	CFM	STATIC PRESSURE	LOW	HIGH	CRITICAL	MAINTENANCE	PROGRAM S/S	ON-OFF-AUTO	MODULATE	MAX. / MIN.	OPEN / CLOSE	REMARKS
SYSTEM	●																	BAS
ROOM DIFFERENTIAL PRESS SETPOINT						●												DPS-5
ROOM DIFFERENTIAL PRESS ACTUAL						●												DPS-5
ROOM DIFFERENTIAL MONITOR		●							●	●	●							(NORMAL, WARNING, HIGH)

LEGEND

AFM	AIR FLOW MEASURING DEVICE	MONITORS AIR FLOW RATE PROVIDES VELOCITY PRESSURE FOR TRANSMITTAL TO DCP.
ΔP	DIFFERENTIAL PRESSURE SENSOR	TRANSMITS DIFFERENTIAL PRESSURE TO DCP TO INDICATE FILTER CONDITIONS AND STATUS OF FANS.
CT-1	DISTRIBUTED CONTROL PANEL	CT THAT TRANSMITS AMP DRAW ON HEAT WHEEL MOTOR TO DCP.
DCP	DISTRIBUTED CONTROL PANEL	CONTROLS OPERATION OF AIR HANDLING UNIT IN ACCORDANCE WITH THE SEQUENCE OF OPERATION.
D-1	OUTSIED AIR DAMPER 2 POSITION	OPENS WHEN SUPPLY FAN STARTS AND CLOSES WHEN SUPPLY FAN STOPS.
ECC	ENGINEERING CONTROL CENTER	FOR MONITORING OF SYSTEM OPERATIONS.
F SD	DUCT SMOKE DETECTORS (FURNISHED AND WIRED TO FIRE ALARM PANEL BY ELECTRICAL)	SENSES AND TRANSMITS SMOKE CONDITION
G	PRESSURE GAUGE	FILTER CONDITION INDICATOR
H-1	RETURN AIR HUMIDITY SENSOR	SENSES AND TRANSMITS RETURN AIR HUMIDITY TO DCP FOR CONTROL AND INDICATION
H-2	SUPPLY AIR HUMIDITY SENSOR	SENSES AND TRANSMITS SUPPLY AIR HUMIDITY TO DCP FOR CONTROL AND INDICATION
H-3	SUPPLY AIR HUMIDITY SENSOR	SENSES AND TRANSMITS SUPPLY AIR HUMIDITY TO DCP FOR CONTROL AND INDICATION
H-4	HEAT WHEEL HUMIDITY SENSOR	SENSES AND TRANSMITS LEAVING HW HUMIDITY ON EXHAUST SIDE
H-5	HEAT WHEEL HUMIDITY SENSOR	SENSES AND TRANSMITS LEAVING HW HUMIDITY ON SUPPLY SIDE
FSD-1	RETURN AIR FIRE/SMOKE DAMPER	CLOSES WHEN UNIT IS SHUT OFF OR WHENEVER SMOKE IS DETECTED BY F SD.
FSD-2	SUPPLY AIR FIRE/SMOKE DAMPER	CLOSES WHEN UNIT IS SHUT OFF OR WHENEVER SMOKE IS DETECTED BY F SD.
SPS-1	STATIC PRESSURE SENSOR (SEE FLOOR PLANS FOR LOCATION)	SENSES AND TRANSMIT DUCT STATIC PRESSURE TO DCP.
SPS-2	HIGH LIMIT STATIC PRESSURE SENSOR	SENSES AND TRANSMITS DUCT STATIC PRESSURE NEAR AHU TO DCP.
T-1	SUPPLY AIR TEMPERATURE SENSOR	SENSES AND TRANSMITS SUPPLY AIR DRY BULB TEMPERATURE TO DCP FOR CONTROL AND INDICATION.
T-2	OUTSIDE AIR TEMPERATURE SENSOR	SENSES AND TRANSMITS OUTSIDE AIR DRY BULB TEMPERATURE TO DCP FOR CONTROL AND INDICATION.
T-3	LEAVING PREHEAT COIL AIR AIR TEMPERATURE SENSOR (FREEZE PROTECTION)	SENSES AND TRANSMITS PREHEAT AIR DRY BULB TEMPERATURE TO DCP FOR CONTROL AND INDICATION.
T-4	RETURN AIR TEMPERATURE SENSOR	SENSES AND TRANSMITS RETURN AIR DRY BULB TEMPERATURE TO DCP FOR INDICATION ONLY.
T-5	OUTSIDE AIR TEMPERATURE SENSOR	SENSES AND TRANSMITS OUTSIDE AIR DRY BULB TEMPERATURE TO DCP FOR INDICATION ONLY.
T-6	LEAVING COOLING COIL AIR TEMPERATURE SENSOR	SENSES AND TRANSMITS COOLING COIL DRY BULB TEMPERATURE TO DCP FOR INDICATION ONLY.
T-7	LEAVING HEAT WHEEL AIR TEMPERATURE	SENSES AND TRANSMITS LEAVING HEAT WHEEL ON THE EXHAUST SIDE TO DCP
T-8	LEAVING HEAT WHEEL AIR TEMPERATURE	SENSES AND TRANSMITS LEAVING HEAT WHEEL TEMEPRATURE ON SUPPLY SIDE TO DCP
V-1	CHILLED WATER CONTROL VALVE TWO WAY MODULATING TYPE	PROPORTIONS FLOW OF CHILLED WATER TO COOLING COIL IN RESPONSE TO DCP.
V-2	HEATING WATER CONTROL VALVE MODULATING TWO WAY TYPE	PROPORTIONS FLOW OF HOTWATER TO PREHEAT COIL IN RESPONSE TO DCP.
V-3	STEAM CONTROL VALVE MODULATING HUMIDIFIER	PROPORTIONS FLOW OF STEAM TO HUMIDIFIER IN RESPONSE TO DCP.
VPS	VELOCITY PRESSURE SENSOR	SENSES AND TRANSMITS VELOCITY PRESSURE TO DCP.
VSMC	VARIABLE SPEED MOTOR CONTROLLER WITH MOTOR STARTER	CONTROLS SUPPLY AND EXHAUST FANS MOTOR SPEED IN RESPONSE TO DCP.

AHU SEQUENCE OF OPERATION

1. GENERAL
   1.1 UNIT IS NORMALLY STARTED AND STOPPED BY THE DCP OR REMOTELY AT THE ECC. H-O-A SWITCH SHALL BE KEPT IN THE "AUTO" POSITION. "HAND" AND "OFF" SHALL BE USED ONLY FOR MAINTENANCE. WHEN UNIT IS "OFF" D-1, FSD-1 AND FSD-2 SHALL BE FULLY CLOSED. WHEN UNIT IS "ON" D-1, FSD-1 AND FSD-2 SHALL BE FULLY OPEN AND HEAT WHEEL SHALL ROTATE AND SUPPLY/EXHAUST FANS SHALL OPERATE.

2. TEMPERATURE CONTROL
   2.1 THE SUPPLY AIR TEMPERATURE, SENSED BY T-1, SHALL BE MAINTAINED AT SETPOINT BY DCP MODULATING V-1 AND V-2 IN SEQUENCE.
   2.2 WHEN THE TEMPERATURE OF THE OUTSIDE AIR, SENSED BY T-2, IS ABOVE 60°F, THE DCP SHALL MODULATE V-1 TO MAINTAIN THE SUPPLY AIR TEMPERATURE, SENSED BY T-1.
   2.3 WHEN THE TEMPERATURE OF THE OUTSIDE AIR, SENSED BY T-2, IS BELOW THE SUPPLY AIR TEMPERATURE, SENSED BY T-1, THEN V-2 SHALL MODULATE OPEN MAINTAIN THE SUPPLY AIR TEMPERATURE. SET POINT AS SENSED BY T-1.

3. AIR FLOW CONTROL
   3.1 THE SUPPLY AIR FLOW SHALL BE CONTROLLED BY THE DCP MODULATING SUPPLY FAN VARIABLE SPEED MOTOR CONTROLLER (VSMC) TO MAINTAIN THE DUCT STATIC PRESSURE SETPOINT (SET AT 0.75 INCHES STATIC PRESSURE) AS SENSED BY SPS STATIC PRESSURE SENSOR (SEE PLANS FOR LOCATION).
   3.2 THE DCP USING TOTAL SUPPLY AIR AND RETURN AIR FLOW SIGNALS SHALL RESET THE EXHAUST FAN VSMC TO MAINTAIN A CONSTANT CFM DIFFERENCE BETWEEN THE CFM FOR THE SUPPLY FAN AND THE CFM FOR THE EXHAUST FAN.
   3.3 THE DCP USING HIGH PRESSURE SENSOR SPS-2 LOCATED AT THE SUPPLY FAN DISCHARGE SHALL PREVENT THE SUPPLY FAN FROM DEVELOPING OVER FOUR INCHES OF STATIC PRESSURE. IF STATIC PRESSURE AT SPS-2 EXCEEDS FOUR INCHES SUPPLY FAN SHALL SHUT "OFF".
   3.4 OUTSIDE AIR FLOW SHALL BE MEASURED BY AN AIR FLOW MEASURING STATION LOCATED IN THE OUTSIDE AIR DUCT.

4. FREEZE PROTECTION
   4.1 IF THE AIR TEMPERATURE AS SENSED BY T-3 FALLS BELOW 45°F, AN ALARM SIGNAL SHALL BE INDICATED AT THE DCP AND ECC. IF THIS TEMPERATURE FALLS BELOW 40°F, THE UNIT SUPPLY AND RETURN FANS SHALL SHUT "OFF" AND A CRITICAL ALARM SHALL BE INDICATED AT THE DCP AND ECC.

5. AUTOMATIC SHUTDOWN/RESTART
   5.1 WHEN SMOKE IS DETECTED BY DUCT SMOKE DETECTORS F SD SHOWN ABOVE, THE SUPPLY AND RETURN FANS SHALL SHUT "OFF" AND AN ALARM SIGNAL SHALL BE TRANSMITTED TO THE FIRE ALARM SYSTEM. FOR ALARM PURPOSES ONLY ALL FIRE/SMOKE DAMPERS IN THE SUPPLY AND RETURN DUCTS SHALL CLOSE. EXHAUST FANS SERVING SPACE OF SUPPLY FAN SHALL CONTINUE TO RUN. SUPPLY AND RETURN FANS SHALL RESTART AND FIRE/SMOKE DAMPERS SHALL OPEN WHEN FIRE ALARM CIRCUIT IS RESET.

6. EMERGENCY CONSTANT SPEED OPERATION
   6.1 ON ALL VSMC FANS IN VAV SYSTEMS UPON FAILURE OF THE VSMC THE FANS SHALL BE STARTED/STOPPED MANUALLY AT THE DCP OR THE ECC THROUGH THE BY-PASS STARTER. FANS SHALL THEN BE OPERATED AT CONSTANT DESIGN SPEED.

Bid Document

Revisions:	Date

CONSULTANTS:

Structural
McComas Engineers
1717 E 116th Street
Carmel, IN 46032
Tel 317.580.0402
317.582.0766
Fax

Civil
Asaturian Eaton & Assoc.
1440 Old West Main
Carbondale, IL 62901
Tel 618.529.3414
618.529.3423
Fax

Industrial Hygenist
John A Jurgiel & Assoc.
123 N. Main Street
St. Charles, MO 63301
Tel 636.757.3060
636.757.3064
Fax

Geotechnical
Holcomb Foundation
393 Wood Road
Carbondale, IL 62901
Tel 618.529.5262
618.457.8991
Fax

ARCHITECT/ENGINEERS:

DAE DESIGN ENGINEERING
220 N College Ave
Indianapolis, IN 46202
Tel 317.464.9090
317.464.9393
Fax

FoxArchitects
1 Memorial Dr. STE 1800
Saint Louis, MO 63102
Tel 314.621.4343
314.621.0261
Fax

Drawing Title
MECHANICAL DETAILS

Approved: Associate Director | Approved: Chief Engineer
Approved: Chief of Staff | Approved: Safety Officer
Approved: Infection Control | Approved: Chief, Police & Security

Project Title
Expand & Upgrade Building 42 for Laboratory

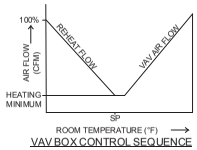
Location Marion, IL

Date 12-20-17 | Checked DH | Drawn BZ

Project Number 657-502
Building Number 42-Addition
Drawing Number MQ-009

Office of Facilities Management
VA | U.S. Department of Veterans Affairs

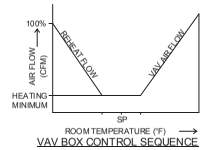
VA FORM 08-6231, OCT 1978



VAV BOX CONTROL SEQUENCE

NO DEADBAND

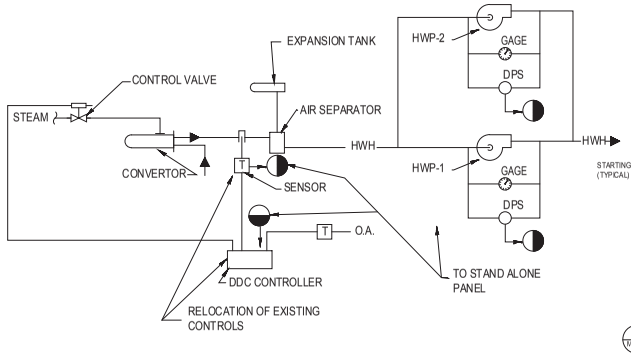
A. UPON FALL IN SPACE TEMPERATURE THE VAV DAMPER WILL MODULATE TO MINIMUM POSITION.
B. UPON FURTHER DROP IN SPACE TEMPERATURE VALVE V-1 WILL MODULATE TO MAINTAIN SET POINT ± .5° F. THE ADJUSTABLE TOLERANCE OF ± .5° F HAS BEEN SELECTED TO PREVENT VALVE HUNTING.
C. THE REVERSE SHALL OCCUR ON THE RISE IN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



VAV BOX CONTROL SEQUENCE

W/DEADBAND

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

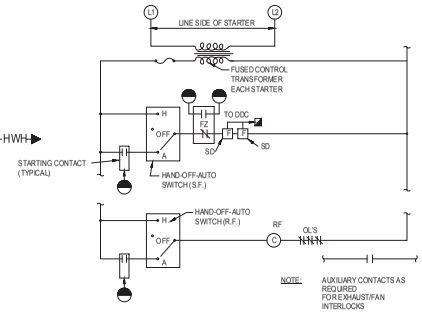


C MQ009 HEATING HOT WATER PUMP CONTROLS

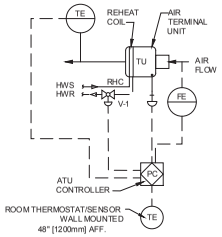
SEQUENCE OF OPERATION:

CONVERTOR CONTROL

WHEN PUMP IS IN OPERATION STEAM CONTROL VALVE SHALL MODULATE TO MAINTAIN THE SUPPLY TEMPERATURE AT THE CONTROL POINT.
THE SUPPLY TEMPERATURE SHALL BE RESET INVERSELY WITH THE OUTDOOR AIR TEMPERATURE AS SCHEDULED.



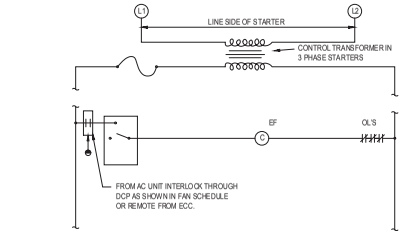
A MQ009 AIR HANDLING UNIT AHU-1 & AHU-2 CONTROL



NO SUPPLEMENTAL HEATING

E MQ005 VARIABLE VOLUME AIR TERMINAL UNIT CONTROL DIAGRAM

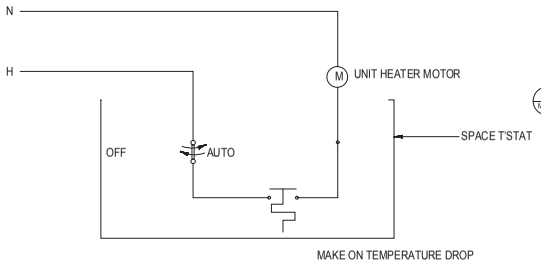
NTS



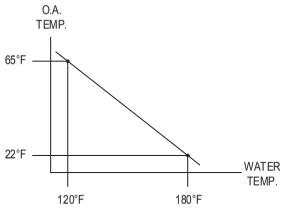
NOTE: LOCATE PITOT TUBE IN FAN INLET DUCT.

B MQ009 EXHAUST FANS INTERLOCK WITH AC UNIT

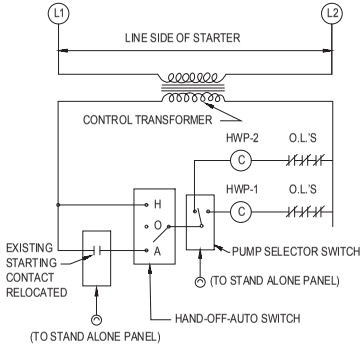
NTS



D MQ009 UNIT HEATER CONTROL DIAGRAM



F MQ009 HEATING HOT WATER RESET SCHEDULE



G MQ009 PUMP START CONTROL

SEQUENCE OF OPERATION:

HOT WATER HEATING SYSTEMS

PUMP SHALL BE STARTED AND STOPPED BY HAND-OFF-AUTO SWITCH IN THE STARTER AND WHEN IN THE AUTO POSITION BY THE DCP OR REMOTELY BY THE ECC. WHEN PUMP STARTS, CONVERTOR CONTROLS SHALL BE ENERGIZED. TEMPERATURE TRANSMITTER IN THE HOT WATER LEAVING THE CONVERTOR SHALL, THROUGH THE DCP, MODULATE CONVERTOR STEAM VALVE IN PARALLEL TO MAINTAIN THE SUPPLY TEMPERATURE CONTROL POINT, PROVIDED PUMP RUNS. THE HOT WATER SUPPLY TEMPERATURE SHALL BE RESET INVERSELY WITH THE OUTSIDE AIR TEMPERATURE AS SCHEDULED.

Bid Document

Revisions:	Date

CONSULTANTS:

Structural	Civil	Industrial Hygienist	Geotechnical
McComas Engineers	Asaturian Eaton & Assoc.	John A Jurgiel & Assoc.	Holcomb Foundation
1717 E 116th Street	1440 Old West Main	123 N. Main Street	393 Wood Road
Carmel, IN 46032	Carbondale, IL 62901	St. Charles, MO 63301	Carbondale, IL 62901
Tel 317.580.0402	Tel 618.529.3414	Tel 636.757.3060	Tel 618.529.5262
317.582.0766	618.529.3423	636.757.3064	618.457.8991
Fax	Fax	Fax	Fax

062-0-046274 REGISTERED PROFESSIONAL ENGINEER

ARCHITECT/ENGINEERS:

DAE DESIGN ARCHITECTS ENGINEERS, P.C.
220 N College Ave
Indianapolis, IN 46202
Tel 317.464.9090
317.464.9393
Fax

FoxArchitects
1 Memorial Dr. STE 1800
Saint Louis, MO 63102
Tel 314.621.4343
314.621.0261
Fax

Drawing Title	Project Title	Project Number
MECHANICAL DETAILS	Expand & Upgrade Building 42 for Laboratory	657-502
Approved: Associate Director / Approved: Chief Engineer		Building Number: 42-Addition
Approved: Chief of Staff / Approved: Safety Officer	Location: Marion, IL	Drawing Number: MQ-010
Approved: Infection Control / Approved: Chief, Police & Security	Date: 12-20-17 / Checked: DH / Drawn: BZ	

Office of Facilities Management

VA | U.S. Department of Veterans Affairs

SF-1 FORM, OB-42231, OCT 1978

12-01-2017 12:31:16 AM

VETERANS AFFAIRS

MEDICAL CENTER

MARION,
ILLINOIS

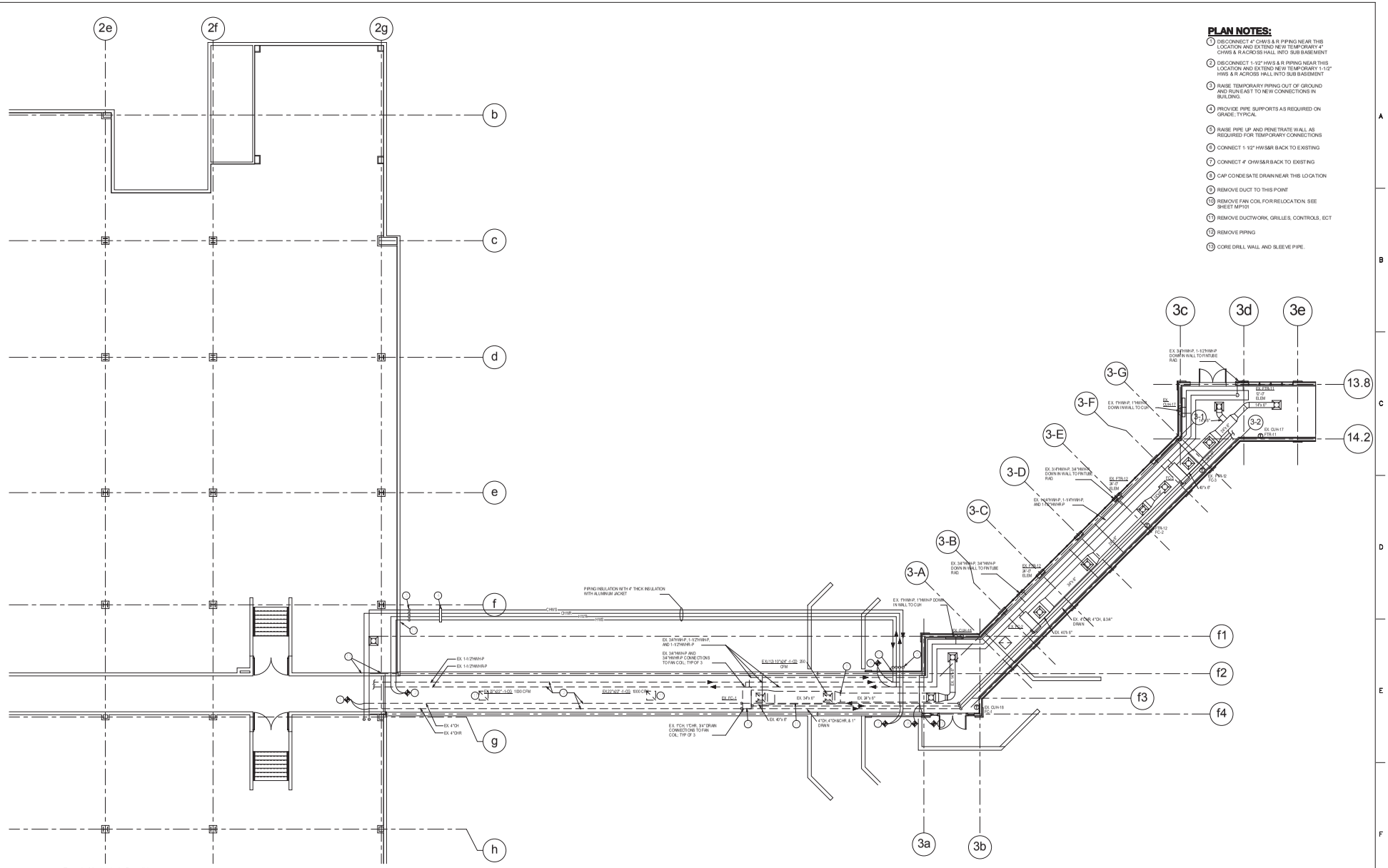
SYSTEM POINT DESCRIPTION

SERVICE: LOCATION:

VARIABLE AIR VOLUME REHEAT SYSTEMS: MEZZANINE

POINTS LIST SCHEDULE FOR ENGINEERING CONTROL CENTER (ECC)

| | CONTROL POINTS | | | | | | | | MONITORING POINTS | | | | | | | |



Tunnel - Mechanical - Demolition
1/8" = 1'-0"

PLAN NOTES:

1. DISCONNECT 4" CHWS & R PIPING NEAR THIS LOCATION AND EXTEND NEW TEMPORARY 4" CHWS & R ACROSS HALL INTO SUB BASEMENT
2. DISCONNECT 1-1/2" HWS & R PIPING NEAR THIS LOCATION AND EXTEND NEW TEMPORARY 1-1/2" HWS & R ACROSS HALL INTO SUB BASEMENT
3. RAISE TEMPORARY PIPING OUT OF GROUND AND RUN EAST TO NEW CONNECTIONS IN BUILDING.
4. PROVIDE PIPE SUPPORTS AS REQUIRED ON GRADE; TYPICAL
5. RAISE PIPE UP AND PENETRATE WALL AS REQUIRED FOR TEMPORARY CONNECTIONS
6. CONNECT 1-1/2" HWS&R BACK TO EXISTING
7. CONNECT 4" CHWS&R BACK TO EXISTING
8. CAP CONDESATE DRAIN NEAR THIS LOCATION
9. REMOVE DUCT TO THIS POINT
10. REMOVE FAN COIL FOR RELOCATION SEE SHEET MP101
11. REMOVE DUCTWORK, GRILLES, CONTROLS, ECT
12. REMOVE PIPING
13. CORE DRILL WALL AND SLEEVE PIPE.

Bid Document

Revisions:	Date

CONSULTANTS:

Structural	Civil	Industrial Hygenist	Geotechnical
McComas Engineers	Asaturian Eaton & Assoc.	John A Jurgiel & Assoc.	Holcomb Foundation
1717 E 116th Street	1440 Old West Main	123 N. Main Street	393 Wood Road
Carmel, IN 46032	Carbondale, IL 62901	St. Charles, MO 63301	Carbondale, IL 62901
Tel 317.580.0402	Tel 618.529.3414	Tel 636.757.3060	Tel 618.529.5262
317.582.0766	618.529.3423	636.757.3064	618.457.8991
Fax	Fax	Fax	Fax

062-046274
REGISTERED PROFESSIONAL ENGINEER

ARCHITECT/ENGINEERS:

DAE
220 N College Ave
Indianapolis, IN 46202
Tel 317.464.9090
317.464.9393
Fax

FoxArchitects
1 Memorial Dr. STE 1800
Saint Louis, MO 63102
Tel 314.621.4343
314.621.0261
Fax

Drawing Title: TUNNEL MECHANICAL - DEMOLTION

Approved: Associate Director | Approved: Chief Engineer
Approved: Chief of Staff | Approved: Safety Officer
Approved: Infection Control | Approved: Chief, Police & Security

Project Title: Expand & Upgrade Building 42 for Laboratory

Location: Marion, IL

Date: 12-20-17 | Checked: DH | Drawn: BZ

Project Number: 657-502
Building Number: 42-Addition
Drawing Number: DM-101

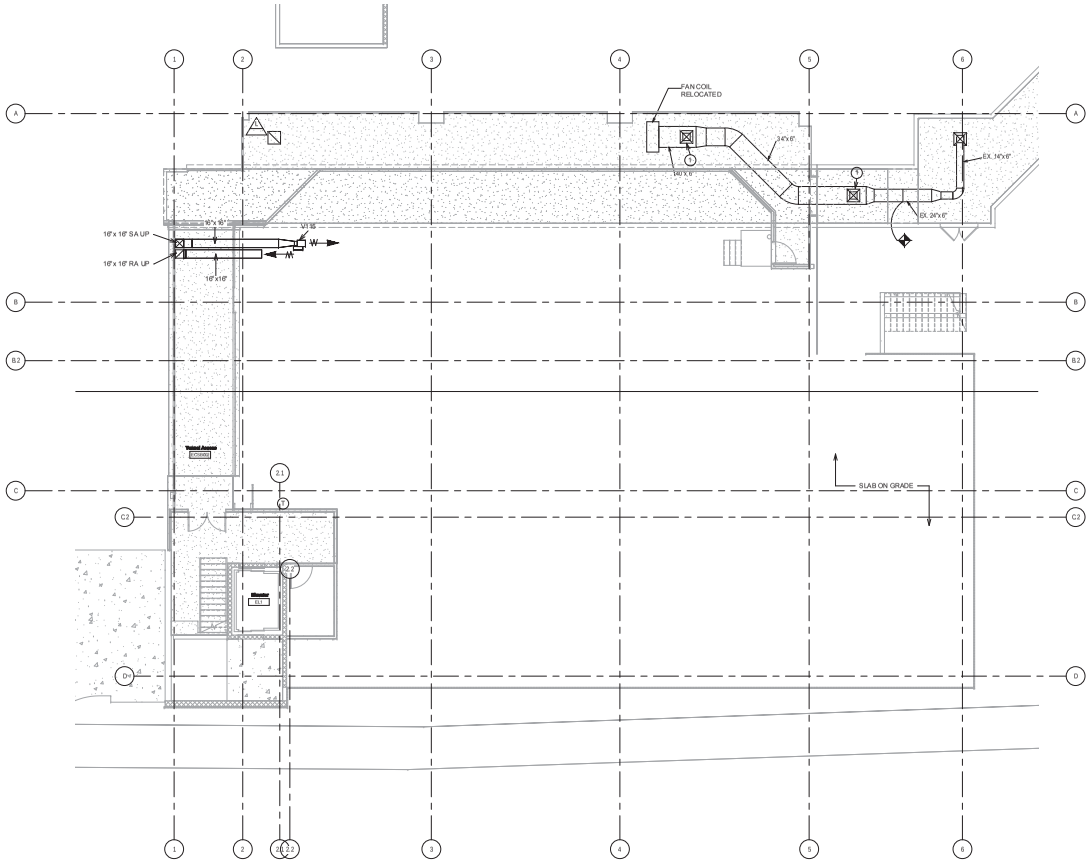
Office of Facilities Management
VA | U.S. Department of Veterans Affairs

SF 1129A, OB-4231, OCT 1987

12-21-2017 12:32:30 AM

PLAN NOTES:

1. RE-INSTALL EXISTING DIFFUSERS NEAR THIS LOCATION AS REQUIRED.



Lower Level - Mechanical - HVAC Floor Plan
1/8" = 1'-0"

Bid Document

Revisions:	Date

CONSULTANTS:

Structural
McComas Engineers
1717 E 116th Street
Carmel, IN 46032
Tel 317.580.0402
317.582.0766
Fax

Civil
Asaturian Eaton & Assoc.
1440 Old West Main
Carbondale, IL 62901
Tel 618.529.3414
618.529.3423
Fax

Industrial Hygenist
John A Jurgiel & Assoc.
123 N. Main Street
St. Charles, MO 63301
Tel 636.757.3060
636.757.3064
Fax

Geotechnical
Holcomb Foundation
393 Wood Road
Carbondale, IL 62901
Tel 618.529.5262
618.457.8991
Fax

062-040274
REGISTERED
PROFESSIONAL
ENGINEER

ARCHITECT/ENGINEERS:

DAE
220 N College Ave
Indianapolis, IN 46202
Tel 317.464.9090
317.464.9393
Fax

FoxArchitects
1 Memorial Dr. STE 1800
Saint Louis, MO 63102
Tel 314.621.4343
314.621.0261
Fax

Drawing Title
LOWER LEVEL - HVAC DUCT PLAN

Approved: Associate Director
Approved: Chief Engineer
Approved: Chief of Staff
Approved: Safety Officer
Approved: Infection Control
Approved: Chief, Police & Security

Project Title
Expand & Upgrade Building 42 for Laboratory

Location Marion, IL

Date 12-20-17
Checked DH
Drawn BZ

Project Number 657-502
Building Number 42-Addition
Drawing Number MH-101

Office of Facilities Management
VA | U.S. Department of Veterans Affairs

VA FORM 08-6231, OCT 1978

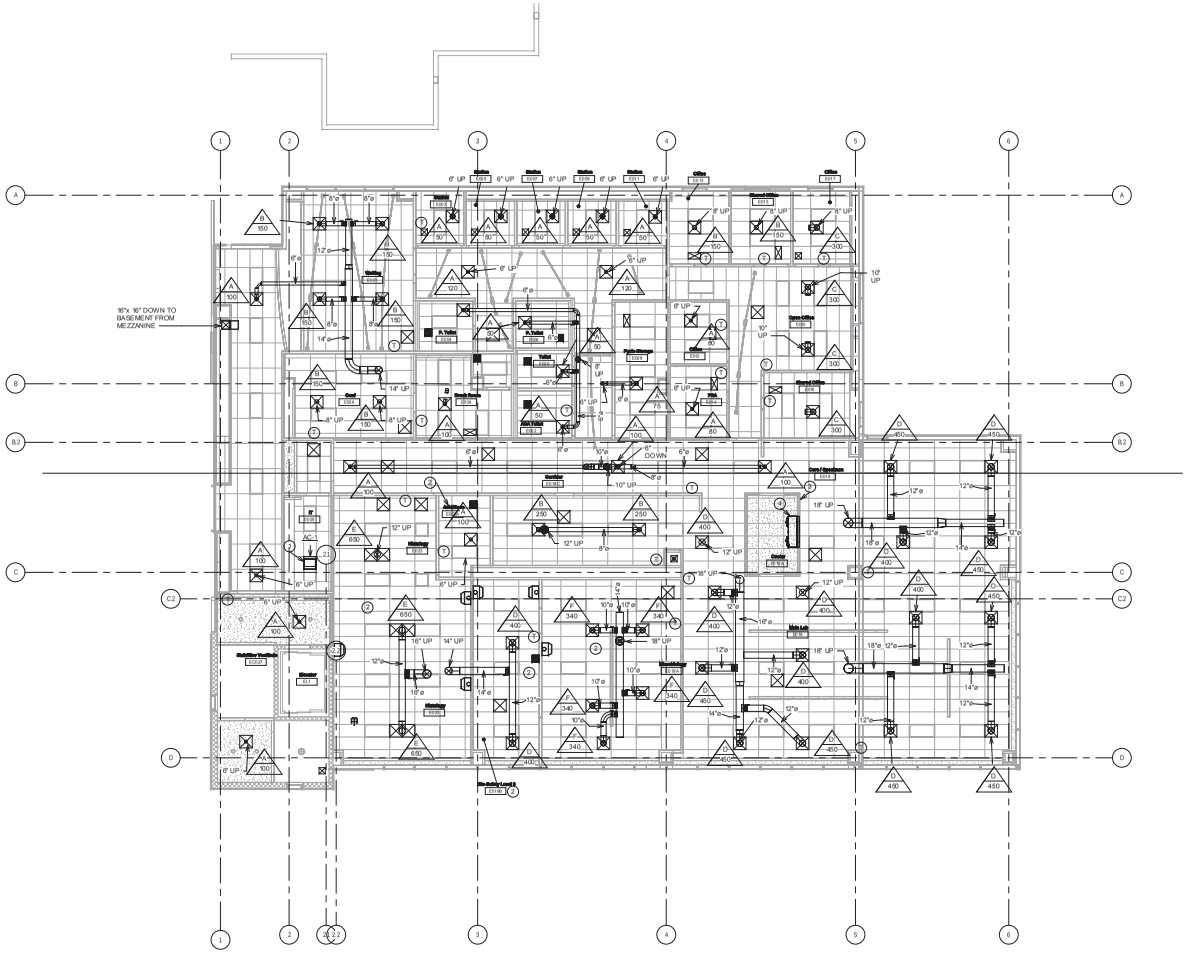
12-20-2017 12:41:07 AM

GENERAL NOTES:

1. PROVIDE A SCCR PER THE DIV 26 OCPD STUDY

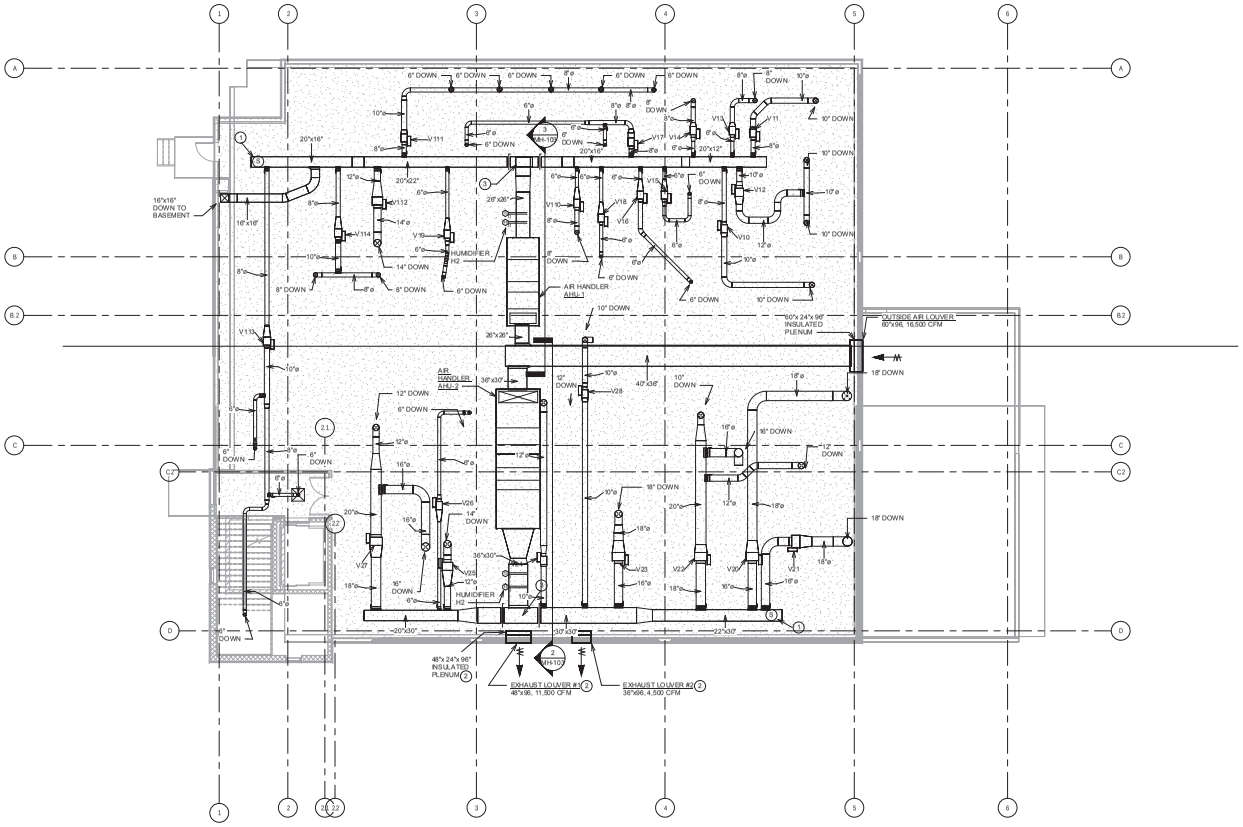
PLAN NOTES:

1. ROUTE REFRIGERANT LINES UP TO MEZZANINE AND TO CONDENSING UNIT ON ROOF.
2. THIS ROOM TO HAVE NEGATIVE PRESSURE
3. 12'-6" x 8'-0" x 8'-0" WALK-IN COOLER WITH 2 DOORS. SEE ARCHITECTURAL EQUIPMENT PLANS.
4. EVAPORATOR 10,000 BTU/HR AT 16 HOURS RUN TIME 120V/1PH

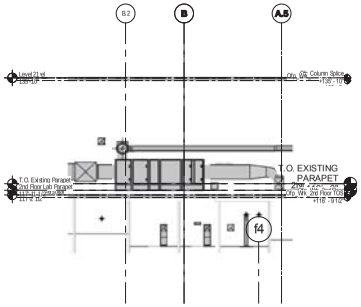

16"x 16" DOWN TO BASEMENT FROM MEZZANINE
DOWN
Elevator
Mechanical
Janitor
Storage
Office
Conference
Kitchen
Dining
Lounge
Exam Room
Treatment
Nurse Station
Waiting
Corridor
Mechanical Room
Mechanical Shaft
Stairwell
Vestibule
Mechanical Shaft
Mechanical Room
Mechanical Shaft
Mechanical Room
Mechanical Shaft
Mechanical Room

PLAN NOTES:

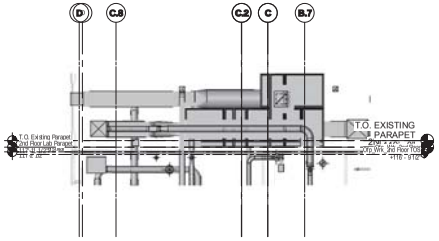
1. DUCT STATIC PRESSURE SENSOR.
2. SEE SHEET MH105.
3. TURNING VANES IN TEE.



Second Floor Mezzanine-Mechanical - Supply Duct Floor Plan
1/8" = 1'-0"



AHU-1
1/8" = 1'-0"



AHU-2
1/8" = 1'-0"

Bid Document

Revisions:	Date

CONSULTANTS:

Structural	Civil	Industrial Hygenist	Geotechnical
McComas Engineers	Asaturian Eaton & Assoc.	John A Jurgiel & Assoc.	Holcomb Foundation
1717 E 116th Street	1440 Old West Main	123 N. Main Street	393 Wood Road
Carmel, IN 46032	Carbondale, IL 62901	St. Charles, MO 63301	Carbondale, IL 62901
Tel 317.580.0402	Tel 618.529.3414	Tel 636.757.3060	Tel 618.529.5262
317.582.0766 Fax	618.529.3423 Fax	636.757.3064 Fax	618.457.8991 Fax

062-046274 REGISTERED PROFESSIONAL ENGINEER

ARCHITECT/ENGINEERS:

DAE DESIGN ENGINEERING, INC. — 220 N College Ave, Indianapolis, IN 46202, Tel 317.464.9090, 317.464.9393 Fax

FoxArchitects — 1 Memorial Dr., STE 1800, Saint Louis, MO 63102, Tel 314.621.4343, 314.621.0261 Fax

Drawing Title: SECOND FLOOR MEZZAINE - SUPPLY DUCT PLAN

Approved: Associate Director | Approved: Chief Engineer
Approved: Chief of Staff | Approved: Safety Officer
Approved: Infection Control | Approved: Chief, Police & Security

Project Title: Expand & Upgrade Building 42 for Laboratory

Location: Marion, IL

Date: 12-20-17 | Checked: DH | Drawn: BZ

Project Number: 657-502
Building Number: 42-Addition
Drawing Number: MH-103

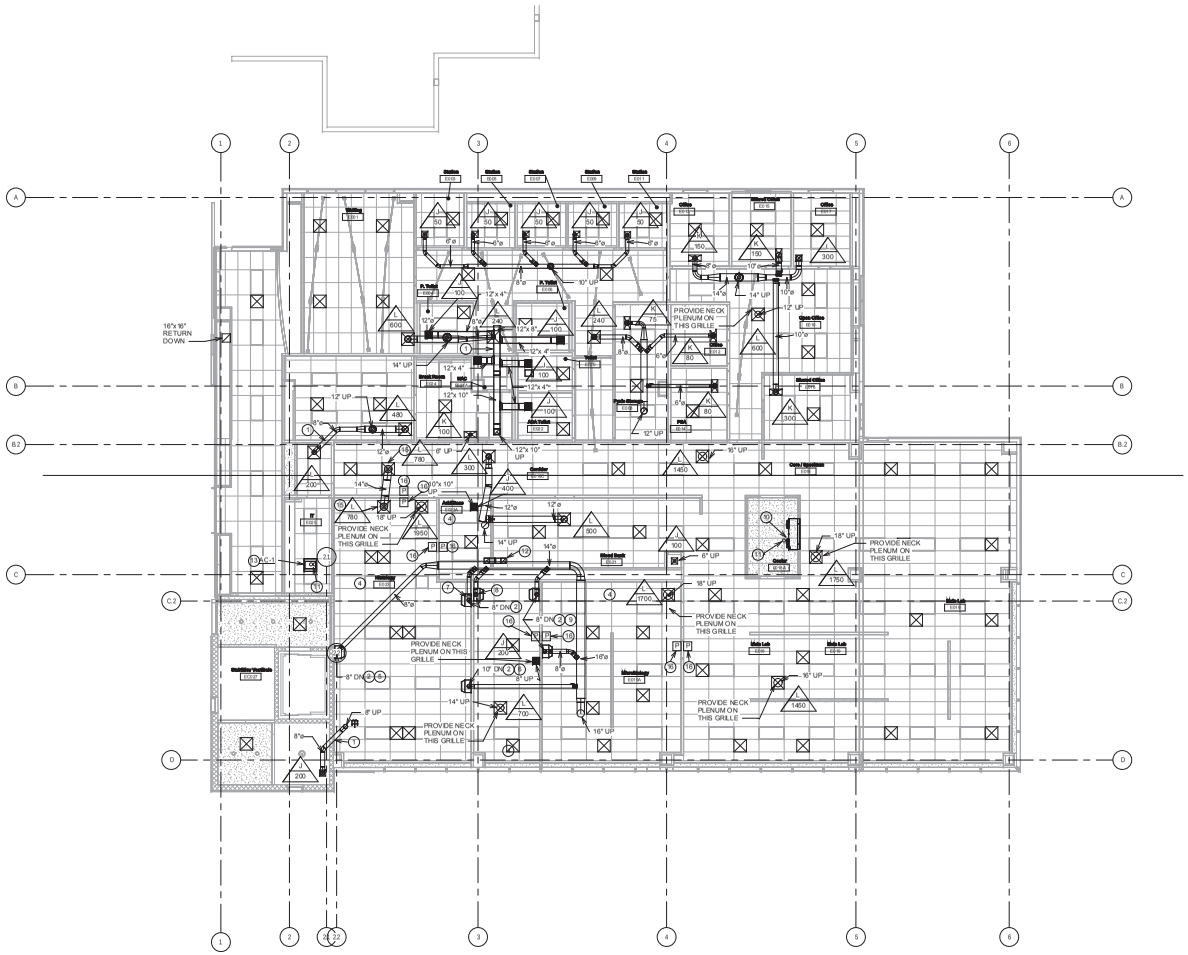
Office of Facilities Management
VA | U.S. Department of Veterans Affairs

VA FORM 08-6231, OCT 1978

12-21-2017 12:42:45 AM

PLAN NOTES:

1. PROVIDE FIRE DAMPER AT THIS WALL PENETRATION AND DUCT ACCESS DOOR
2. AIR VOLUME CONTROL VALVE ACV-1
3. TWO (2) 'J' GRILLS CONNECTED FOR TRANSFER AIR, 300 CFM
4. THIS ROOM TO BE NEGATIVE PRESSURE
5. EXHAUST HOOD H1.3, 72"L, 620 CFM @ 0.1"
6. EXHAUST HOOD H1.2, 96"L, 860 CFM @ 0.2"
7. EXHAUST HOOD H1.1, 60"L, 900 CFM @ 0.2"
8. EXHAUST HOOD M1, 48"L 380 CFM @ 0.1"
9. EXHAUST HOOD M2, 48"L 380 CFM @ 0.1"
10. EVAPORATOR FOR COOLER, PIPE CONDENSATE DRAIN TO FLOOR DRAIN. SEE PLUMBING SHEETS
11. REFRIGERATION PIPING UP, SEE SHEET MP 103
12. 12"x 10" TRANSFER DUCT WITH (2) TWO TYPE 'J' GRILLES. INSTALL A 12"x 10" FABRIC BLADE BACK DRAFT DAMPER IN DUCT. AIR TO TRANSFER INTO ACID BASE ROOM.
13. UNIT MOUNTED IN CEILING.
14. 14" ROUND TRANSFER DUCT WITH FABRIC BLADE BACK DAFT DAMPER IN DUCT. AIR TO TRANSFER FROM CORRIDOR INTO HISTOLOGY.
19. NECK PLENUM ON THIS GRILLE.
18. NEGATIVE PRESSURE MONITOR; SEE DETAIL M/M2009.



First Floor Mechanical - Return Duct Floor Plan
1/8" = 1'-0"

Bid Document

Revisions:	Date

CONSULTANTS:

Structural	Civil	Industrial Hygenist	Geotechnical
McComas Engineers	Asaturian Eaton & Assoc.	John A Jurgiel & Assoc.	Holcomb Foundation
1717 E 116th Street	1440 Old West Main	123 N. Main Street	393 Wood Road
Carmel, IN 46032	Carbondale, IL 62901	St. Charles, MO 63301	Carbondale, IL 62901
Tel 317.580.0402	Tel 618.529.3414	Tel 636.757.3060	Tel 618.529.5262
317.582.0766	618.529.3423	636.757.3064	618.457.8991
Fax	Fax	Fax	Fax

062-0-046274
REGISTERED PROFESSIONAL ENGINEER

ARCHITECT/ENGINEERS:

SDVOB DAE DESIGN ENGINEERING, INC.
220 N College Ave
Indianapolis, IN 46202
Tel 317.464.9090
317.464.9393
Fax

VOSB FoxArchitects
1 Memorial Dr. STE 1800
Saint Louis, MO 63102
Tel 314.621.4343
314.621.0261
Fax

Drawing Title
FIRST FLOOR - RETURN & EXHAUST PLAN

Approved: Associate Director | Approved: Chief Engineer
Approved: Chief of Staff | Approved: Safety Officer
Approved: Infection Control | Approved: Chief, Police & Security

Project Title
Expand & Upgrade Building 42 for Laboratory

Location Marion, IL

Date 12-20-17 | Checked DH | Drawn BZ

Project Number 657-502
Building Number 42-Addition
Drawing Number MH-104

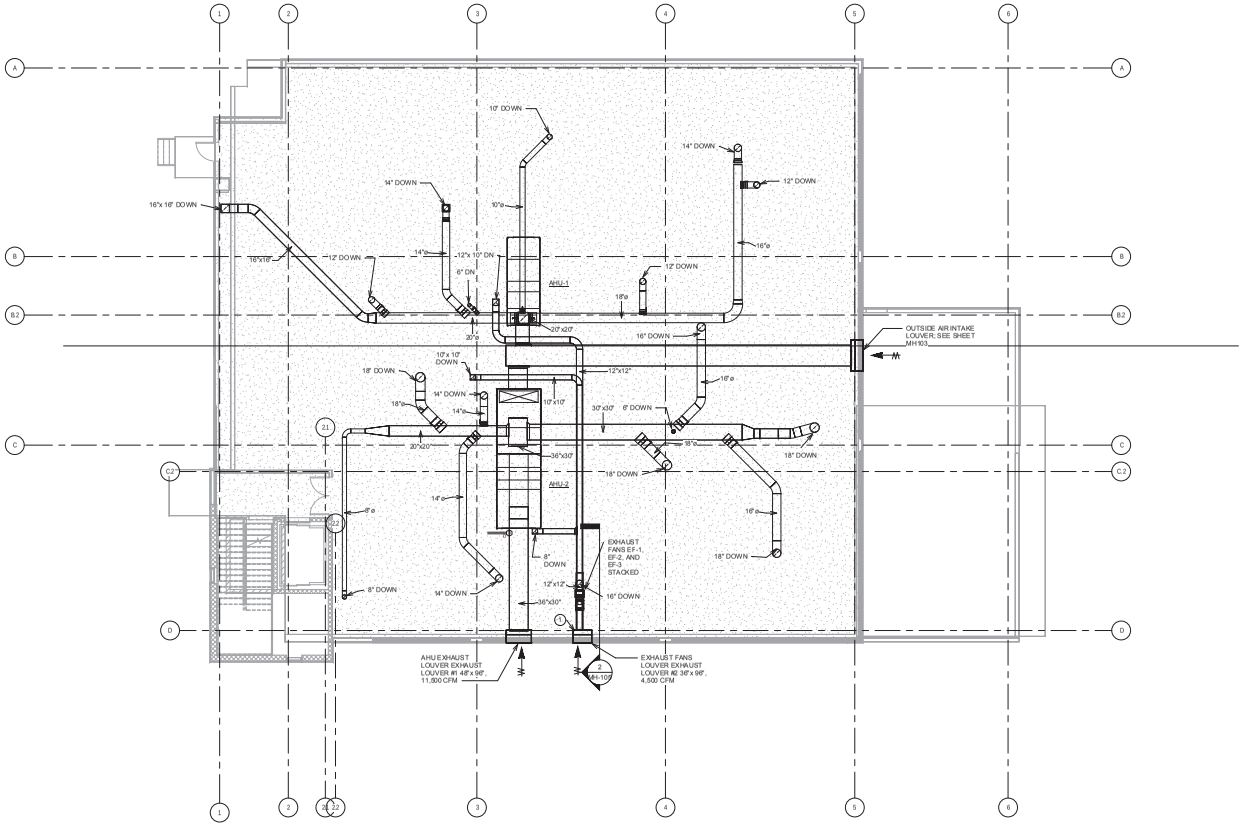
Office of Facilities Management
VA | U.S. Department of Veterans Affairs

SF-1 FORM: OB-42231, OCT 1978

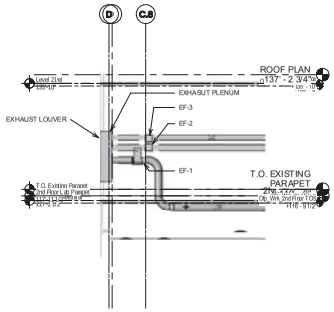
12-20-2017 12:49:37 AM

PLAN NOTES:

1. BACK DRAFT DAMPER LIKE RUSKIN NMS2 AT CONNECTION TO EXHAUST PLENUM.



Second Floor Mezzanine-Mechanical - Return Duct Floor Plan
1/8" = 1'-0"



SECOND FLOOR EXHAUST
1/8" = 1'-0"

Bid Document

Revisions:	Date

CONSULTANTS:

Structural	Civil	Industrial Hygenist	Geotechnical
McComas Engineers	Asaturian Eaton & Assoc.	John A Jurgiel & Assoc.	Holcomb Foundation
1717 E 116th Street	1440 Old West Main	123 N. Main Street	393 Wood Road
Carmel, IN 46032	Carbondale, IL 62901	St. Charles, MO 63301	Carbondale, IL 62901
Tel 317.580.0402	Tel 618.529.3414	Tel 636.757.3060	Tel 618.529.5262
317.582.0766	618.529.3423	636.757.3064	618.457.8991
Fax	Fax	Fax	Fax

062-040474
REGISTERED PROFESSIONAL ENGINEER

ARCHITECT/ENGINEERS:

DAE DESIGN ENGINEERING, INC.
220 N College Ave
Indianapolis, IN 46202
Tel 317.464.9090
317.464.9393
Fax

FoxArchitects
1 Memorial Dr. STE 1800
Saint Louis, MO 63102
Tel 314.621.4343
314.621.0261
Fax

Drawing Title: Second Floor Mechanical - Return & Exhaust Duct Floor Plan

Approved: Associate Director | Approved: Chief Engineer
Approved: Chief of Staff | Approved: Safety Officer
Approved: Infection Control | Approved: Chief, Police & Security

Project Title: Expand & Upgrade Building 42 for Laboratory

Location: Marion, IL

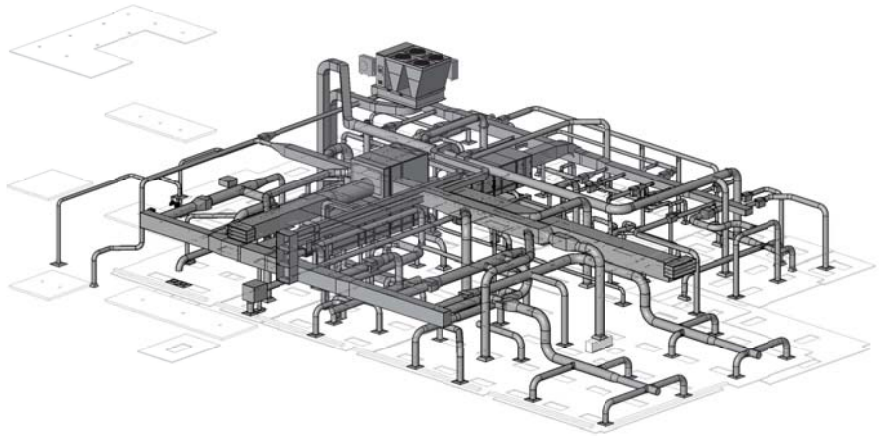
Date: 12-20-15 | Checked: DH | Drawn: BZ

Project Number: 657-502
Building Number: 42-Addition
Drawing Number: MH-105

Office of Facilities Management
VA | U.S. Department of Veterans Affairs

SF-1 FORM OB-4231, OCT 1978

12-21-2015 12:44:37 AM



Mechanical - HVAC Duct ISOMETRIC

Bid Document

Revisions:	Date

CONSULTANTS:

Structural
McComas Engineers
1717 E 116th Street
Carmel, IN 46032
Tel 317.580.0402
317.582.0766
Fax

Civil
Asaturian Eaton & Assoc.
1440 Old West Main
Carbondale, IL 62901
Tel 618.529.3414
618.529.3423
Fax

Industrial Hygenist
John A Jurgiel & Assoc.
123 N. Main Street
St. Charles, MO 63301
Tel 636.757.3060
636.757.3064
Fax

Geotechnical
Holcomb Foundation
393 Wood Road
Carbondale, IL 62901
Tel 618.529.5262
618.457.8991
Fax

062-040274
REGISTERED
PROFESSIONAL
ENGINEER

ARCHITECT/ENGINEERS:

DAE
220 N College Ave
Indianapolis, IN 46202
Tel 317.464.9090
317.464.9393
Fax

FoxArchitects
1 Memorial Dr. STE 1800
Saint Louis, MO 63102
Tel 314.621.4343
314.621.0261
Fax

Drawing Title
HVAC ISOMETRC

Approved: Associate Director | Approved: Chief Engineer
Approved: Chief of Staff | Approved: Safety Officer
Approved: Infection Control | Approved: Chief, Police & Security

Project Title
Expand & Upgrade
Building 42 for Laboratory

Location Marion, IL

Date 12-20-17 | Checked DH | Drawn BZ

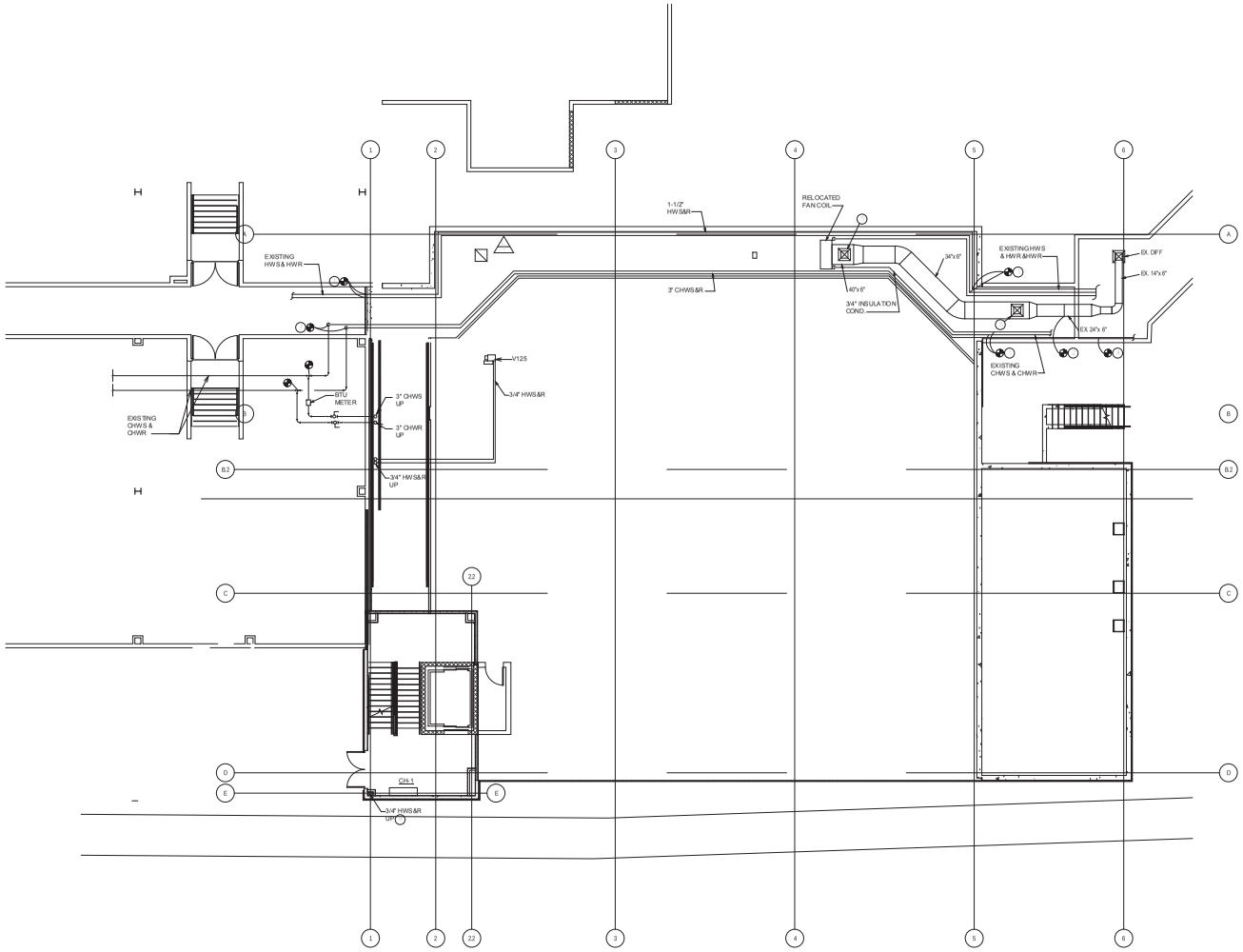
Project Number 657-502
Building Number 42-Addition
Drawing Number MH-106

Office of
Facilities
Management

VA | U.S. Department of Veterans Affairs

SF-1 FORM 08-4231, OCT 1978

12-21-2017 12:39:38 AM



Lower Level - Mechanical - HVAC Piping Floor Plan
1/8" = 1'-0"

GENERAL NOTES:

1. PIPE ALL VAV BOXES WITH 2-WAY CONTROL VALVES

PLAN NOTES:

1. REMOVE TEMPORARY PIPING. RECONNECT TO EXISTING PIPING AS REQUIRED. PATCH ALL HOLES IN WALLS CREATED BY TEMPORARY PIPING. TYPICAL
2. CONNECT NEW DUCTWORK TO EXISTING
3. RECONNECT FAN COIL TO 3/4"HWS&R AND 1" CHWS&CHWR AND 3/4" CONDENSATE DRAIN
4. CONNECT NEW 3/4" CONDENSATE DRAIN TO EXISTING
5. RELOCATED DIFFUSER.
6. PIPING UP TO CH-1

Bid Document

Revisions:	Date

CONSULTANTS:

Structural	Civil	Industrial Hygenist	Geotechnical
McComas Engineers	Asaturian Eaton & Assoc.	John A Jurgiel & Assoc.	Holcomb Foundation
1717 E 116th Street	1440 Old West Main	123 N. Main Street	393 Wood Road
Carmel, IN 46032	Carbondale, IL 62901	St. Charles, MO 63301	Carbondale, IL 62901
Tel 317.580.0402	Tel 618.529.3414	Tel 636.757.3060	Tel 618.529.5262
317.582.0766	618.529.3423	636.757.3064	618.457.8991
Fax	Fax	Fax	Fax

062-044274
REGISTERED PROFESSIONAL ENGINEER

ARCHITECT/ENGINEERS:

DAE
220 N College Ave
Indianapolis, IN 46202
Tel 317.464.9090
317.464.9393
Fax

FoxArchitects
1 Memorial Dr. STE 1800
Saint Louis, MO 63102
Tel 314.621.4343
314.621.0261
Fax

Drawing Title: LOWER LEVEL - HVAC PIPING

Approved: Associate Director | Approved: Chief Engineer
Approved: Chief of Staff | Approved: Safety Officer
Approved: Infection Control | Approved: Chief, Police & Security

Project Title: Expand & Upgrade Building 42 for Laboratory

Location: Marion, IL

Date: 12-20-17 | Checked: DH | Drawn: BZ

Project Number: 657-502
Building Number: 42-Addition
Drawing Number: MP-101

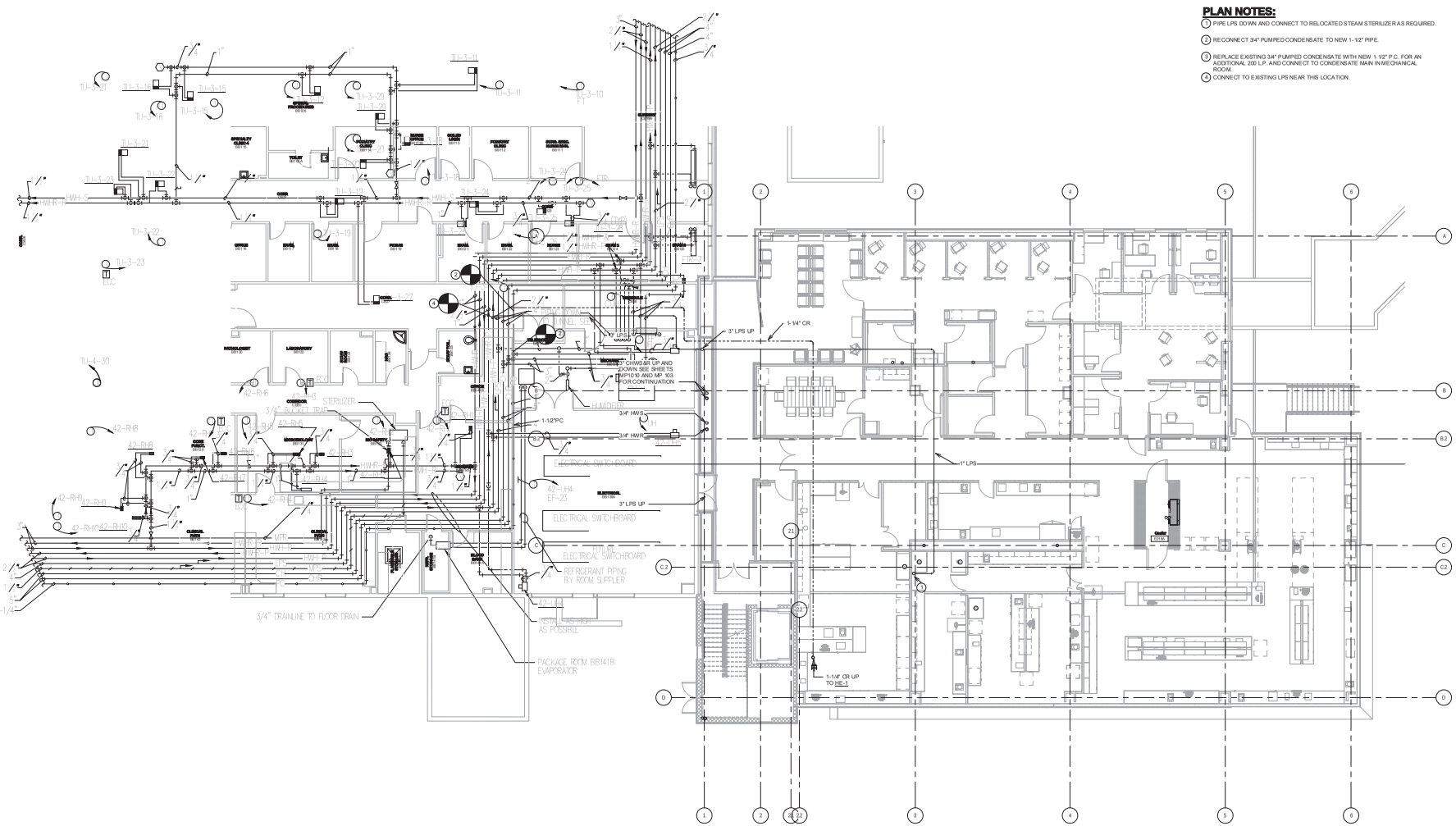
Office of Facilities Management
VA | U.S. Department of Veterans Affairs

VA FORM 08-6231, OCT 1978

12-21-2017 12:46:28 AM

PLAN NOTES:

1. PIPE LPS DOWN AND CONNECT TO RELOCATED STEAM STERILIZER AS REQUIRED.
2. RECONNECT 3/4" PUMPED CONDENSATE TO NEW 1-1/2" PIPE.
3. REPLACE EXISTING 3/4" PUMPED CONDENSATE WITH NEW 1-1/2" P.C. FOR AN ADDITIONAL 200 L.P. AND CONNECT TO CONDENSATE MAIN IN MECHANICAL ROOM.
4. CONNECT TO EXISTING LPS NEAR THIS LOCATION.



First Floor -Mechanical - HVAC Piping Floor Plan
1/8" = 1'-0"

Bid Document

Revisions:	Date

CONSULTANTS:

Structural	Civil	Industrial Hygenist	Geotechnical
McComas Engineers	Asaturian Eaton & Assoc.	John A Jurgiel & Assoc.	Holcomb Foundation
1717 E 116th Street	1440 Old West Main	123 N. Main Street	393 Wood Road
Carmel, IN 46032	Carbondale, IL 62901	St. Charles, MO 63301	Carbondale, IL 62901
Tel 317.580.0402	Tel 618.529.3414	Tel 636.757.3060	Tel 618.529.5262
317.582.0766	618.529.3423	636.757.3064	618.457.8991
Fax	Fax	Fax	Fax

STATE OF ILLINOIS 062-040474 REGISTERED PROFESSIONAL ENGINEER

ARCHITECT/ENGINEERS:

DAE DESIGN-ARCHITECT ENGINEER, P.C.
220 N College Ave
Indianapolis, IN 46202
Tel 317.464.9090
317.464.9393
Fax

FoxArchitects
1 Memorial Dr. STE 1800
Saint Louis, MO 63102
Tel 314.621.4343
314.621.0261
Fax

Drawing Title: FIRST FLOOR - HVAC PIPING

Approved: Associate Director | Approved: Chief Engineer
Approved: Chief of Staff | Approved: Safety Officer
Approved: Infection Control | Approved: Chief, Police & Security

Project Title: Expand & Upgrade Building 42 for Laboratory

Location: Marion, IL

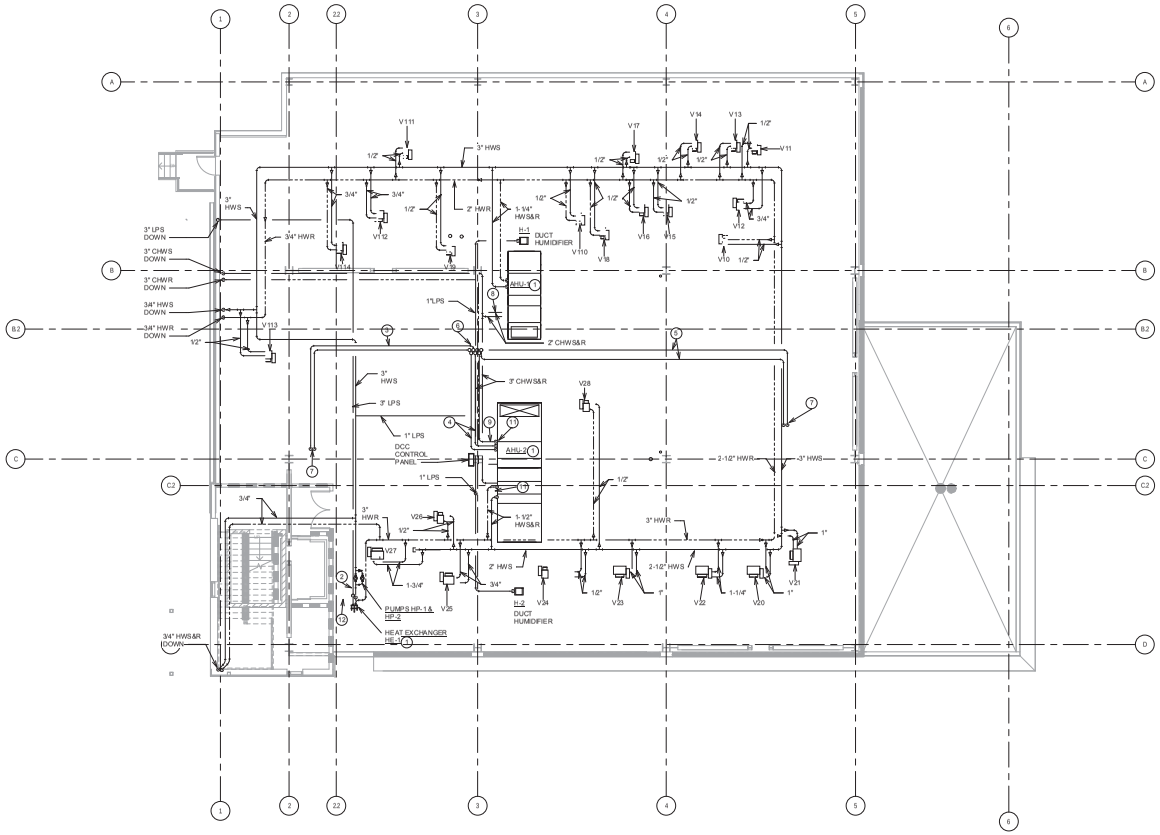
Date: 12-20-17 | Checked: DH | Drawn: BZ

Project Number: 657-502
Building Number: 42-Addition
Drawing Number: MP-102

Office of Facilities Management
VA | U.S. Department of Veterans Affairs

SF-1 FORM 08-4231, OCT 1978

12-21-2017 12:47:00 AM



Second Floor Mezzanine-Mechanical - HVAC Piping Floor Plan
1/8" = 1'-0"

GENERAL NOTES:

1. PIPE ALL VAV BOXES WITH 2-WAY CONTROL VALVES

PLAN NOTES:

1. MOUNT UNIT ON A 4" CONCRETE HOUSE KEEPING PAD, 6"
2. STEAM CONTROL VALVES / SEE DETAILS D/MQ005, F/MQ006, G/MQ006.
3. REFRIGERANT PIPE TO AC-1 IN I.T. ROOM
4. REFRIGERANT PIPE TO DC COIL IN AHU-2
5. REFRIGERANT PIPE TO EVAPORATOR FAN IN REFRIGERATOR
6. UP TO DX EQUIPMENT ON ROOF. SEE SHEET MP201 FOR CONTINUATION
7. SEE SHEET MH401 FOR CONTINUATION
8. WFMP-1 WATER FLOW DEVICE
9. WFMP-2 WATER FLOW DEVICE
10. PRV-1 AND SV-1. SEE DETAIL.
11. PIPE WITH 2-WAY CONTROL VALVES.
12. CONDENSATE PUMP; SEE DETAIL J/MQ006. 1-1/4" COND. RETURN DOWN.

Bid Document

Revisions:	Date

CONSULTANTS:

Structural	Civil	Industrial Hygenist	Geotechnical
McComas Engineers	Asaturian Eaton & Assoc.	John A Jurgiel & Assoc.	Holcomb Foundation
1717 E 116th Street	1440 Old West Main	123 N. Main Street	393 Wood Road
Carmel, IN 46032	Carbondale, IL 62901	St. Charles, MO 63301	Carbondale, IL 62901
Tel 317.580.0402	Tel 618.529.3414	Tel 636.757.3060	Tel 618.529.5262
317.582.0766	618.529.3423	636.757.3064	618.457.8991
Fax	Fax	Fax	Fax

ARCHITECT/ENGINEERS:

DAE
220 N College Ave
Indianapolis, IN 46202
Tel 317.464.9090
317.464.9393
Fax

FoxArchitects
1 Memorial Dr. STE 1800
Saint Louis, MO 63102
Tel 314.621.4343
314.621.0261
Fax

Drawing Title: SECOND FLOOR MEZZAINNE -HVAC PIPING

Approved: Associate Director | Approved: Chief Engineer
Approved: Chief of Staff | Approved: Safety Officer
Approved: Infection Control | Approved: Chief, Police & Security

Project Title: Expand & Upgrade Building 42 for Laboratory

Location: Marion, IL

Date: 12-20-17 | Checked: DH | Drawn: BZ

Project Number: 657-502
Building Number: 42-Addition
Drawing Number: MP-103

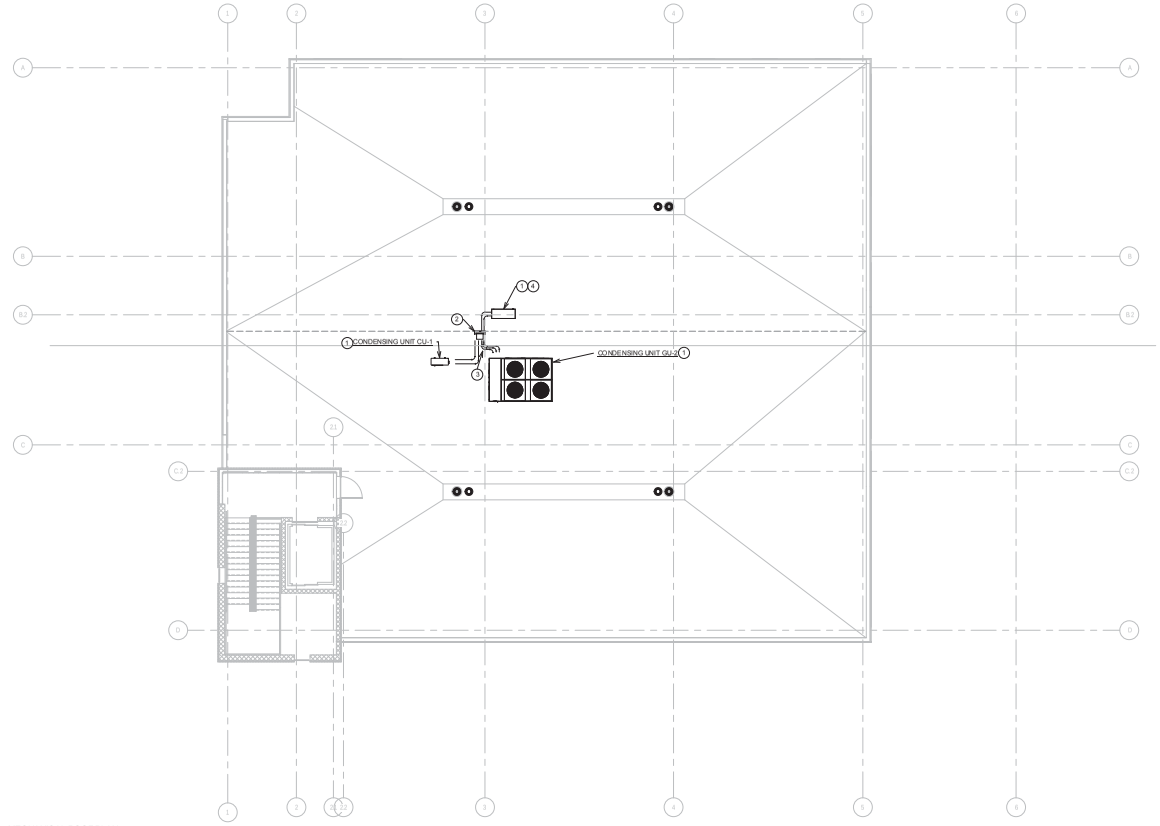
Office of Facilities Management
VA | U.S. Department of Veterans Affairs

VA FORM 08-4231, OCT 1978

12-20-17 12:48:00 AM

PLAN NOTES:

1. MOUNT UNIT ON FULL PERIMETER ROOF CURB
2. PRE-MANUFACTURE PIPE VAULT LIKE RPH VAULT AW 120/14.12, INSULATED CURB AND BOX WITH EXIT SEALS FOR CORRECT PIPING SIZES. SEE DETAIL
3. REFRIGERANT PIPING; SUPPORT WITH PRE-MANUFACTURED SUPPORT RAILS; TYPICAL
4. REFRIGERATOR COOLER CONDENSING UNIT. 1HP, 208V/3PH.



MECHANICAL ROOF PLAN
1/8" = 1'-0"

Bid Document

Revisions:	Date

CONSULTANTS:

Structural	Civil	Industrial Hygenist	Geotechnical
McComas Engineers	Asaturian Eaton & Assoc.	John A Jurgiel & Assoc.	Holcomb Foundation
1717 E 116th Street	1440 Old West Main	123 N. Main Street	393 Wood Road
Carmel, IN 46032	Carbondale, IL 62901	St. Charles, MO 63301	Carbondale, IL 62901
Tel 317.580.0402	Tel 618.529.3414	Tel 636.757.3060	Tel 618.529.5262
317.582.0766	618.529.3423	636.757.3064	618.457.8991
Fax	Fax	Fax	Fax

062-046274
REGISTERED PROFESSIONAL ENGINEER

ARCHITECT/ENGINEERS:

DAE
220 N College Ave
Indianapolis, IN 46202
Tel 317.464.9090
317.464.9393
Fax

FoxArchitects
1 Memorial Dr. STE 1800
Saint Louis, MO 63102
Tel 314.621.4343
314.621.0261
Fax

Drawing Title: MECHANICAL ROOF PLAN

Approved: Associate Director | Approved: Chief Engineer
Approved: Chief of Staff | Approved: Safety Officer
Approved: Infection Control | Approved: Chief, Police & Security

Project Title: Expand & Upgrade Building 42 for Laboratory

Location: Marion, IL

Date	Checked	Drawn
12-20-17	DH	BZ

Project Number: 657-502
Building Number: 42-Addition
Drawing Number: MP-201

Office of Facilities Management
VA | U.S. Department of Veterans Affairs

VA FORM 08-4231, OCT 1978

12/21/2017 12:46:46 AM