Drawing: H:\PROJ2015\20150017\DRAWINGS\XREF\MAS-BORD.DWG
March 27, 2015 10:50:40 a.m.
Xrefs: No Xrefs found

THE USE OF THESE PLANS AND SPECIFICATIONS SHALL BE RESTRICTED TO THE ORIGINAL SITE FOR WHICH THEY WERE PREPARED AND PUBLICATION THEREOF IS EXPRESSLY LIMITED TO SUCH USE. RE-USE, REPRODUCTION, OR PUBLICATION BY ANY METHOD, IN WHOLE OR IN PART, IS PROHIBITED. TITLE TO THE PLANS AND SPECIFICATIONS REMAINS WITH THE ENGINEER WITHOUT PREJUDICE. VISUAL CONTACT WITH THESE PLANS AND SPECIFICATIONS SHALL CONSTITUTE PRIMA FACIE EVIDENCE OF THE ACCEPTANCE OF THESE RESTRICTIONS. AXIOM ENGINEERS INC.– LEE & ASSOCIATES CONSULTING ENGINEERS

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

SPLIT SYSTEM AIR CONDITIONERS

MARK	COOL MBH		HEAT MBH		CFM	ESP	KW	V/PH	UNIT MCA	WT LBS	EER/COP	LINE SIZE		MAKE & MODEL	REMARKS
	TC	SC	TH	SH								GAS	LIQ		
(E) AC-1	15	11	17	–	350	–	–	208/1	0.35	44	11.6/3.4	1/2	1/4	MITSUBISHI PLFY-P15NCMU-E	(1)
(E) AC-2	15	11	17	–	350	–	–	208/1	0.35	44	11.6/3.4	1/2	1/4	MITSUBISHI PLFY-P15NCMU-E	(1)
(E) AC-3	15	11	17	–	350	–	–	208/1	0.35	44	11.6/3.4	1/2	1/4	MITSUBISHI PLFY-P15NCMU-E	(1)
(E) AC-4	15	11	17	–	350	–	–	208/1	0.35	44	11.6/3.4	1/2	1/4	MITSUBISHI PLFY-P15NCMU-E	(1)

(1) INTEGRAL TO UNIT

VAV CONTROL BOXES

MARK	CFM		DIAM	PD @ MAX CFM	WATER TEMP	HOT WATER COIL				MAKE & MODEL	REMARKS
	MIN	MAX				MBH	PD	GPM	RUNOUT		
(E) VAV 5.5	870	870	9"	–	180 °F	14	–	0.75	14 IN	TITUS ESV 3000 (SERVES C156)	(1) (2) (3)
(E) VAV 5.17	740	740	9"	–	180 °F	14	–	0.75	12 IN	TITUS ESV 3000 (SERVES C158)	(1) (2) (3)

(1) (E) VAV BOX TO REMAIN
(2) BALANCE VAV BOX TO NEW AIRFLOWS
(3) BOXES ARE SET TO CONTSTANT VOLUME

AIR DISTRIBUTION

MARK	TYPE	MAKE & MODEL	REMARKS
CD-1	CEILING DIFFUSER	TITUS PAS	(1) (3)
CD-2	CEILING DIFFUSER	TITUS PAS	(2) (3)
EG-1	EXHAUST GRILLE	TITUS PAR	(1) (3)
EG-2	EXHAUST GRILLE	TITUS PAR	(2) (3)

(1) WITH BORDER FOR HARD CEILING
(2) WITH BORDER FOR T-BAR CEILING
(3) WITH OBD

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. DIFFUSER, REGISTER AND GRILLE SIZES SHOWN ON FLOOR PLANS ARE NECK SIZES.
6. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATIONS OF CEILING DIFFUSERS, REGISTERS, AND GRILLES.
7. SEISMIC PROVISIONS REQUIRED – SEE SPECS
   ALL PRESSURES LISTED ARE GAGE PRESSURE UNLESS OTHERWISE NOTED
8. ALL OPENINGS IN PROTECTIVE BARRIERS (SHIELDING) SHALL BE BACKED WITH LEAD OR FITTED WITH RADIATION BAFFLES. SEE ARCHITECT'S DRAWING FOR LOCATION.

ABBREVIATIONS

A/E ARCHITECT / ENGINEER
AAHX 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
ARI 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 BASE BOARD 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
CD-2 CONSTRUCTION DOCUMENTS (SUBMISSION2)
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
CO CLEAN OUT
CO2 CARBON DIOXODE
COP COEFFICIENT OF PERFORMANCE
CP CONDENSATE PUMP
CR CEILING REGISTER
CS CONDENSATE STORAGE TANK
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
DIW DEIONIZED WATER
DP DEW POINT TEMPERATURE
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
ECU EVAPORATIVE CONDENSER UNIT
EER ENERGY EFFICIENCY RATIO
EF EXHAUST FAN
EG EXHAUST GRILLE
EGS EMERGENCY GAS SHUTOFF
EGT ENTERING GLYCOL TEMPERATURE
EH EXHAUST HOOD
EJ EXPANSION JOINT
ENT ENTERING
ER EXHAUST REGISTER
ERC ELECTRIC REHEAT COIL
ESP EXTERNAL STATIC PRESSURE
ET EXPANSION TANK
EUH ELECTRIC UNIT HEATER
EWC EVAPORATIVE WATER COOLER
EWT ENTERING WATER TEMPERATURE
EX. EXISTING
F FAHRENHEIT
F&T FLOAT AND THERMOSTATIC
F/SDPR 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/FEEDWATER 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
FSTAT FREEZESTAT

FT FEET
FT-LB FOOT-POUND
FTR FIN TUBE RADIATION
FV FACE VELOCITY

GA GAUGE
GAL GALLONS
GFCI GOVERNMENT FURNISHED CONTRACTOR INSTALLED
GFF GOVERNMENT FURNISHED (FUTURE CONTRACTOR INSTALLED)
GH GRAVITY HOOD
GPD GALLONS PER DAY
GPH GALLONS PER HOUR
GPM GALLONS PER MINUTE
GPR GAS PRESSURE REGULATOR
GS GALVANIZED STEEL

H HUMIDIFER
H&CW HOT & COLD WATER
HB HOSE BIBB
HC HEATING COIL
HD HEAD
HD HOOD
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
HSTAT 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
HX HEAT EXCHANGER
HZ HERTZ

I/O INPUT /OUTPUT
IAQ INDOOR AIR QUALITY
ID INSIDE DIAMETER
IN INCHES
IN WC INCH WATER COLUMN
IN WG INCH WATER GAUGE
kW KILOWATI
kWh KILOWATI HOUR
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
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
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
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
OBD OPPOSED BLADE DAMPER
OFM OIL FLOWMETER
OR OPERATING ROOM
P PUMP
PC PUMPED CONDENSATE
PCF POUNDS PER CUBIC FOOT (FEET)
PD PRESSURE DROP
PF PRE-FILTER
PG PRESSURE GAGE
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
RAT RETURN AIR TEMPERATURE
RCCH REMOTE CONDENSER CHILLER
RCU RECIPROCATING CHILLER UNIT
RD REFRIGERANT DISCHARGE
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
SCFM STANDARD CUBIC FEET PER MINUTE
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
SI SQUARE INCHES
SP STATIC PRESSURE
SP GR SPECIFIC GRAVITY
SPD SUPPLY PROCESS AND DISTRIBUTION
SPS STATIC PRESSURE SENSOR
SQ FT SQUARE FOOT (FEET)
SR SUPPLY AIR REGISTER
SS STAINLESS STEEL
T & PCV TEMPERATURE AND PRESSURE CONTROL VALVE
TAB TESTING, ADJUSTING, BALANCE
TD TEMPERATURE DIFFERENCE
TDH TOTAL DYNAMIC HEAD
TG TRANSFER GRILLE
TP TRAP
TR TOP REGISTER
TSP TOTAL STATIC PRESSURE
TSTAT THERMOSTAT
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
VSD VARIABLE SPEED DRIVE
W WATTS
Wb WET-BULB (TEMPERATURE)
WCCH WATER COOLED CHILLER
WCCU WATER COOLED CONDENSING UNIT
WCHP WATER COOLED HEAT PUMPS
WCPU WATER COOLED PACKAGED UNIT
WF WATER FILTER
WFM WATER FLOWMETER
WG WATER GAGE

PIPING SYMBOLS

HPS HIGH PRESSURE STEAM (60 PSIG AND ABOVE)
HPR HIGH PRESSURE STEAM CONDENSATE RETURN
LPS LOW PRESSURE STEAM (15 PSIG AND BELOW)
LPR LOW PRESSURE STEAM CONDENSATE RETURN
RL REFRIGERANT LIQUID
RS REFRIGERANT SUCTION
RHG REFRIGERANT HOT GAS
CWS CONDENSER WATER SUPPLY (FROM TOWER)
CWR 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
CF CHEMICAL FEED
CW COLD WATER (CITY WATER)
SW SOFTENED WATER

VALVE SYMBOLS

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

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
T THERMOMETER
P PRESSURE GAGE
TEST PLUG (PRESSURE/TEMPERATURE)
AV AUTOMATIC AIR VENT
MV MANUAL AIR VENT
QUICK-COUPLE HOSE CONNECTOR
PIPE DEMOLITION

100% CONSTRUCTION DOCUMENTS

Revisions: | Date

CONSULTANTS:

vc. (831) 649-8000
fx. (831) 649-8038
email: mail@axiomengineers.com
AXIOM ENGINEERS[SM]
LEE & ASSOCIATES
CONSULTING ENGINEERS
AE Project # : 20150017
22 Lower Ragsdale Dr., Suite A
Monterey, California 93940-5788

REGISTERED PROFESSIONAL ENGINEER
WILLIAM M. ESTES
No. M24908
EXP. SEPT 30, 2015
MECHANICAL
STATE OF CALIFORNIA

ARCHITECT/ENGINEERS:
HFP JOB #01-13
hfp architects
209 w. alamar ave
santa barbara, ca 93105
805·969·6887 fax: 805·969·6888

Drawing Title	LEGEND, SCHEDULES AND NOTES - MECHANICAL
Approved: Project Director	
Project Title	CT SCANNER PREP VA NORTHERN CALIFORNIA HEALTHCARE SYSTEM
Location	MARTINEZ, CA
Date	06/26/2015
Checked	WME
Drawn	CADD
Project Number	612-14-037
Building Number	19
Drawing Number	M0.1
Dwg.	19 of 44

Office of Construction and Facilities Management
Department of Veterans Affairs

VA FORM 08-6231