





**MECHANICAL ABBREVIATIONS**

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

**HVAC GENERAL NOTES**

- ALL PIPING AND DUCTS IN FINISHED ROOMS OR SPACES SHALL BE CONCEALED IN A FURRED CHASE OR ABOVE THE HARD SUSPENDED CEILING.
- THE FIRST FIGURE OF DUCT SIZE INDICATES DIMENSION OF FACE SHOWN OR INDICATED. DUCT SIZES ARE NET INSIDE DIMENSIONS.
- ACCESS PANELS IN HARD SUSPENDED CEILINGS ARE REQUIRED FOR ALL VALVES, TRAPS, DAMPERS, CLEANOUTS, CONTROLS, ETC. ACCESS PANELS SHALL BE FURNISHED AND INSTALLED UNDER THE ARCHITECTURAL SPECIFICATIONS.
- TOTAL STATIC PRESSURE NOTED IN THE SCHEDULES INCLUDES DUCT SYSTEM, TERMINAL UNITS, FILTERS, COILS, ETC.
- FOR TYPICAL STEAM AND WATER PIPING CONNECTIONS TO EQUIPMENT, SEE EQUIPMENT DETAILS.
- DIFFUSER, REGISTER AND GRILLE SIZES SHOWN ON FLOOR PLANS ARE NECK SIZES.
- WATER PIPE CONNECTIONS TO AIR HEATING AND COOLING COILS SHALL BE MADE TO PROVIDE COUNTER FLOW BETWEEN WATER AND AIR.
- WALL TYPE EXHAUST REGISTERS NOTED AS "BR" ON DRAWINGS ARE TO BE INSTALLED WITH BOTTOM ELEVATION OF REGISTER AT 7' ABOVE FINISHED FLOOR.
- ALL PRESSURES LISTED ARE GAGE PRESSURE UNLESS NOTED OTHERWISE.
- ALL CONTROL SYSTEM EQUIPMENT SHALL BE COMPATIBLE WITH EXISTING BUILDING MANAGEMENT SYSTEM CONTROLS. EXTEND EXISTING CONTROL SYSTEM TO INCLUDE ALL OF THE CONTROLS AND SEQUENCES SHOWN.
- COORDINATE EXISTING FIRE SPRINKLER HEADS AND LIGHTS WITH DIFFUSERS.

**GENERAL NOTES**

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

ADDENDUM #1, NOTE #2 pg. M-101	04/22/2019	<b>CONSULTANTS:</b>	<b>ARCHITECT/ENGINEERS:</b>  750 W HAMPDEN AVE SUITE #300 ENGLEWOOD CO 80110 (720) 550-8307 WWW.VALHALLAENGINEERING.COM	<b>STAMP:</b> 		Drawing Title <b>MECHANICAL ABBREVIATIONS &amp; GENERAL NOTES</b>	Phase <b>100% CONSTRUCTION DOCUMENTS</b>	Project Title <b>UPGRADE NFS HVAC SYSTEM FORT MEADE, SD</b>	Project Number <b>568-18-102</b>
Issued:	Date:					Approved: Project Director		Location VA MEDICAL CENTER - FT. MEADE, SD	Building Number <b>146</b>
								Issue Date <b>4/19/2019</b>	Checked <b>MS</b>
								Drawn <b>MR</b>	Drawing Number <b>M-001</b>



**CONTROLS SYMBOLS**

T	ROOM THERMOSTAT/TRANSMITTER - WALL MOUNT
M	ROOM HUMIDISTAT (MOISTURE)/TRANSMITTER - WALL MOUNT
TT	TEMPERATURE TRANSMITTER
TT	TEMPERATURE TRANSMITTER, AVERAGING ELEMENT
MT	MOISTURE (HUMIDITY) TRANSMITTER
PT	PRESSURE TRANSMITTER
SPS	STATIC PRESSURE SENSOR
FT	FLOW TRANSMITTER
IT	CURRENT TRANSMITTER
CT	CONDUCTIVITY TRANSMITTER
SD	SMOKE DETECTOR
PDT	PRESSURE DIFFERENTIAL TRANSMITTER
PDS	PRESSURE DIFFERENTIAL SWITCH
HS	HAND SWITCH (HAND-OFF-AUTO SWITCH)
ZC	VALVE OR DAMPER POSITION CONTROLLER
KR	LOCAL RECORDING TIME CLOCK (RUNTIME)
TSL	TEMPERATURE SWITCH, LOW (FREEZESTAT)
TSH	TEMPERATURE SWITCH, HIGH (FREEZESTAT)
LC	LEVEL CONTROLLER
LT	LEVEL TRANSMITTER
PSH	PRESSURE SWITCH HIGH
PSL	PRESSURE SWITCH LOW
EPT	ELECTRONIC TO PNEUMATIC TRANSDUCER
AT <sub>CO2</sub>	CARBON DIOXIDE TRANSMITTER
AT <sub>CO</sub>	CARBON MONOXIDE TRANSMITTER
AT <sub>DC</sub>	OCCUPANCY SENSOR
LTCP	LOCAL TEMPERATURE CONTROL PANEL
HVAC	HVAC CONTROL PANEL
VSMC	VARIABLE SPEED MOTOR CONTROLLER
ECC	INTEGRATE CONTROL POINT ON REMOTE GRAPHICS WORKSTATION AT ENERGY CONTROL CENTER
TC	TEMPERATURE CONTROLLER. SEE SEQUENCE OF OPERATION
PC	PRESSURE CONTROLLER. SEE SEQUENCE OF OPERATION
SC	SPEED CONTROLLER. SEE SEQUENCE OF OPERATION
FC	FLOW CONTROLLER. SEE SEQUENCE OF OPERATION
FSH	FLOW SWITCH HIGH
FSL	FLOW SWITCH LOW
KC	TIME CLOCK CONTROLLING EQUIPMENT ON A SCHEDULE
	TEMPERATURE SENSING ELEMENT FOR TRANSMITTING TEMPERATURE TO EMCS (PROVIDE 12 INCHES MINIMUM LENGTH IN DUCT WHEN SPACE PERMITS.)
	SENSOR WITH AVERAGING ELEMENT TO TRANSMIT TEMPERATURE TO EMCS MOTOR STARTER
⊠	ELECTRIC OPERATED CONTROL
M	DAMPER OR VALVE
BAS	BUILDING AUTOMATION SYSTEM

**DUCTWORK SYMBOLS**

UP	DN	SUPPLY DUCT (UP & DOWN)
UP	DN	EXHAUST DUCT (UP & DOWN)
UP	DN	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
		INCLINED RISE, IN DIRECTION OF AIR FLOW
		INCLINED DROP, IN DIRECTION OF AIR FLOW
		LIMIT OF DEMOLITION
		FLEXIBLE CONNECTION, EQUIPMENT, VIBRATION, OR SEISMIC
		VANED ELBOW (PROVIDE ALL SQUARE OR RECTANGULAR ELBOWS WITH VANES EVEN IF SYMBOL IS MISSING)
		VANED ELBOW (SHORT RADIUS)
		STANDARD RADIUS ELBOW (LONG RADIUS)
10x8		NEW DUCT (INSIDE DIMENSIONS: WIDTH x DEPTH)
		EXISTING DUCT TO REMAIN

**TERMINAL UNIT SYMBOLS**

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

**DRAWING SYMBOLS**

2	DETAIL NUMBER
H4	DRAWING NUMBER WHERE DRAWN
A	SECTION LETTER
HT	DRAWING NUMBER WHERE SHOWN
26-SF-3	BUILDING NO. WHERE EQUIPMENT IS LOCATED. EQUIPMENT ABBREVIATION (SUPPLY FAN) SUPPLY FAN NO. 3 IN BUILDING NO. 26 TYPICAL UNIT NO.
26-TU-4	BUILDING NO. WHERE EQUIPMENT IS LOCATED ITEM (TERMINAL UNIT SHOWN) ITEM NUMBER (TERMINAL UNIT NO. 1) SERVED BY AIR HANDLER UNIT NO. 1

**AIR TERMINAL SYMBOLS**

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

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

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

**GENERAL PIPING SYMBOLS**

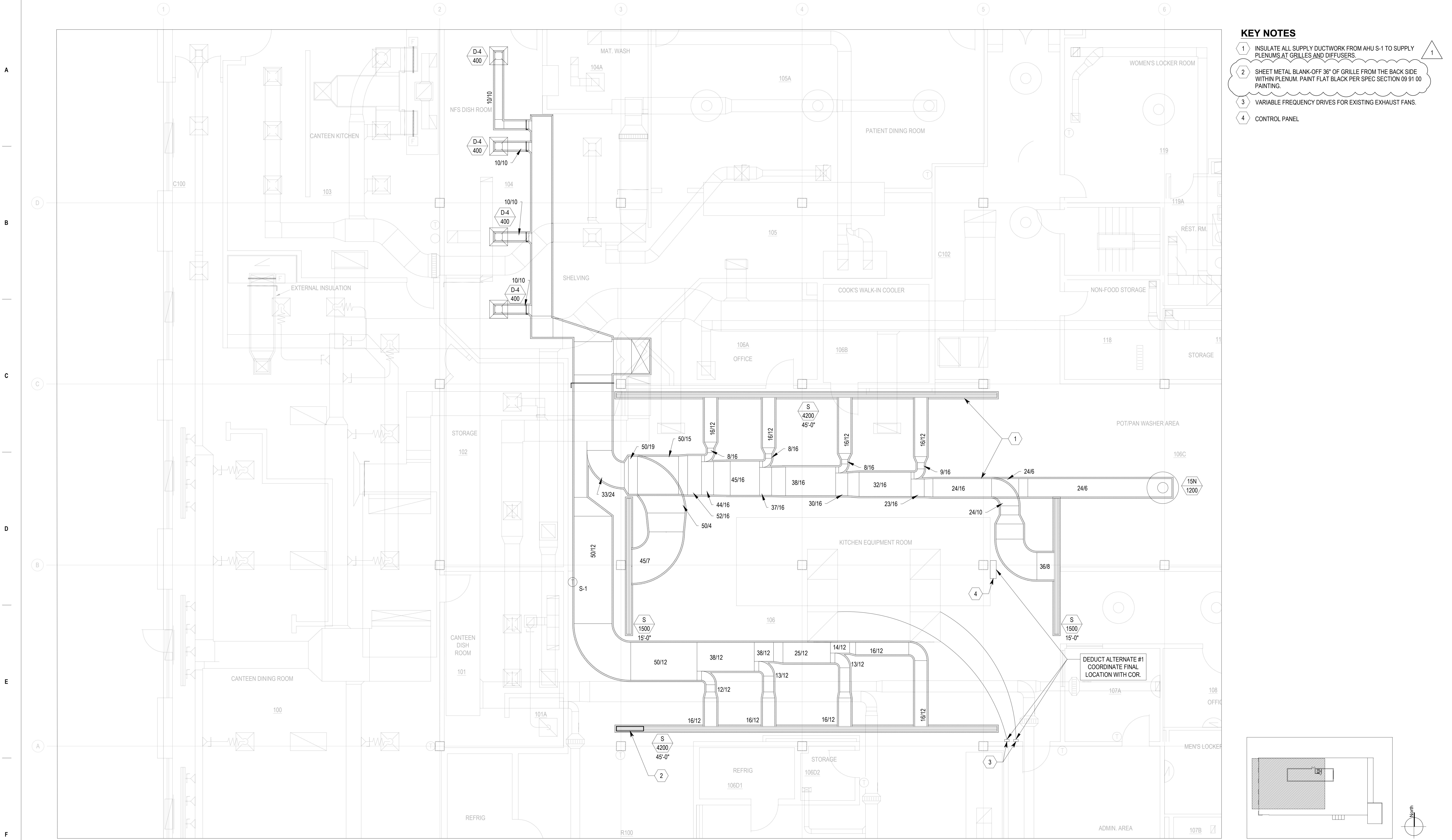
	DIRECTION OF PIPE PITCH (DOWN)
	DIRECTION OF FLOW
	ANCHOR
	REDUCER OR INCREASER
	ECCENTRIC REDUCER
	TOP CONNECTION, 45° OR 90°
	BOTTOM CONNECTION, 45° OR 90°
	SIDE CONNECTION
	CAPPED OUTLET
	RISE OR DROP IN PIPE
	UNION
	PIPE UP
	PIPE DOWN
	INVERTED BUCKET TRAP SET INCLUDING PIPING ACCESSORIES SEE DETAIL
	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)
AV	AUTOMATIC AIR VENT
MV	MANUAL AIR VENT
	QUICK-COUPLE HOSE CONNECTOR
	CONNECT TO EXISTING
	LIMIT OF DEMOLITION
	AIR SEPERATOR

**VALVE SYMBOLS**

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

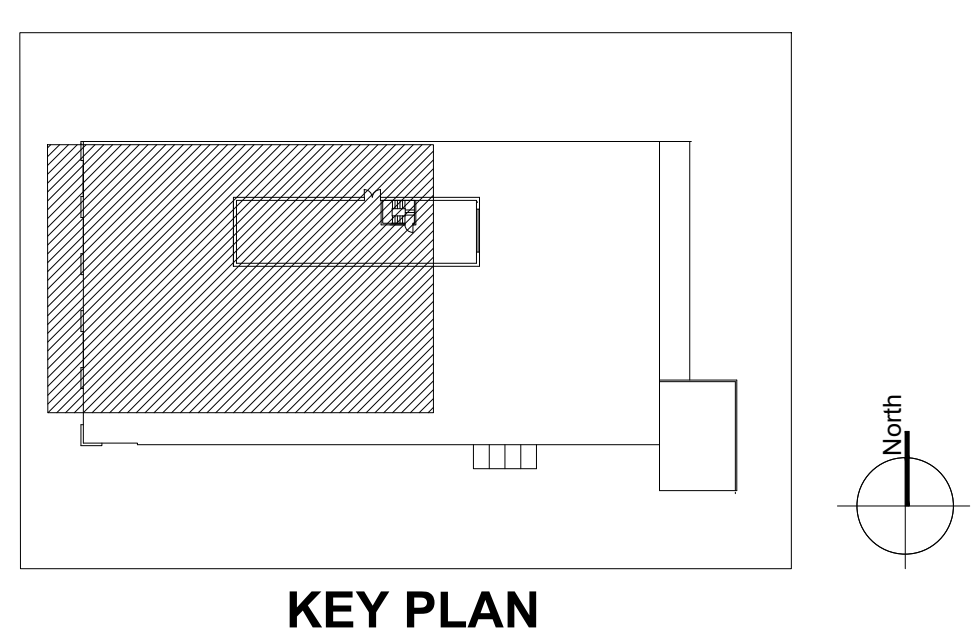
ADDENDUM #1, NOTE #2 pg. M-101	04/22/2019	<b>CONSULTANTS:</b>	<b>ARCHITECT/ENGINEERS:</b> VALHALLA ENGINEERING GROUP, LLC 750 W HAMPDEN AVE SUITE #300 ENGLEWOOD CO 80110 (720) 550-6307 WWW.VALHALLAENGINEERING.COM	<b>STAMP:</b> COLORADO LICENSED PROFESSIONAL ENGINEER VEG 18.15	<b>Drawing Title:</b> MECHANICAL SYMBOLS	<b>Phase:</b> 100% CONSTRUCTION DOCUMENTS	<b>Project Title:</b> UPGRADE NFS HVAC SYSTEM FORT MEADE, SD	<b>Project Number:</b> 568-18-102		
					<b>Approved:</b> Project Director		<b>Location:</b> VA MEDICAL CENTER - FT. MEADE, SD	<b>Building Number:</b> 146		
<b>Issued:</b>	<b>Date:</b>						<b>Issue Date:</b> 4/19/2019	<b>Checked:</b> MS	<b>Drawn:</b> MR	<b>Drawing Number:</b> M-002





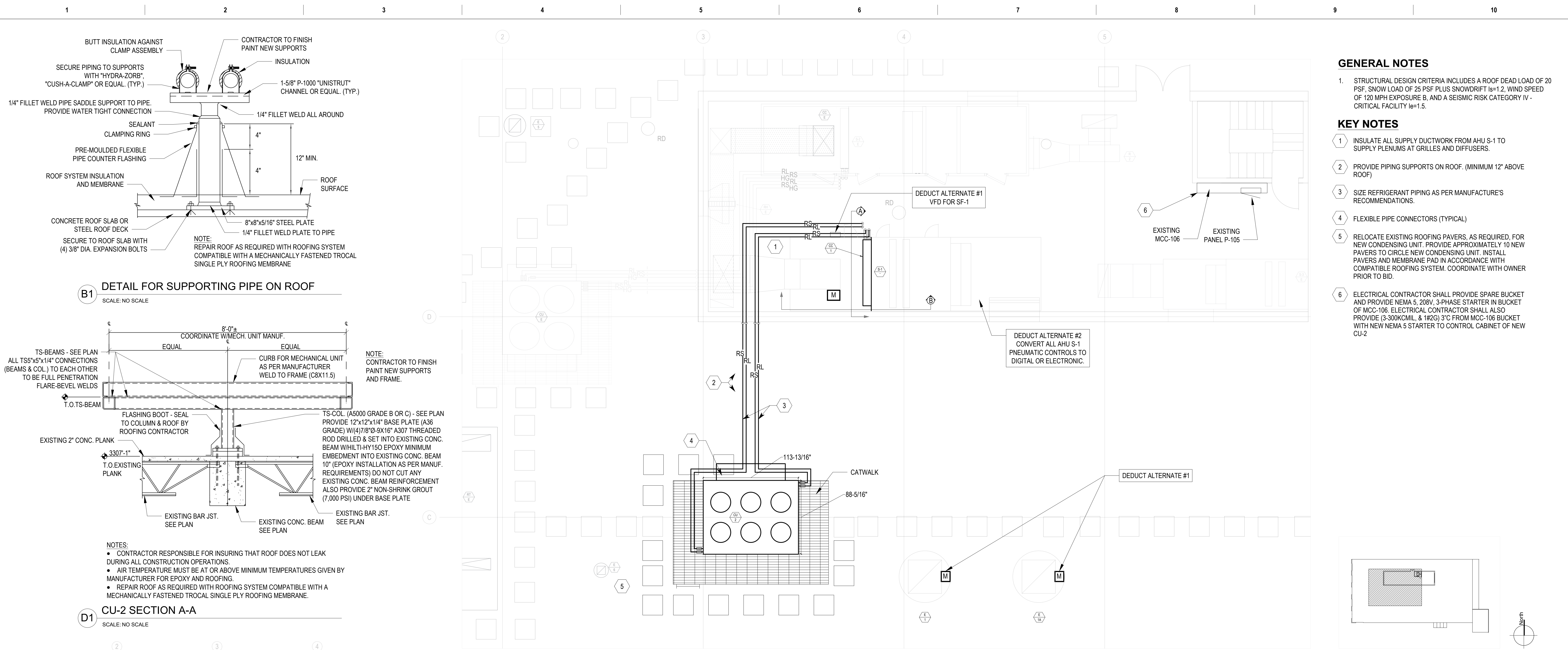
- KEY NOTES**
- 1 INSULATE ALL SUPPLY DUCTWORK FROM AHU S-1 TO SUPPLY PLENUMS AT GRILLES AND DIFFUSERS.
  - 2 SHEET METAL BLANK-OFF 36" OF GRILLE FROM THE BACK SIDE WITHIN PLENUM. PAINT FLAT BLACK PER SPEC SECTION 09 91 00 PAINTING.
  - 3 VARIABLE FREQUENCY DRIVES FOR EXISTING EXHAUST FANS.
  - 4 CONTROL PANEL

**1 S-1 1ST FLOOR PLAN**  
 SCALE: 1/4" = 1'-0"

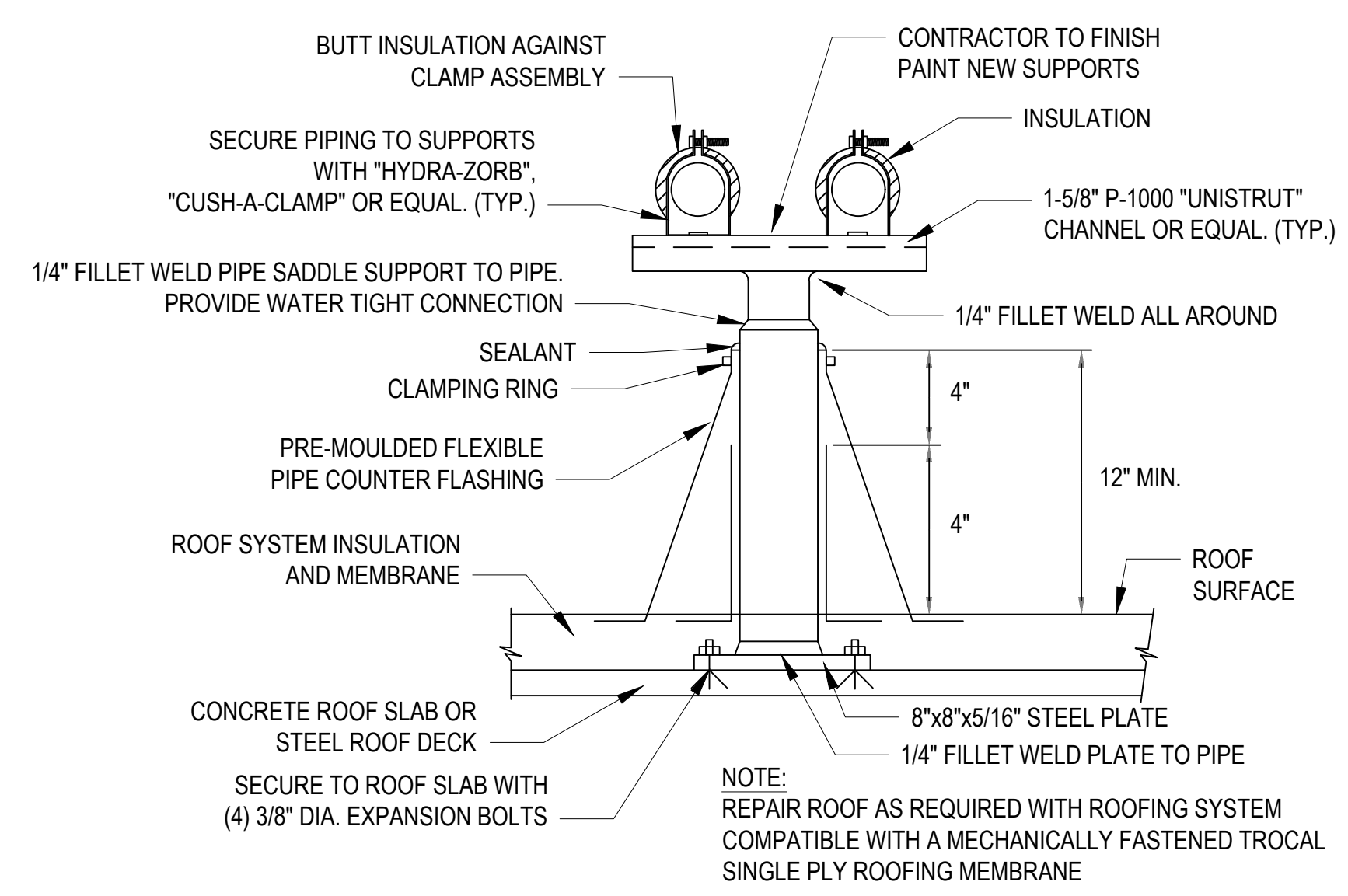


ADDENDUM #1, NOTE #2 pg. M-101 04/22/2019 Issued: _____ Date: _____	<b>CONSULTANTS:</b> _____ _____	<b>ARCHITECT/ENGINEERS:</b>  VALHALLA ENGINEERING GROUP, LLC 750 W HAMPDEN AVE SUITE #300 ENGLEWOOD CO 80110 (720) 550-6307 WWW.VALHALLAENGINEERING.COM	<b>STAMP:</b>  U.S. Department of Veterans Affairs	Drawing Title <b>MECHANICAL 1ST FLOOR PLAN</b>	Phase 100% CONSTRUCTION DOCUMENTS	Project Title UPGRADE NFS HVAC SYSTEM FORT MEADE, SD	Project Number 568-18-102
				Approved: Project Director	Location VA MEDICAL CENTER - FT. MEADE, SD	Issue Date 4/19/2019	Checked MS

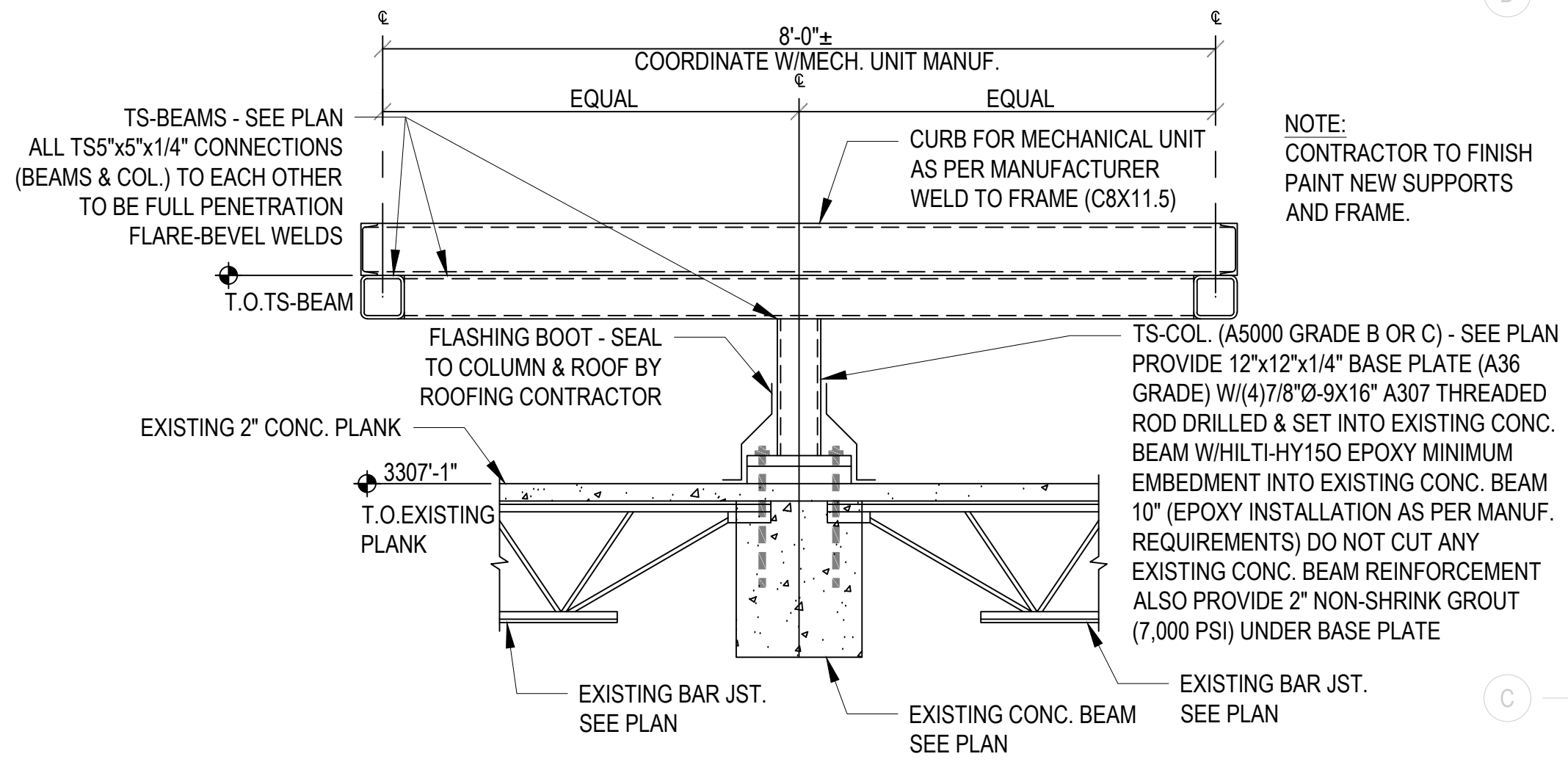




- GENERAL NOTES**
- STRUCTURAL DESIGN CRITERIA INCLUDES A ROOF DEAD LOAD OF 20 PSF, SNOW LOAD OF 25 PSF PLUS SNOWDRIFT  $I_s=1.2$ , WIND SPEED OF 120 MPH EXPOSURE B, AND A SEISMIC RISK CATEGORY IV - CRITICAL FACILITY  $I_e=1.5$ .
- KEY NOTES**
- INSULATE ALL SUPPLY DUCTWORK FROM AHU S-1 TO SUPPLY PLENUMS AT GRILLES AND DIFFUSERS.
  - PROVIDE PIPING SUPPORTS ON ROOF. (MINIMUM 12" ABOVE ROOF)
  - SIZE REFRIGERANT PIPING AS PER MANUFACTURER'S RECOMMENDATIONS.
  - FLEXIBLE PIPE CONNECTORS (TYPICAL)
  - RELOCATE EXISTING ROOFING PAVERS, AS REQUIRED, FOR NEW CONDENSING UNIT. PROVIDE APPROXIMATELY 10 NEW PAVERS TO CIRCLE NEW CONDENSING UNIT. INSTALL PAVERS AND MEMBRANE PAD IN ACCORDANCE WITH COMPATIBLE ROOFING SYSTEM. COORDINATE WITH OWNER PRIOR TO BID.
  - ELECTRICAL CONTRACTOR SHALL PROVIDE SPARE BUCKET AND PROVIDE NEMA 5, 208V, 3-PHASE STARTER IN BUCKET OF MCC-106. ELECTRICAL CONTRACTOR SHALL ALSO PROVIDE (3-300KCMIL & 1#2G) 3" C FROM MCC-106 BUCKET WITH NEW NEMA 5 STARTER TO CONTROL CABINET OF NEW CU-2

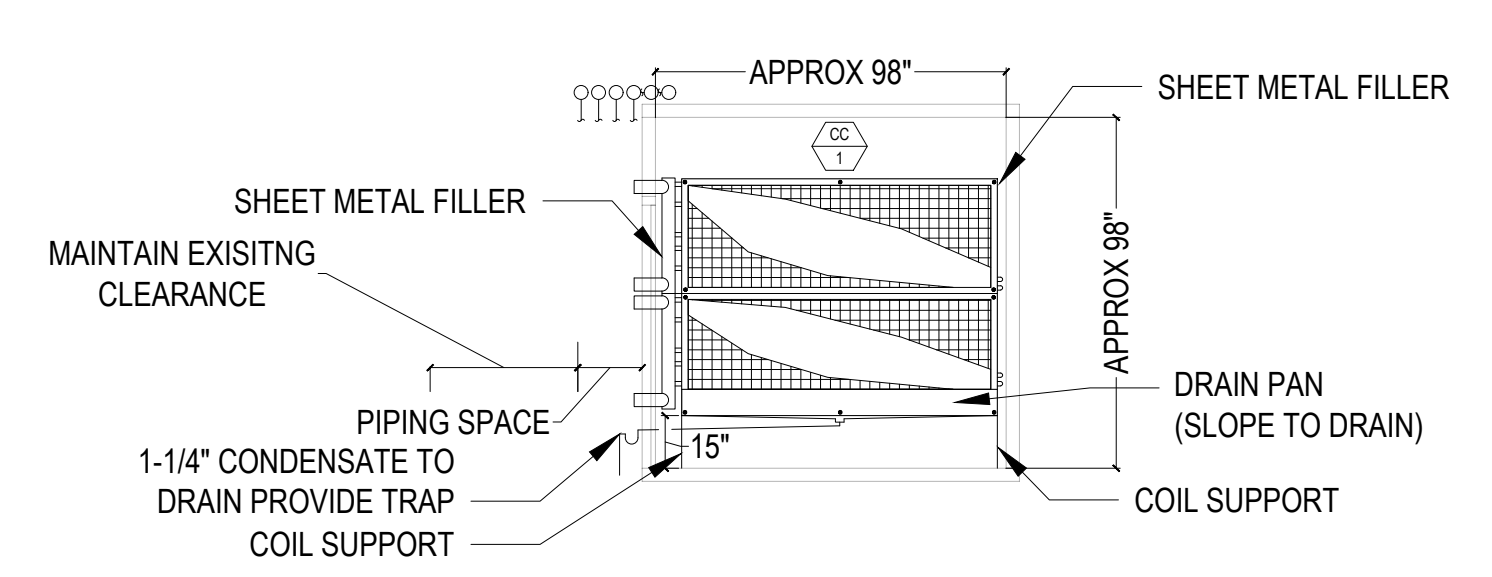


**B1** DETAIL FOR SUPPORTING PIPE ON ROOF  
SCALE: NO SCALE

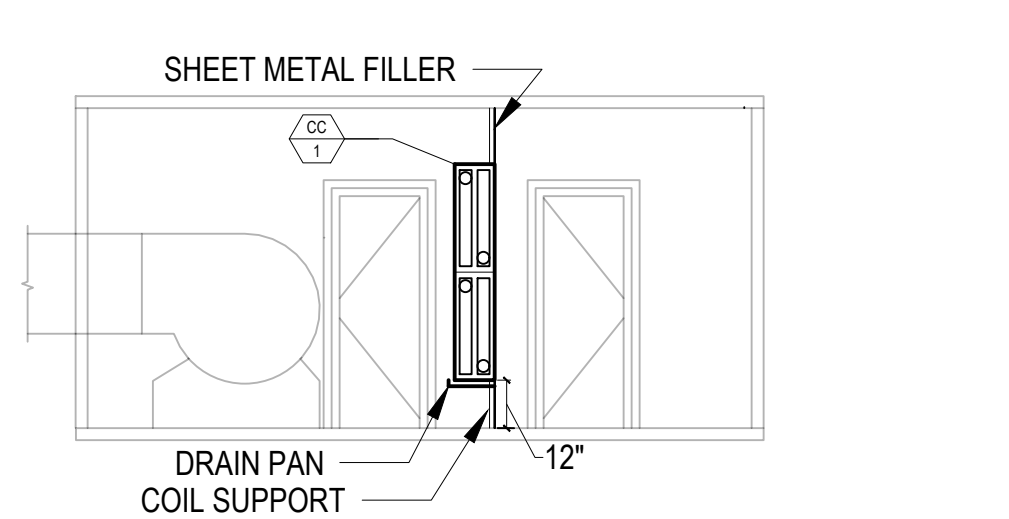


**D1** CU-2 SECTION A-A  
SCALE: NO SCALE

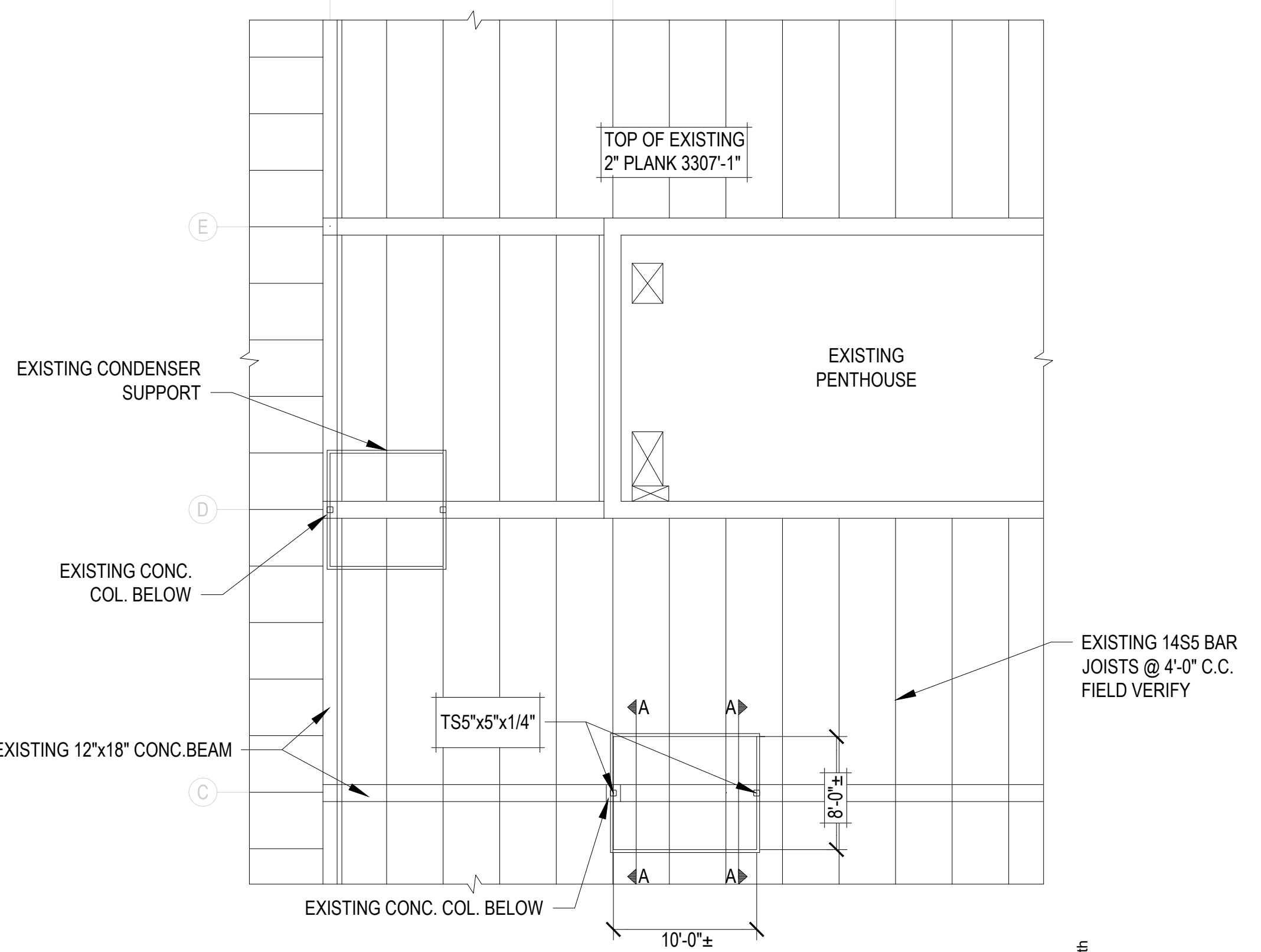
**D5** S-1 ROOF AND PENTHOUSE PLAN  
SCALE: 1/4" = 1'-0"



**E5** S-1 SECTION A  
SCALE: 1/4" = 1'-0"



**F5** S-1 SECTION B  
SCALE: 1/4" = 1'-0"



**F1** CU-2 ROOF SUPPORT PLAN  
SCALE: 1/8" = 1'-0"

MARK	LOCATION	SYSTEM AND/OR SERVICE	CAPACITY BTUH	SUCTION TEMP °F	AMBIENT AIR °F	MAX COND TEMP °F	COMPRESSOR MOTOR				CONDENSER FAN MOTOR			
							# COMP	POWER HP	PHASE	VOLT	# COND. FAN	POWER HP	PHASE	VOLT
CU-2	ROOF	AHU S-1	679,040	45	95	127.9	[4]	74.13	3	200	6	6.325	3	200

NOTE: 1. PROVIDE MODULATING HOT GAS BY-PASS ON EACH CIRCUIT. 2. MINIMUM 2 REFRIGERANT CIRCUITS. 3. SCROLL COMPRESSORS. 4. 4-STAGES (0-25-50-75-100). 5. PROVIDE BAS INTERFACE TO EXISTING JOHNSON CONTROL EMS. 6. PROVIDE HAIL AND WIND GUARDS. 7. PHASE LOSS / VOLTAGE PROTECTION. 8. 115 VOLT CONVENIENCE OUTLET.

MARK	LOCATION	AREA AND/OR BLDG SERVED	SYSTEM AND/OR SERVICE	AIR FLOW CFM	MAX FACE VELOCITY FPM	APD IN WG	EAT		LAT		TOTAL CAPACITY MBH	SENSIBLE CAPACITY MBH	REFRIGERANT	SATURATED SUCTION TEMP °F
							D <sub>b</sub> °F	W <sub>b</sub> °F	D <sub>b</sub> °F	W <sub>b</sub> °F				
CC-2	PENTHOUSE	CLINICAL	AHU-S1	15160	378	0.221	95	69	60	66.87	570.32	517.72	R-410A	45

NOTE: 1. 3500 FT ALTITUDE. 2. TRANE CU50 OR ENGINEER APPROVED EQUIVALENT. 3. TWO COILS BOTH INTERTWINED COILS. 4. NOMINAL COIL HEIGHT 36" x 80" (TOTAL 72" x 80")

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Issued:	Date:			VEG 18.15		Approved: Project Director		Location VA MEDICAL CENTER - FT. MEADE, SD	Building Number <b>146</b>
								Issue Date 4/19/2019	Checked MS
								Drawn RT	Drawing Number <b>M-102</b>



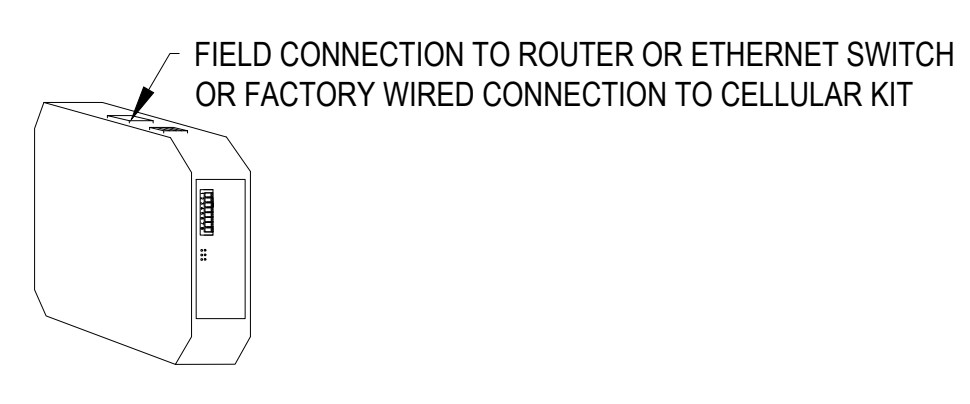
ELECTRICAL PACKAGE				SWITCHES		OPTION	FANS CONTROLLED				
NO.	TAG	PACKAGE #	LOCATION	LOCATION	QUANTITY		TYPE	Φ	H.P.	VOLT	FLA
1		DCV-2111	WALL MOUNT IN SS BOX	05-SS WALL MOUNT BOX	1 LIGHT 1 FAN	SMART CONTROLS DCV	EXHAUST	3	3,000	208	9.5

**CASLINK MONITOR AND CONTROL**

- HOOD CONTROL PANEL TO SUPPORT COMMUNICATIONS TO BUILDING MANAGEMENT SYSTEM.
- HOOD CONTROL PANEL TO ALLOW BUILDING MANAGEMENT SYSTEM TO MONITOR REAL TIME PARAMETERS OUTLINED AS MONITOR IN THE POINTS LIST.
- HOOD CONTROL PANEL TO ALLOW BUILDING MANAGEMENT SYSTEM TO CONTROL PARAMETERS OUTLINED AS CONTROL IN THE POINTS LIST.
- HOOD CONTROL PANEL TO ALLOW REMOTE CHANGES TO SYSTEM SETTING SUCH AS: VFD FREQUENCIES, ECM SPEEDS, TEMPERATURE SET POINTS, FAN SCHEDULES, ETC.

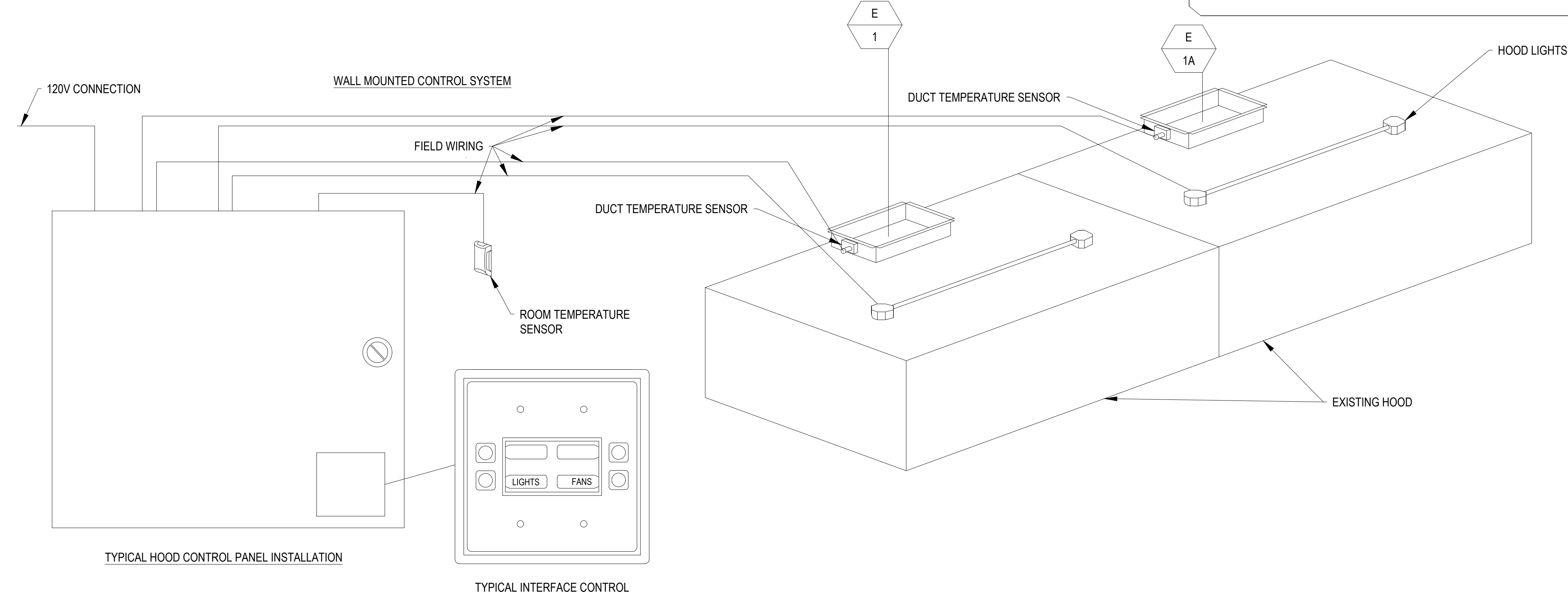
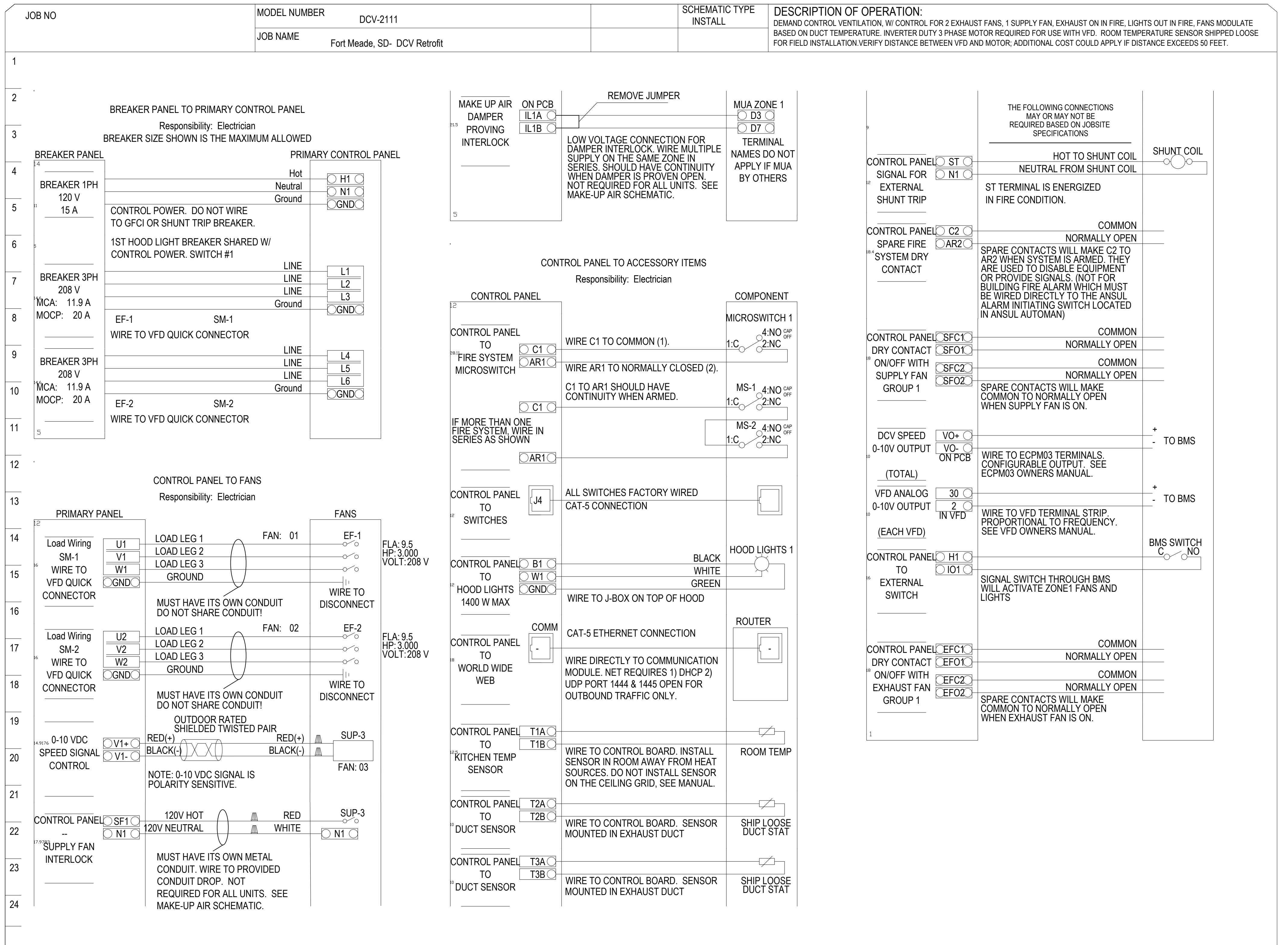
**MONITORING AND CONTROL POINTS LIST**

DCV PACKAGES	FUNCTION
ROOM TEMPERATURE	MONITOR
DUCT TEMPERATURE(S)	MONITOR
MUA DISCHARGE TEMPERATURE	MONITOR
KITCHEN RTU DISCHARGE TEMP.	MONITOR
FAN SPEED (2)	MONITOR
FAN AMPERAGE (2)	MONITOR
FAN POWER (2)	MONITOR
VFD FAULTS (2)	MONITOR
CONTROLLER FAULTS	MONITOR
FAN FAULTS (2)	MONITOR
FAN STATUS (2)	MONITOR
PCU FAULTS	MONITOR
PCU FILTER CLOG PERCENTAGES	MONITOR
FIRE CONDITION	MONITOR
CORE FIRE SYSTEM	MONITOR
BUILDING PRESSURES	MONITOR
PREP TIME BUTTON	MONITOR & CONTROL
FANS BUTTON	MONITOR & CONTROL
LIGHTS BUTTON	MONITOR & CONTROL



**ALL DRAWING CONTENTS ARE FOR DEDUCT ALTERNATE #1**

**BASIS OF DESIGN IS CAPTIVEARE. PANEL SCHEMATICS ARE FOR REFERENCE ONLY. ELECTRICAL CONTRACTOR TO PROVIDE 120V 15A CONNECTION. WIRE PER MANUFACTURER RECOMMENDATION.**



**HOOD CONTROL PANEL- DEMAND CONTROL VENTILATION (DCV) CONTROLS**

WRITTEN SPECIFICATIONS: THE HOOD CONTROL PANEL WITH DEMAND CONTROL VENTILATION AUTOMATICALLY MODULATES FANS BASED ON COOKING LOAD. MODULATION ALLOWS FOR ENERGY SAVINGS COMPARED TO FANS RUNNING ON HIGH SPEED DURING COOKING OPERATION.

LISTINGS: THE MODEL'S ELECTRICAL CONTROL PANEL ARE ETL LISTED UNDER FILE NUMBER 101754591 COL-001 AND COMPLIES WITH UL508A STANDARDS AND CAN/CSA C22.2, NO. 14-05 STANDARDS. ECPM03 CIRCUIT BOARD IS ETL LISTED UNDER FILE NUMBER 100901773B0X-001 AND COMPLIES WITH UL 61010-1 STANDARD AND CAN/CSA C22.2, NO. 61010-1 STANDARDS.

SEQUENCE OF OPERATIONS: THE HOOD CONTROL PANEL INTERLOCKS THE 2 EXHAUST FANS WITH THE MAKEUP AIR UNIT. (S-1) THE HOOD CONTROL PANEL IS CAPABLE OF OPERATING IN ONE OR MORE OF THE FOLLOWING STATES AT ANY GIVEN TIME:

**AUTOMATIC:** THE DCV HOOD CONTROL PACKAGE IS DESIGNED TO THERMOSTATICALLY ACTIVATE THE EXHAUST FANS AND MAKE-UP AIR FOR AN EXHAUST HOOD WHENEVER ELEVATED TEMPERATURES ARE SENSED IN THE EXHAUST SYSTEM. THIS OPTION WILL MEET THE REQUIREMENTS OF IMC 507.1.1 AND IMC 508.1 BY PROVIDING A THERMOSTAT(S) MOUNTED IN THE DUCT OR HOOD RISER TO SENSE INCREASED EXHAUST TEMPERATURES.

ONCE THE DUCT TEMPERATURE REACHES THE ACTIVATION POINT, THE EXHAUST FANS AND MAU WILL BE ACTIVATED. THE CONTROLS ALSO PROVIDE HYSTERESIS TO PREVENT CYCLING OF THE FANS AFTER THE COOKING APPLIANCES HAVE BEEN TURNED OFF AND THE HEAT IN THE EXHAUST SYSTEM IS REDUCED. THE HYSTERESIS IS FACTORY SET 2 DEGREES AND WILL KEEP THE EXHAUST RUNNING UNTIL THE TEMPERATURE FALLS 2 DEGREES BELOW THE ACTIVATION SET POINT. A HYSTERESIS TIMER ALSO EXISTS TO KEEP THE FANS RUNNING FOR AT LEAST 30 MIN AFTER BEING ACTIVATED BY THE TEMPERATURE RISE.

THE PANEL IS FACTORY CONFIGURED TO SHUT DOWN SUPPLY FANS, TURN ON THE EXHAUST FANS AND TURN OFF THE HOOD LIGHTS IN A FIRE CONDITION.

THE DCV TURNS DOWN TO 20-25% OF TOTAL EXHAUST IN PREP MODE. THE SYSTEM IS CAPABLE OF TURNING DOWN TO 0% WHEN OPERATING AUTOMATICALLY IF IT DOES NOT SENSE A NEED FOR HOOD OPERATION. THE DCV WILL MODULATE THE FANS IT IS CONTROLLING BASED ON DEMAND AND THE LOW SPEED AND HIGH SPEED SETTINGS ARE FULLY ADJUSTABLE BASED ON DEMAND.

IN THE EVENT OF A FIRE, THERE ARE TWO FORMS OF ACTIVATION. THE MECHANICAL REMOTE PULL MAY BE ACTIVATED OR THE MECHANICAL DETECTION LINK IN THE HOOD MAY MELT. THE ANSUL AUTOMAN TAKES THIS MECHANICAL ACTIVATION AND CONVERTS IT TO AN ELECTRIC NOTIFICATION SIGNAL VIA THE MICROSWITCH AND BUILDING-INITIATING SWITCH. IN EITHER EVENT, THE DCV WILL BE ELECTRICALLY NOTIFIED VIA THE ANSUL AUTOMAN. THE DCV WILL THEN TURN ON THE EXHAUST FAN, TURN OFF THE MAKE-UP AIR UNIT AND TURN OFF THE HOOD LIGHTS. THE ANSUL AUTOMAN WILL CLOSE THE MECHANICAL GAS VALVE TO CLOSE THE GAS LINE OR, IF AN ELECTRIC GAS VALVE IS USED, THE HOOD CONTROL PANEL WILL SEND A SIGNAL TO THE SHUNTED PORTION OF THE BREAKER PANEL TO REMOVE POWER FROM THE COOKING APPLIANCES. THE BUILDING-INITIATING SWITCH CAN BE USED TO NOTIFY THE BUILDING ALARM SYSTEM.

**MANUAL:** THE SYSTEM OPERATES BASED ON HUMAN INPUT FROM AN HMI.

**SCHEDULE:** A WEEKLY SCHEDULE CAN BE SET TO RUN FANS FOR A SPECIFIED PERIOD THROUGHOUT THE DAY. THERE ARE THREE OCCUPIED TIMES PER DAY TO ALLOW FOR THE USER TO SET UP A TIME THAT IS SUITABLE TO THEIR NEEDS. ANY TIME THAT IS WITHIN THE DEFINED OCCUPIED TIME, THE SYSTEM WILL RUN SUITABLE TO THEIR NEEDS. ANY TIME THAT IS WITHIN THE DEFINED OCCUPIED TIME, THE SYSTEM WILL RUN AT MODULATION MODE AND FOLLOW THE FAN PROCEDURE ALGORITHM BASED ON TEMPERATURE DURING THIS TIME. DURING UNOCCUPIED TIME, THE SYSTEM WILL HAVE AN EXTRA OFFSET TO PREVENT UNINTENDED ACTIVATION OF THE SYSTEM DURING A TIME WHERE THE SYSTEM IS NOT BEING OCCUPIED.

**OTHER:** THE SYSTEM OPERATES BASED ON THE INPUT FROM AN EXTERNAL SOURCE (DDC, BAS OR HARD-WIRED INTERLOCK)

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<b>Issued:</b>	<b>Date:</b>						<b>Issue Date:</b> 4/19/2019	<b>Checked:</b> MS	<b>Drawn:</b> RT	<b>Drawing Number:</b> M-200