PIPE LINE ABBREVIATIONS

?" CD	COOLING COIL CONDENSATE DRAIN
?" CHWS	CHILLED WATER SUPPLY
?" CHWR	CHILLED WATER RETURN
CWS	CONDENSER WATER SUPPLY
CWR	CONDENSER WATER RETURN
?" HHWS	HEATING HOT WATER SUPPLY
?" HHWR	HEATING HOT WATER RETURN
?" HL	REFRIGERANT LIQUID
?" RS	REFRIGERANT SUCTION
?" HG	HOT GAS
?" HGR	HOT GAS REHEAT
?" MW	MAKE-UP WATER (DS OF RPZ)

HVAC LEGEND

- VAV HOT WATER COIL
- CONTROL DAMPER, MOTOR OPERATED
- MANUAL BALANCE DAMPER
- BD — BACKDRAFT DAMPER
- AD / AD — ACCESS DOOR (AD), ACCESS PANEL (AP)
- AD — DAMPERS: FIRE (FD)- SMOKE (SD) - FIRE/SMOKE (F/SD)-
- AD — MANBARS
- FLEXIBLE DUCT CONNECTION
- RECTANGULAR ELBOW W/TURNING VANES
- GORED ELBOW (FLAT OVAL OR ROUND)
- SMOOTH ELBOW (RECTANGULAR OR ROUND)
- UP — RISE IN RESPECT TO AIR-FLOW
- DN — DROP IN RESPECT TO AIR-FLOW
- SQUARE OR RECTANGULAR TO ROUND TRANSITION
- SUPPLY OR OUTSIDE AIR DUCT SECTION
- RETURN OR EXHAUST AIR DUCT SECTION
- ROUND FLEXIBLE DUCT (5'-0" MAX LENGTH)
- SQUARE OR RECT SUPPLY DIFFUSER
- RETURN AIR DIFFUSER
- EXHAUST AIR DIFFUSER
- T — THERMOSTAT
- CO2 — CARBON DIOXIDE MONITOR
- H — HUMIDISTAT
- VAV- — VARIABLE AIR VOLUME TERMINAL BOX (SHUT OFF)

PIPE LINE ACCESSORIES

- AIR VENT
- GATE VALVE
- OS&Y — OUTSIDE SCREW & YOKE VALVE
- BUTTERFLY VALVE
- CHECK VALVE
- 3 - WAY VALVE
- BALL VALVE
- BALANCING VALVE
- RELIEF VALVE, SAFETY OR THERMAL
- CONTROL VALVE
- M — MOTORIZED CONTROL VALVE
- SUCTION DIFFUSER
- AV — AUTOMATIC AIR VENT ASSEMBLY
- MV — MANUAL AIR VENT - SEE SPECIFICATIONS FOR APPROPRIATE VALVE TYPE.
- FLEX CONNECTION
- BACKFLOW PREVENTION ASSEMBLY
- PUMP
- THERMOMETER
- PRESSURE REDUCING VALVE
- SELF CONTAINED PRESSURE REDUCING (REGULATING) VALVE
- PRESSURE GAUGE
- Y-TYPE STRAINER
- Y-TYPE STRAINER WITH BLOWDOWN
- REMOVABLE CAP
- REDUCER (CONCENTRIC)
- REDUCER (ECCENTRIC)
- UNION
- BLIND FLANGE
- TEST CONNECTION
- * — COMPONENTS TO BE FURNISHED WITH EQUIPMENT
- M / FM — FLOW MAGNETIC METER
- BP — BACKFLOW PREVENTION ASSEMBLY

AIR DISTRIBUTION DEVICE IDENTIFICATION

MARK
QTY — (?) SA-#
AIR FLOW — 175

SECTION CUT SYMBOL

INDICATES PERSPECTIVE AND LIMITS OF SECTION
A / M-003 — SECTION DESIGNATOR
DRAWING WHERE SECTION IS DRAWN

DETAIL CALLOUT SYMBOL

INDICATES LIMITS OF DETAIL/SECTION
A / M-001 — DETAIL/SECTION DESIGNATOR
DRAWING WHERE DETAIL/SECTION IS DRAWN

DETAIL/SECTION TITLE

NUMBER = DETAIL DESIGNATOR
LETTER = SECTION DESIGNATOR

DETAIL / SECTION TITLE

DRAWING WHERE DETAIL/SECTION IS TAKEN

PICTURE SYMBOL/CAMERA DIRECTION

X?

HVAC DESIGN CRITERIA

LOCATION: DAM NECK ANNEX, OCEANA NAS, VIRGINIA BEACH, VA		LATITUDE:	36.82
WMO# 723075		LONGITUDE:	76.03
		ELEVATION:	23 FT.
STANDARD OUTDOOR DESIGN CONDITIONS:			
WINTER DESIGN DRY BULB (99.6%):	21°F	DEHUMIDIFICATION DEW POINT (0.4%):	77°F
SUMMER DESIGN DRY BULB (0.4%):	93°F	DEHUMIDIFICATION DRY BULB (0.4%):	84°F
SUMMER DESIGN WET BULB (0.4%):	77°F		
CRITICAL AREA DESIGN CONDITIONS:		COOLING DRY BULB:	72°F
HEATING DESIGN DRY BULB:	68°F	DEW POINT:	55°F
GENERAL AREA DESIGN CONDITIONS:		COOLING DRY BULB:	78°F
HEATING DESIGN DRY BULB:	68°F	DEW POINT:	55°F
MECH. AREA DESIGN CONDITIONS:		COOLING DRY BULB:	80°F
HEATING DESIGN DRY BULB:	68°F	DEW POINT:	55°F

24 **NEW WORK KEYNOTE INDICATOR**
NEW WORK KEYNOTE NUMBER

24 **DEMOLITION KEYNOTE INDICATOR**
DEMOLITION KEYNOTE NUMBER

GENERAL NOTES:

1. LEGEND IS GENERAL IN NATURE AND MAY INDICATE MORE INFORMATION THAN IS APPLICABLE TO PROJECT.
2. PROVIDE ALL MATERIALS, VALVES, HANGERS, ETC., AND PERFORM ALL LABOR REQUIRED TO INSTALL A COMPLETE AND OPERABLE MECHANICAL SYSTEMS AS INDICATED ON THE DRAWINGS, AS SPECIFIED, AND AS REQUIRED BY CODE.
3. INSTALL ALL MECHANICAL EQUIPMENT AND APPURTENANCES IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS, CONTRACT DOCUMENTS, AND APPLICABLE CODES AND REGULATIONS.
4. COORDINATE CONSTRUCTION OF ALL MECHANICAL WORK WITH STRUCTURAL, CIVIL, ELECTRICAL WORK, ETC., AS SHOWN ON OTHER CONTRACT DOCUMENT DRAWINGS.
5. MAINTAIN A MINIMUM OF 7'-6" CLEARANCE TO UNDERSIDE OF DUCTWORK, PIPES, CONDUITS, ETC., THROUGHOUT ACCESS ROUTES AND IN MECHANICAL ROOMS.
6. LOCATE ALL MECHANICAL EQUIPMENT FOR UNOBSTRUCTED ACCESS TO UNIT ACCESS PANELS, CONTROLS, AND VALVING
7. VERIFY DIMENSIONS AND CONNECTION SIZE WITH FURNISHED EQUIPMENT.
8. ALL ELEVATIONS ARE ABOVE FINISHED FLOOR TO BOTTOM OF DUCT, PIPE, OR PIPE INSULATION UNLESS NOTED OTHERWISE.
9. DUCT DIMENSIONS INDICATED REFER TO SHEET METAL DIMENSIONS. SHEET METAL SIZE SHALL BE AIR OPENING DIMENSION PLUS THE THICKNESS OF ACOUSTICAL LINER WHERE LINER IS INSTALLED. WHERE LINER IS NOT INSTALLED, AIR OPENING SIZE AND SHEET METAL SIZE SHALL BE THE SAME.
10. WHERE POSSIBLE LOCATE TRANSFER AIR DUCTS AND OPENINGS 24" ABOVE HIGHEST CEILING ELEVATION UNLESS OTHERWISE NOTED.
11. COORDINATE ALL WALL AND ROOF PENETRATIONS WITH STRUCTURAL AND ARCHITECTURAL PLANS.
12. INSTALL TEMPERATURE CONTROLS AND CO2 SENSORS AT 48" ABOVE FINISHED FLOOR AND COORDINATE WITH OTHER DEVICES LOCATED ON WALLS. COORDINATE WITH ARCHITECTURAL WALL FINISHES.
13. CO2 SENSORS SHALL BE PROVIDED BY DIVISION 23. PROVIDE CO2 SENSOR BACK TO CORRESPONDING VAV BOX AS SCHEDULED FOR VENTILATION. 1
14. PROVIDE STRUCTURAL EQUIPMENT PADS IN ACCORDANCE WITH DETAILS ON STRUCTURAL DRAWINGS.
15. DESIGN AND PROVIDE SEISMIC SUPPORTS, ISOLATORS, AND RESTRAINT DEVICES IN ACCORDANCE WITH STRUCTURAL SPECIFICATIONS. WHERE SEISMIC SUPPORT REQUIREMENTS CONFLICT WITH ATFP REQUIREMENTS PROVIDE THE MORE STRINGENT.
16. VFDs SHALL BE PROVIDED BY THE MECHANICAL CONTRACTOR ON INSTALLED BY THE ELECTRICAL CONTRACTOR. PROVIDE ALL VFDs WITH INTEGRAL DISCONNECTS. PROVIDE ALL VFDs WITH BYPASS CAPABILITIES WITH ACROSS THE LINE STARTERS. PROVIDE ALL VFDs WITH AN INTERNAL OR EXTERNAL 3% LINE REACTOR. COORDINATE WITH SPECIFICATION SECTIONS 26 29 23 AND 23 09 23.13 20.
17. PROJECT REQUIRES PHASED CONSTRUCTION, INCLUING TEMPORARY UTILITY SERVICE, COORDINATE PHASING WITH OTHER TRADES.
18. UNLESS OTHERWISE INDICATED, PROVIDE RUNOUTS TO MATCH THE INLET SIZE OF DEVICE BEING SERVED.
19. COORDINATE ALL MECHANICAL WORK WITH ARCHITECTURAL GENERAL NOTES ON SHEET A002.

MECHANICAL ABBREVIATIONS

24x12	RECTANGULAR DUCT DIMENSION (INCHES)
24x12 FO	FLAT OVAL DUCT DIMENSION (INCHES)
12"Ø	ROUND DUCT DIMENSION
AC	AIR CONDITIONING
ACCU	AIR COOLED CONDENSING UNIT
AD	ACCESS DOOR
AFF	ABOVE FINISHED FLOOR
AHU	AIR HANDLING UNIT
AMB	AMBIENT
ARV	AIR RELEASE VALVE
ATFP	ANTITERRORISM FORCE PROTECTION
AV	AIR VENT
BCU	BLOWER COIL UNIT
BPP	BOILER PRIMARY PUMP
BFP	BACKFLOW PREVENTER
BOD	BOTTOM OF DUCT
BOP	BOTTOM OF PIPE
BW	BUTT WELD
CA	COMPRESSED AIR
CD	CEILING DIFFUSER, CONDENSSATE DRAIN
COND	CONDENSATE
CF	CEILING FAN
CFM	CUBIC FEET PER MINUTE
CL	CENTER LINE OF PIPE / DUCT ELEVATION
COM	COMPRESSOR
CUH	CABINET UNIT HEATER
CD	CONDENSATE DRAIN
CR	CONDENSATE RETURN
CWR	CONDENSER WATER RETURN
CWS	CONDESNER WATER SUPPLY
CHWR	CHILLED WATER RETURN
CHWS	CHILLED WATER SUPPLY
CRAHU	COMPUTER ROOM AIR HANDLING UNIT
Cv	COEFFICIENT VALVE
DCW	DOMESTIC CHILL WATER
DN	DOWN
DR	DRAIN
DRG	DIFFUSER, REGISTER, GRILLE
DTW	DOMESTIC TEMPERED WATER
EL	ELEVATION
ELL	ELBOW
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EF	EXHAUST FAN
EFF	EFFECTIVENESS
EG	EXHAUST GRILLE
ER	EXHAUST REGISTER
EER	ENERGY EFFICENCY RATIO
ET	EXPANSION TANK
EWT	ENTERING WATER TEMPERATURE
F	FAN
°F	FAHRENHEIT (DEGREES)
°F DB	DRY BULB TEMPERATURE
FT WC	FEET WATER COLUMN (PRESSURE)
IN WC	INCHES WATER COLUMN (PRESSURE)
°WB	WET BULB TEMPERATURE
FCU	FAN COIL UNIT
FLA	FULL LOAD AMPS
FF	FLAT FACED
FOB	FLAT ON BOTTOM
FOT	FLAT ON TOP
FPVAV	FAN POWERED VA BOX
FPM	FEET PER MINUTE
FM	FLOW METER
GDT	GENERATOR DAY TANK
GV	GATE VALVE
GPM	GALLONS PER MINUTE
HDPE	HIGH DENSITY POLYETHYLENE
HHWS	HEATING HOT WATER SUPPLY
HHWR	HEATING HOT WATER RETURN
HX	HEAT EXCHANGER
HPS	HIGH PRESSURE STEAM (>15 PSIG)
HUM	HUMIDIFIER
HP	HORSEPOWER
HZ	HERTZ
IN	INCH(ES)
IN WC	INCHES WATER COLUMN
IPLV	INTEGRATED PART LOAD VALUE
KW	KILOWATT
LAT	LEAVING AIR TEMPERATURE
L	LOUVER
LWT	LEAVING WATER TEMPERATURE
LMTD	LOG MEAN TEMPERATURE DIFFERENCE
LPS	LOW PRESSURE STEAM (≤ 15PSIG)
MFR	MANUFACTURER
MJ	MECHANICAL JOINT
MA	MIXED AIR
MBH	THOUSAND BRITISH THERMNAL UNITS PER HOUR
MCA	MINIMUM CIRCUIT AMPACITY
MD	MOTORIZED DAMPER
MIN	MINIMUM
MOCP	MAXIMUM OVER-CURRENT PROTECTION
MAX	MAXIMUM
MW	MAKE-UP WATER
NIC	NOT IN CONTRACT
NC	NORMALLY CLOSED (FAIL POSITION)
NC	NOISE CRITERIA
NPT	NATIONAL PIPE THREAD
NO	NORMALLY OPEN (FAIL POSITION)
OB	OPPOSED BLADE
OA	OUTSIDE AIR
OPER	OPERATING
PB	PARALLEL BLADE
PACU	PACKAGED AIR CONDITIONING UNIT
PH	PHASE
PSIA	POUNDS PER SQUARE INCH ABSOLUTE
PSIG	POUNDS PER SQUARE INCH GAUGE
PW	PROCESS WATER
QTY	QUANTITY
RA.	RETURN AIR
RECT	RECTANGULAR
RED	REDUCER/REDUCING
REFR	REFRIGERANT
RG	RETURN GRILLE
RL	REFRIGERANT LIQUID
RS	REFRIGERANT SUCTION
RMJ	RESTRAINED MECHANICAL JOINT
RPZ	REDUCED PRESSURE ZONE BFP
RTU	ROOF TOP
SCH	SCHEDULE
SSFS	SIDE STREAM FILTRATION SYSTEM
SR	SHORT RADIUS
SEF	SMOKE EXHAUST FAN
SRC	SPRING RETURN CLOSED
SF	SQUARE FEET
SA	SUPPLY AIR
SP	STATIC PRESSURE
SRC	SPRING RETURN CLOSED
SR	SUPPLY REGISTER
TA	TRANSFER AIR
TH	THERMOSTAT
TOA	TREATED OUTSIDE AIR
TOC	TOP OF CONCRETE
TOD	TOP OF DUCT
TOS	TOP OF STEEL
TYP	TYPICAL
UH	UNIT HEATER
VFD	VARIABLE FREQUENCY DRIVE
VAV	VAV
V	VENT
WC	WATER COLUMN
WH	WATER HEATER
WPD	WATER PRESSURE DROP
WT	WEIGHT
W.O.G.	WIDE OPEN GRATE

SYM	DESCRIPTION	DATE	APPR
1	AMENDMENT CHANGES	03/18/16	CMG

NAVFAC

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SATISFACTORY TO DATE
DES CMG DRW JLL CHK JPC
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IPT TECH. BRANCH HEAD
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DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
IPT-HAMPTON ROADS
NAVAL FACILITIES ENGINEERING COMMAND ~ MIDLANT
NAVAL STATION, NORFOLK
NAS OCEANA-DAM NECK ANNEX
VIRGINIA BEACH, VIRGNIA
P-603 MARITIME SURVEILLANCE SYSTEM FACILTY
MECHANICAL GENERAL NOTES, LEGEND, AND ABBREVIATIONS

SCALE: AS NOTED
EPROJECT NO. 1344924
CONSTR. CONTR. NO. N40085-16-R-6119
NAVFAC DRAWING NO. 12712930
SHEET 164 OF 296
M-001

DRAWFORM REVISION: 10 MAY 2014

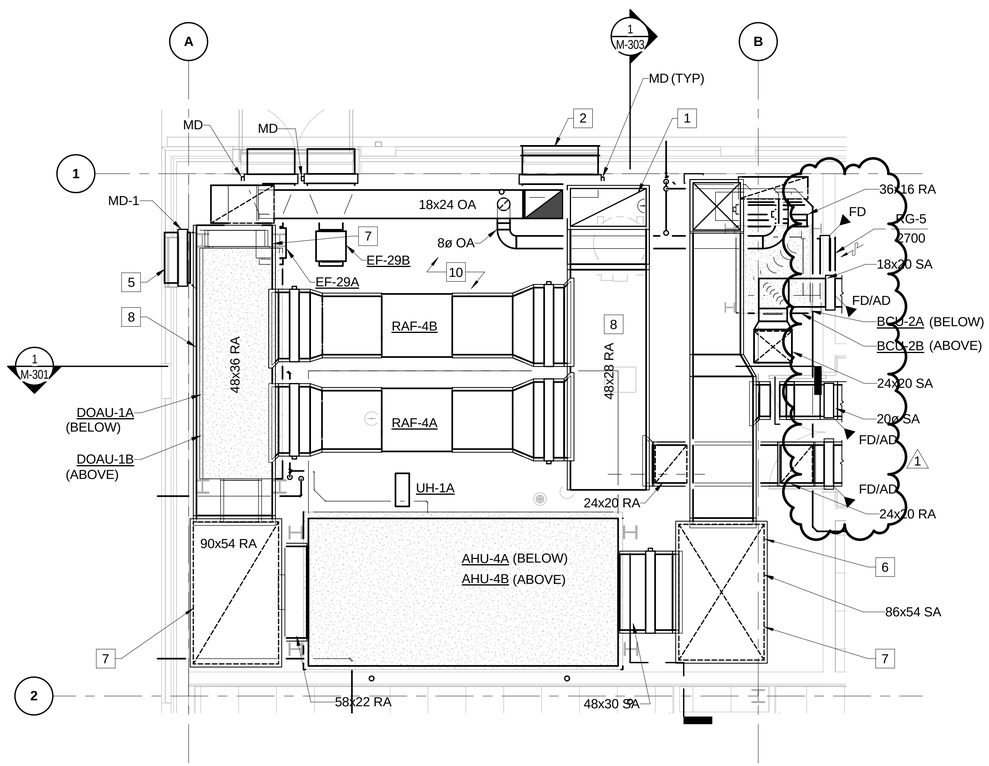
FILE NAME: C:\Revit_Projects\82327-P603MSSFac\Models\MEP\82327_M_603_pgrepony.rvt
REV/DATE: 3/25/2016 10:33:46 AM

GENERAL NOTES:

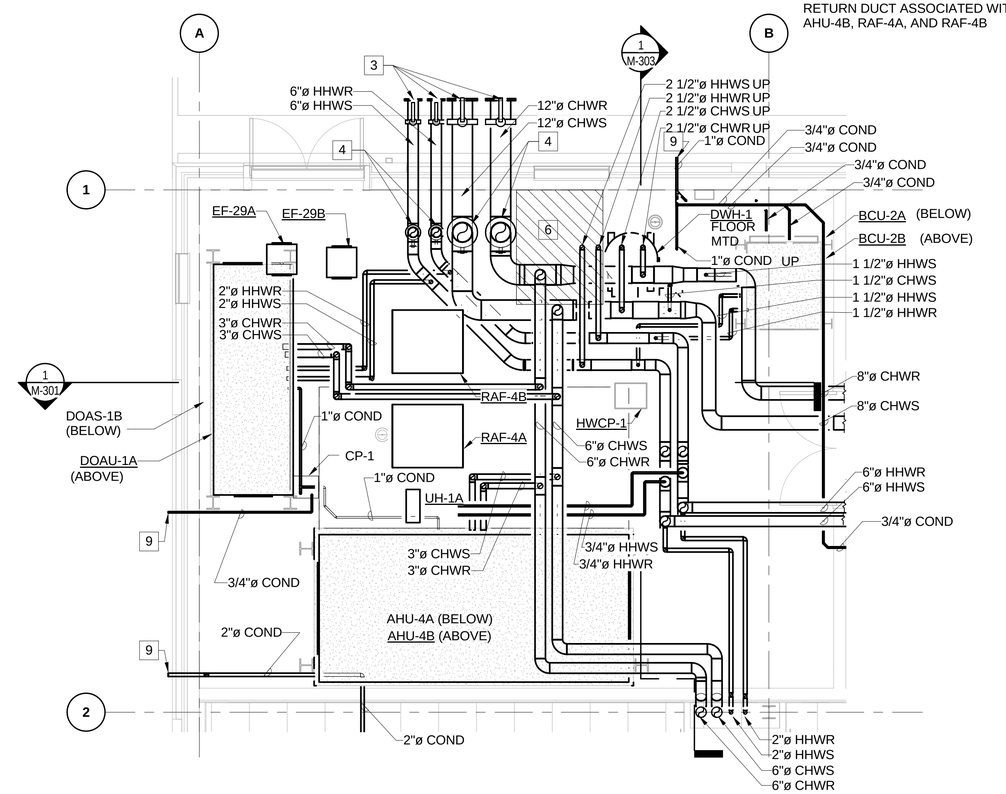
1. REFER TO SHEET M-001 FOR MECHANICAL GENERAL NOTES, LEGEND, AND ABBREVIATIONS.

NEW WORK NOTES:

1. 48x28 RA FROM SECOND FLOOR SEE SHEET MH102 FOR CONTINUATION.
2. REFER TO ARCHITECTURAL PLAN FOR LOUVER DIMENSIONS. PROVIDE LOW LEAKAGE DAMPERS INTERLOCK DAMPER WITH EXHAUST FANS EF-29A AND EF-29B.
3. PROVIDE VALVES AND BLIND FLANGES FOR EMERGENCY CONNECTION.
4. PROVIDE ISOLATION VALVES ON EACH SIDE OF TEE.
5. REFER TO ARCHITECTURAL PLANS FOR LOUVER DIMENSIONS. PROVIDE LOW LEAKAGE OPPOSED BLADE MOTORIZED DAMPER.
6. COORDINATE FLOOR SPACE AND SLEEVES WITH PLUMBING AND FIRE PROTECTION.
7. DOUBLE WALL CASING.
8. DOUBLE WALL RETURN AIR CASING.
9. DISCHARGE CONDENSATE TO SPLASH BLOCK.
10. PROVIDE DOUBLE WALL DUCT TRHOUGHOUT MECHANICAL ROOM AND SECOND FLOOR SHAFT FOR SUPPLY AND RETURN DUCT ASSOCIATED WITH AHU-4A, AHU-4B, RAF-4A, AND RAF-4B



A1 P-603 - ENLARGED HVAC PLAN - MECH. ROOM 107
SCALE: 1/4" = 1'-0"



A3 P-603 - ENLARGED PIPING PLAN - MECH. ROOM 107
SCALE: 1/4" = 1'-0"

GRAPHIC SCALE:
1/4" =1'-0" 0' 2' 4' 8'

SYM	DESCRIPTION	DATE	APPR
1	AMENDMENT CHANGES	03/18/16	CMG

NAVFAC

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NAVAL FACILITIES ENGINEERING COMMAND – MIDLANT
IPT-HAMPTON ROADS
NAVAL STATION NORFOLK
NAS OCEANA-DAM NECK ANNEX
VIRGINIA BEACH, VIRGINIA
P-603 MARITIME SURVEILLANCE SYSTEM FACILTY
P-603 - ENLARGED MECHANICAL PLANS

SCALE: AS NOTED
EPROJECT NO. 1344924
CONSTR. CONTR. NO. N40085-16-R-6119
NAVFAC DRAWING NO. 12712949
SHEET 183 OF 296
M-401

DRAWFORM REVISION: 10 MAY 2014

FILE NAME: C:\Revit_Projects\82327-P603MSSFac\Models\MEP\82327_M_603_pgregory.rvt
REV/DATE: 3/25/2016 10:33:55 AM

VARIABLE AIR VOLUME BOX SCHEDULE (VAV)

MARK	LOCATION	INLET DIAMETER (IN)	MAX AIRFLOW (CFM)	MIN AIRFLOW (CFM)	MIN INLET PRESS (IN WC)	HOT WATER REHEAT COIL DATA MIN HEAT CAPACITY (MBH)	EAT DB (°F)	LAT DB (°F)	EWT (°F)	LWT (°F)	HOT WATER FLOWRATE (GPM)	SOUND LEVEL (MAX NC)	NOTES
VAV-401	603	6	420	240	0.75	7.0	55	85	100	90	1.4	25	1,2
VAV-402	603	10	920	290	0.75	9.1	55	85	100	90	1.8	25	1,2
VAV-403	603	6	120	55	0.75	2.5	55	85	100	90	0.5	25	1,2
VAV-404	603	6	260	100	0.75	4.2	55	85	100	90	0.8	30	1,2
VAV-405	603	10	690	690	0.75	9.1	55	85	100	90	1.8	30	1,2
VAV-406	603	6	290	120	0.75	3.9	55	85	100	90	0.8	25	1,2
VAV-407	603	6	180	60	0.75	2.5	55	85	100	90	0.5	25	1,2
VAV-408	603	10	770	240	0.75	10.0	55	85	100	90	2.0	30	1,2
VAV-409	603	10	730	190	0.75	5.7	55	85	100	90	1.1	25	1,2
VAV-410	603	10	810	330	0.75	9.7	55	85	100	90	1.9	25	1,2
VAV-411	603	10	720	260	0.75	9.4	55	85	100	90	1.9	30	1,2
VAV-412	603	6	130	40	0.75	2.5	55	85	100	90	0.5	25	1,2
VAV-413	603	6	130	40	0.75	2.5	55	85	100	90	0.5	25	1,2
VAV-414A	603	16	2250	675	0.75	20.0	55	85	100	90	4.0	35	1,2
VAV-414B	603	16	2250	675	0.75	20.0	55	85	100	90	4.0	35	1,2
VAV-414C	603	16	2250	675	0.75	20.0	55	85	100	90	4.0	35	1,2
VAV-415	603	12	1490	1490	0.75	22.7	55	90	100	90	4.5	30	1,2

NOTES:
1. RUNOUT SIZE TO VAV BOX SHALL MATCH VAV INLET DIAMETER UNLESS OTHERWISE SPECIFIED ON DRAWINGS.
2. PROVIDE STEP DOWN CONTROL TRANSFORMER.

DIFFUSER, REGISTER & GRILLE SCHEDULE

MARK	DESCRIPTION	MOUNTING	THROW PATTERN	MATERIAL	NECK SIZE	FACE SIZE	MAX PD (IN WC)	MAX FLOW (CFM)	MAX SOUND (NC)	NOTES
CD-1	PLAQUE FACE CEILING DIFFUSER	T-BAR CEILING	RADIAL	ALUMINUM	6"Ø	24x24	0.08	135	0.08	1, 2, 9
CD-2	PLAQUE FACE CEILING DIFFUSER	T-BAR CEILING	RADIAL	ALUMINUM	8"Ø	24x24	0.08	280	20	1, 2, 9
CD-3	PLAQUE FACE CEILING DIFFUSER	T-BAR CEILING	RADIAL	ALUMINUM	10"Ø	24x24	0.10	400	20	1, 2, 9
DL-1	HIGH CAPACITY DRUM LOUVER	SIDEWALL REGISTER	-	ALUMINUM	6x15	8x16	0.142	375	26	-
EG-1	LOUVER FACE EXHAUST GRILLE	SURFACE	-	ALUMINUM	6x6	8x 8	0.08	90	20	4, 9
EG-2	LOUVER FACE EXHAUST GRILLE	SURFACE	--	ALUMINUM	8x8	10" x 10"	0.08	150	20	4, 9
EG-3	LOUVER FACE EXHAUST REGISTER	SURFACE	-	ALUMINUM	6x6	8 x 8	-	350	-	4, 9
FTG-1	LOUVER FACED TRANSFER GRILLE	SURFACE	--	STEEL	12x12	14x14	0.03	300	-	4, 8, 9
LS-1	INDUSTRAL LOUVER FACED SUPPLY	DUCT / SIDEWALL	2-WAY	ALUMINUM	10"Ø	60x6	-	375	-	4, 9
LV-1	INDUSTRIAL LOUVER FACED SUPPLY	DUCT / SIDEWALL	1-WAY	ALUMINUM	48" x 20"	50 x 22	0.26	7940	50	6, 7, 9
RG-5	HEAVY DUTY RETURN GRILLE	SURFACE	-	ALUMINUM	46x24	48 X 26	0.10	6000	40	5, 9
RR-1	LOUVER FACE RETURN REGISTER	T-BAR CEILING	-	ALUMINUM	22x22	24x24	0.04	750	20	4, 8, 9
RR-2	LOUVER FACE RETURN REGISTER	SURFACE	-	ALUMINUM	36x12	38x14	0.08	1100	20	4, 9
RR-4	LOUVER FACE RETURN REGISTER	SURFACE	-	ALUMINUM	18x10	20x12	0.08	670	30	4, 9
SR-1	LOUVER FACE SUPPLY REGISTER	DUCT / SIDEWALL	2-WAY	ALUMINUM	16 X10	18 x 12	0.08	720	30	3, 9
SR-2	LOUVER FACE SUPPLY REGISTER	DUCT / SIDEWALL	2-WAY	ALUMINUM	12 X10	14 x 12	0.08	550	30	3, 9
TG-1	LOUVER FACED TRANSFER GRILLE	SURFACE	--	ALUMINUM	12x12	14x14	0.03	300	-	4, 9

NOTES:
1. WHERE INDICATED, PROVIDE CLIPS TO ORIENT FLOW (2-WAY) IN THE DIRECTION OF THE HALLWAY.
2. PROVIDE SECTORIZING BAFFLE OR HIGH INDUCTION
3. PROVIDE DOUBLE DEFLECTION WITH 3/4" CENTERS
4. PROVIDE FIXED LOUVERS WITH 0° DEFLECTION AND 3/4" CENTERS
5. PROVIDE FIXED LOUVERS WITH 45° DEFLECTION AND 3/4" CENTERS
6. PROVIDE SINGLE DELECTION 3" AIRFLOW BLADES
7. SELECTION BASED ON 15° BLADE DEFLECTION.
8. PROVIDE UNIT WITH INTEGRAL 1 HOUR FIRE DAMPER.
9. AIR DEVICE RUNOUTS SHALL MATCH NECK SIZE INDICATED ON SCHEDULE UNLESS OTHERWISE NOTED ON DRAWINGS.

EXPANSION TANK SCHEDULE

MARK	LOCATION	SYSTEM	TYPE	TANK VOLUME (GAL)	ACCEPTANCE VOLUME (GAL)	TEMPERATURE RATING (°F)	PRESSURE RATING (PSIG)
ET-1	CUP	CHW	BLADDER	79	79	240	125
ET-2	CUP	HHW	BLADDER	57	57	240	125

COMPUTER ROOM AIR HANDLING UNIT SCHEDULE (CRAHU) 1/2

MARK	LOCATION	AREA SERVED ROOM NAME	ROOM #	FAN TYPE	TOTAL AIRFLOW (CFM)	FAN MOTOR QUANTITY	EXT. STATIC PRESSURE (IN WC)	FAN MOTOR (HP)	COOLING COIL MAX COIL FACE VELOCITY (FPM)	SENSIBLE CAPACITY (MBH)	TOTAL CAPACITY (MBH)	EAT DB (°F)	EAT WB (° F)	LAT DB (°F)	LAT WB (°F)	EWT (°F)	LWT (°F)	CHW FLOWRATE (GPM)	MAX WATER PRESSURE DROP (FT WC)
CRAHU-1A	603	DATA/EQUIP. ROOM	209	DOWNFLOW	3500	1	0.2	5	400	46.0	47.4	72	60	59.7	55.2	45	55	10.3	7.0
CRAHU-1B	603	DATA/EQUIP. ROOM	209	DOWNFLOW	3500	1	0.2	5	400	46.0	47.4	72	60	59.7	55.2	45	55	10.3	7.0
CRAHU-2A	603	EQUIPMENT SPACE	106	DOWNFLOW	19500	3	0.2	10	500	381.9	432.5	72	60	53.8	51.9	45	55	91.4	8.0
CRAHU-2B	603	EQUIPMENT SPACE	106	DOWNFLOW	19500	3	0.2	10	500	381.9	432.5	72	60	53.8	51.9	45	55	91.4	8.0
CRAHU-2C	603	EQUIPMENT SPACE	106	DOWNFLOW	19500	3	0.2	10	500	381.9	432.5	72	60	53.8	51.9	45	55	91.4	8.0
CRAHU-2D	603	EQUIPMENT SPACE	106	DOWNFLOW	19500	3	0.2	10	500	381.9	432.5	72	60	53.8	51.9	45	55	91.4	8.0
CRAHU-2E	603	EQUIPMENT SPACE	106	DOWNFLOW	19500	3	0.2	10	500	381.9	432.5	72	60	53.8	51.9	45	55	91.4	8.0
CRAHU-2F	603	EQUIPMENT SPACE	106	DOWNFLOW	19500	3	0.2	10	500	381.9	432.5	72	60	53.8	51.9	45	55	91.4	8.0

COMPUTER ROOM AIR HANDLING UNIT SCHEDULE (CRAHU) 2/2

MARK	HOT WATER REHEAT COIL DATA MAX COIL FACE VELOCITY (FPM)	TOTAL CAPACITY (MBH)	EAT DB (°F)	LAT DB (°F)	EWT (°F)	LWT (°F)	HHW FLOWRATE (GPM)	MAX WATER PRESSURE DROP (FT WC)	FILTER TYPE	DIRTY FILTER PRESSURE DROP (IN. W.C.)	ELECTRICAL DATA VOLTS	PHASE	HZ	MCA	MOCP	MAX WEIGHT (LBS)	NOTES
CRAHU-1A	400	6.9	55	72	100	90	1.4	10.00	MERV 8	0.75	460	3	60	5.0	15.0	700	1,2,3,4,5,6
CRAHU-1B	400	6.9	55	72	100	90	1.4	10.00	MERV 8	0.75	460	3	60	5.0	15.0	700	1,2,3,4,5,6
CRAHU-2A	500	56.1	55	72	100	90	11.2	10.00	MERV 8	0.75	460	3	60	7.0	15.0	1200	1,2,3,4,5,6
CRAHU-2B	500	56.1	55	72	100	90	11.2	10.00	MERV 8	0.75	460	3	60	7.0	15.0	1200	1,2,3,4,5,6
CRAHU-2C	500	56.1	55	72	100	90	11.2	10.00	MERV 8	0.75	460	3	60	7.0	15.0	1200	1,2,3,4,5,6
CRAHU-2D	500	56.1	55	72	100	90	11.2	10.00	MERV 8	0.75	460	3	60	7.0	15.0	1200	1,2,3,4,5,6
CRAHU-2E	500	56.1	55	72	100	90	11.2	10.00	MERV 8	0.75	460	3	60	7.0	15.0	1200	1,2,3,4,5,6
CRAHU-2F	500	56.1	55	72	100	90	11.2	10.00	MERV 8	0.75	460	3	60	7.0	15.0	1200	1,2,3,4,5,6

NOTES:
1. PROVIDE PLENUM SUPPLY FANS TO BE LOCATED IN RAISED FLOOR SPACE DIRECTLY BELOW UNIT.
2. PROVIDE FACTORY MOUNTED AND WIRED CONDENSATE PUMP.
3. PROVIDE WITH INTEGRAL DISCONNECT SWITCH.
4. PROVIDE MOISTURE SENSOR UNDER EACH UNIT DIRECTLY CONNECTED TO UNIT CONTROLS.
5. PROVIDE SEPARATE CONTROLS CIRCUIT TO BE CONNECTED TO BUILDING UPS POWER. UNIT SHALL SEQUENTIAL AUTO RESTART AT POWER LOSS EVENTS.
6. PROVIDE AN ADDITIONAL WALL MOUNT CONTROLLER THAT PERMINTS TEH FOLLOWING: INTERCONNECTION OF COOLING UNITS FOR ETAMWORK MODE, DISPALY TO ALLOW SYSTEM VIEW,AND DISPLAY TO ALLOW VIEW OF EACH INDIVIDUAL UNIT.

1

AIR SEPARATOR SCHEDULE

MARK	SERVICE	LOCATION	INLET SIZE	MAX WATER PRESSURE DROP (FT WC)	MAX OPERATING WEIGHT (LBS)
AS-1	CHW	CUP	12"	1.0	4000
AS-2	HW	CUP	8"	1.0	1500

HEAT PUMP CHILLER SCHEDULE (HPC-1)

MARK	LOCATION	HEATING CAPCITY (MBH)	COOLING CAPCITY (TON)	HEATING COP	REFRIGERANT TYPE	LBS OF REFRIGERANT (PER CIRCUIT)	EVAPORATOR FLOW	EWT	LWT	PRESS DROP	FOULING FACTOR (TYPE)	TYPE	CONDENSER FLOW	EWT	LWT	PRESS DROP	FOULING FACTOR (TYPE)	TYPE	ELECTRICAL VOLTS	PHASE	HZ	MCA	MOCP	NOTES
HPC-1	CUP	2,945	200.7	5.5	R410A	24	481	55	45	17.00	0.0001	BRAZED PLATE	589	90	100	17.00	0.00025	BRAZED PLATE	460	3	60	375	450	1,2

NOTES:
1. PROVIDE SINGLE POINT ELECTRICAL CONNECTION.
2. PROVIDE THREE MODULE (MIN) STACKABLE UNIT.

1

SYM	DESCRIPTION	DATE	APPR
1	AMENDMENT CHANGES	03/18/16	CMG

NAVFAC

COMMONWEALTH OF VIRGINIA
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A/E INFO

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SATISFACTORY TO DATE
DES CMG | DRW JLL | CHK JPC
PROJECT MANAGER
IPT TECH. BRANCH HEAD
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DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL FACILITIES ENGINEERING COMMAND – MIDLANT
IPT-HAMPTON ROADS
NAVAL STATION, NORFOLK
NAS OCEANA-DAM NECK ANNEX
VIRGINIA BEACH, VIRGINIA
P-603 MARITIME SURVEILLANCE
SYSTEM FACILTY
MECHANICAL SCHEDULES

SCALE: AS NOTED
EPROJECT NO. 1344924
CONSTR. CONTR. NO. N40085-16-R-6119
NAVFAC DRAWING NO. 12712961
SHEET 195 OF 296
M-602

DRAWFORM REVISION: 10 MAY 2014

FILE NAME: C:\Revit_Projects\82327-P603MSSFacsModels\MEP\82327_M_603_pgregory.rvt
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PUMP SCHEDULE

Mark	LOCATION	TYPE	SERVICE	CAPACITY (GPM)	PUMP HEAD (FT)	SUCTION SIZE (IN)	DISCHARGE SIZE (IN)	PUMP EFFICIENCY (%)	ELECTRICAL DATA MOTOR (RPM)	MOTOR (HP)	MOTOR (TYPE)	SPEED CONTROL TYPE	VOLTS	PHASE	NOTES
P-1A	CUP	VERTICAL SPLIT CASE	CHW	1044.0	105	8	5	79	1760	50	ODP	VFD	460	3	2
P-1B	CUP	VERTICAL SPLIT CASE	CHW	1044.0	105	8	5	79	1760	50	ODP	VFD	460	3	2
P-1C	CUP	VERTICAL SPLIT CASE	CHW	1044.0	105	8	5	79	1760	50	ODP	VFD	460	3	2
P-2A	CUP	VERTICAL SPLIT CASE	CW	1305.0	85	8	5	81	1160	40	ODP	VFD	460	3	1,2
P-2B	CUP	VERTICAL SPLIT CASE	CW	1305.0	85	8	5	81	1160	40	ODP	VFD	460	3	1,2
P-2C	CUP	VERTICAL SPLIT CASE	CW	1305.0	85	8	5	81	1160	40	ODP	VFD	460	3	1,2
P-3A	CUP	BASE MOUNTED END SUCTION	HHW	589.0	100	6	5	80	1760	25	ODP	VFD	460	3	2
P-3B	CUP	BASE MOUNTED END SUCTION	HHW	589.0	100	6	5	80	1760	25	ODP	VFD	460	3	2
P-4A	CUP	BASE MOUNTED END SUCTION	CHW	482.0	40	6	5	80	1160	10	ODP	VFD	460	3	2
P-4B	CUP	BASE MOUNTED END SUCTION	CHW	482.0	40	6	5	80	1160	10	ODP	VFD	460	3	2

NOTES:
1. PROVIDE PUMP REQUIRING NO GREATER THAN > 7 FT WC NPSH.
2. PROVIDE SPRING ISOLATED INERTIA BASE.

CONDENSATE PUMP SCHEDULE

MARK	LOCATION	CONDENSATE REMOVAL GALLONS PER HOUR	MOTOR HP	VOLTAGE	PHASE	FREQUENCY	NOTES
CP-1	603	27.6	1/50	115	1	60 HZ	NEMA 5-20R PLUG
CP-2	CUP	1	1/50	115	1	60 HZ	NEMA 5-20R PLUG

FAN COIL UNIT (FCU) SCHEDULE 1/2

MARK	LOCATION	SUPPLY FAN DATA TOTAL AIRFLOW (CFM)	EXT. STATIC PRESSURE (IN WC)	FAN QUANTITY	MOTOR HP	VOLTS	PHASE	CHILLED WATER COOLING COIL MAX FACE VELOCITY (FPM)	SENSIBLE CAPACITY (MBH)	TOTAL CAPACITY (MBH)	EAT DB (°F)	EAT WB (°F)	LAT DB (°F)	LAT WB (°F)	EWT (°F)	LWT (°F)	CHW FLOW (GPM)	MAX WATER PRESSURE DROP (FT WC)
FCU-1A	603	1200	0.0	3	0.135	208	1	500	24.7	30.9	72	60	52.8	50.9	45	55	6.2	10.00
FCU-1B	603	1200	0.0	3	0.135	208	1	500	24.7	30.9	72	60	52.8	50.9	45	55	6.2	10.00
FCU-2A	603	1200	0.0	3	0.135	208	1	500	24.7	30.9	72	60	52.8	50.9	45	55	6.2	10.00
FCU-2B	603	1200	0.0	3	0.135	208	1	500	24.7	30.9	72	60	52.8	50.9	45	55	6.2	10.00

FAN COIL UNIT (FCU) SCHEDULE 2/2

Mark	ELECTRIC HEATING DATA MAX COIL FACE VELOCITY (FPM)	TOTAL CAPACITY (KW)	FLA	MCA	MOCP	HERTZ	VOLTS	PHASE	FILTER TYPE	DIRTY FILTER PRESSURE DROP (IN WC)	MAX WEIGHT (LBS)	NOTES
FCU-1A	500	5	23	28.8	30	60	208	1	THROW-AWAY	0.25	400	1
FCU-1B	500	5	23	28.8	30	60	208	1	THROW-AWAY	0.25	400	1
FCU-2A	500	5	23	28.8	30	60	208	1	THROW-AWAY	0.25	400	1
FCU-2B	500	5	23	28.8	30	60	208	1	THROW-AWAY	0.25	400	1

NOTES:
1. PROVIDE PRECISION COOLING FAN COIL UNIT, REFER TO CRAHU UNIT SPECIFICATIONS FOR PRODUCT INFORMATION.

1

HYDRONIC ACCESSORIES

SSFS-1 - SIDE STREAM FILTRATION SYSTEM
PROVIDE A SIDE STREAM FILTRATION SYSTEM FOR CONDENSER WATER FILTRATION
PROVIDE CONNECTION TO CHW AND HHW SYSTEMS FOR PERIOD MANUAL SWITCH OVER
FILTRATION SYSTEM RATING: 120-140 GPM
FILTER CAPACITY: 140 GPM
FACKWASH FLOW RATE: 70 GPM
FILTER INLET / OUTLET SIZE: 3 INCHES
DOMESTIC WATER CONNECTION: 2 INCHES
BACKWASH DRAIN CONNECTION: 2 INCHES
VESSEL SIZE: 36"ø X 61.5" ASME STAMPED, SSTL
MOTOR POWER: 5 HP, 460V, 3ø, 60Hz,

1. PROVIDE SINGLE POINT CONNECTION
2. PROVIDE ON BOARD MICRPROCESSOR CONTROLLER.

BLOWER COIL UNIT (BCU) SCHEDULE 1/2

MARK	LOCATION	SUPPLY FAN DATA TOTAL AIRFLOW (CFM)	OUTSIDE AIRFLOW (CFM)	EXT. STATIC PRESSURE (IN WC)	FAN QUANTITY	MOTOR HP	VOLTS	PHASE	CHILLED WATER COOLING COIL MAX FACE VELOCITY (FPM)	SENSIBLE CAPACITY (MBH)	TOTAL CAPACITY (MBH)	EAT DB (°F)	EAT WB (°F)	LAT DB (°F)	LAT WB (°F)	EWT (°F)	LWT (°F)	CHW FLOW (GPM)	MAX WATER PRESSURE DROP (FT WC)
BCU-1	CUP	1710	240	0.75	1	1	460	3	500	48.9	57.4	81.9	66.3	55.9	55.4	45	55	11.5	4.00
BCU-1A	CUP	1710	240	0.75	1	1	460	3	500	48.9	57.4	81.9	66.3	55.9	55.4	45	55	11.5	4.00
BCU-2A	603	2700	260	0.5	1	3	460	3	500	57.5	65.9	73.8	62.3	54.1	53.9	45	55	13.2	1.25
BCU-2B	603	2700	260	0.5	1	3	460	3	500	57.5	65.9	73.8	62.3	54.1	53.9	45	55	13.2	1.25
BCU-3	CUP	400	140	0.5	1	1	460	3	500	11.1	16.6	80.1	67.7	54.9	54.4	45	55	3.3	4.00
BCU-4	CUP	5580	410	1	1	5	460	3	500	134.8	168.6	76.2	64	53.8	53.8	45	55	33.7	6.00

BLOWER COIL UNIT (BCU) SCHEDULE 2/2

MARK	HOT WATER HEATING COIL DATA MAX COIL FACE VELOCITY (FPM)	TOTAL CAPACITY (MBH)	EAT DB (°F)	LAT DB (°F)	EWT (°F)	LWT (°F)	HHW FLOWRATE (GPM)	MAX WATER PRESSURE DROP (FT WC)	FILTER TYPE	DIRTY FILTER PRESSURE DROP (IN WC)	MAX WEIGHT (LBS)
BCU-1	500	43.8	51	83	100	90	8.8	1.00	MERV 8	0.75	400
BCU-1A	500	43.8	51	83	100	90	8.8	1.00	MERV 8	0.75	400
BCU-2A	500	26.8	52.9	83	100	88	5.4	0.50	MERV 8	0.75	700
BCU-2B	500	26.8	52.9	83	100	88	5.4	0.50	MERV 8	0.75	700
BCU-3	500	14.5	51.6	85	100	90	2.9	2.00	MERV 8	0.75	200
BCU-4	500	104.1	57.9	85	100	90	20.8	6.00	MERV 8	0.75	1200

EXHAUST FAN SCHEDULE

MARK	LOCATION	FAN TYPE	AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (IN WG)	ELECTRICAL DATA FAN SPEED (RPM)	FAN MOTOR (HP)	VOLTS	PHASE	DRIVE TYPE	NOTES
EF-24	CUP	CENTRIFUGAL DOWNBLAST	10000	0.375	1725	3	460	3	BELT	
EF-24A	CUP	CENTRIFUGAL DOWNBLAST	10000	0.375	1725	3	460	3	BELT	
EF-25	CUP	INLINE MIXED FLOW	3600	0.5	1725	1.5	460	3	BELT	
EF-27	CUP	CENTRIFUGAL DOWNBLAST	235	0.5	1725	0.33	115	1	BELT	
EF-28A	603	INLINE CENTRIFUGAL	1080	0.5	1725	0.5	115	1	BELT	
EF-28B	603	INLINE CENTRIFUGAL	1080	0.5	1725	0.5	115	1	BELT	
EF-29A	603	INLINE CENTRIFUGAL	800	0.375	1725	0.5	115	1	DIRECT	
EF-29B	603	INLINE CENTRIFUGAL	800	0.375	1725	0.5	115	1	DIRECT	
EF-30A	603	INLINE CENTRIFUGAL	2000	0.375	1725	0.75	460	3	DIRECT	
EF-30B	603	INLINE CENTRIFUGAL	2000	0.375	1725	0.75	460	3	DIRECT	
GEF-1A	CUP	INLINE AXIAL	18250	0.75	1725	7.5	460	3	BELT	1
GEF-1B	CUP	INLINE AXIAL	18250	0.75	1725	7.5	460	3	BELT	1
GEF-1C	CUP	INLINE AXIAL	18250	0.75	1725	7.5	460	3	BELT	1
GEF-1D	CUP	INLINE AXIAL	18250	0.75	1725	7.5	460	3	BELT	1
GEF-1E	CUP	INLINE AXIAL	18250	0.75	1725	7.5	460	3	BELT	1

NOTES:
1. PROVIDE VARIABLE SPEED DRIVE FOR SPEED CONTROL.

RETURN FAN SCHEDULE

MARK	LOCATION	FAN TYPE	AIRFLOW (CFM)	FAN SPEED (RPM)	EXTERNAL STATIC PRESSURE (IN WG)	FAN MOTOR (HP)	SPEED CONTROL TYPE	VOLTS	PHASE	DRIVE TYPE	INLET SOUND dB OCTAVE (MAX) 63	125	250	500	1K	2K	4K	8K
RAF-4A	603	INLINE	11870	1725	1.75	7.5	VFD	115	1	BELT	75	89	81	80	79	74	69	62
RAF-4B	603	INLINE	11870	1725	1.75	7.5	VFD	115	1	BELT	75	89	81	80	79	74	69	62

SYM	DESCRIPTION	DATE	APPR
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ACTIVITY
SATISFACTORY TO DATE
DES CMG | DRW JLL | CHK JPC
PROJECT MANAGER
IPT TECH. BRANCH HEAD
CHIEF ENG/ARCH

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL FACILITIES ENGINEERING COMMAND – MIDLANT
NAVAL STATION NORFOLK
IPT-HAMPTON ROADS
NAS OCEANA-DAM NECK ANNEX
VIRGINIA BEACH, VIRGINIA
P-603 MARITIME SURVEILLANCE SYSTEM FACILTY
MECHANICAL SCHEDULES

SCALE: AS NOTED
EPROJECT NO. 1344924
CONSTR. CONTR. NO. N40085-16-R-6119
NAVFAC DRAWING NO. 12712962
SHEET 196 OF 296
M-603
DRAWFORM REVISION: 10 MAY 2014

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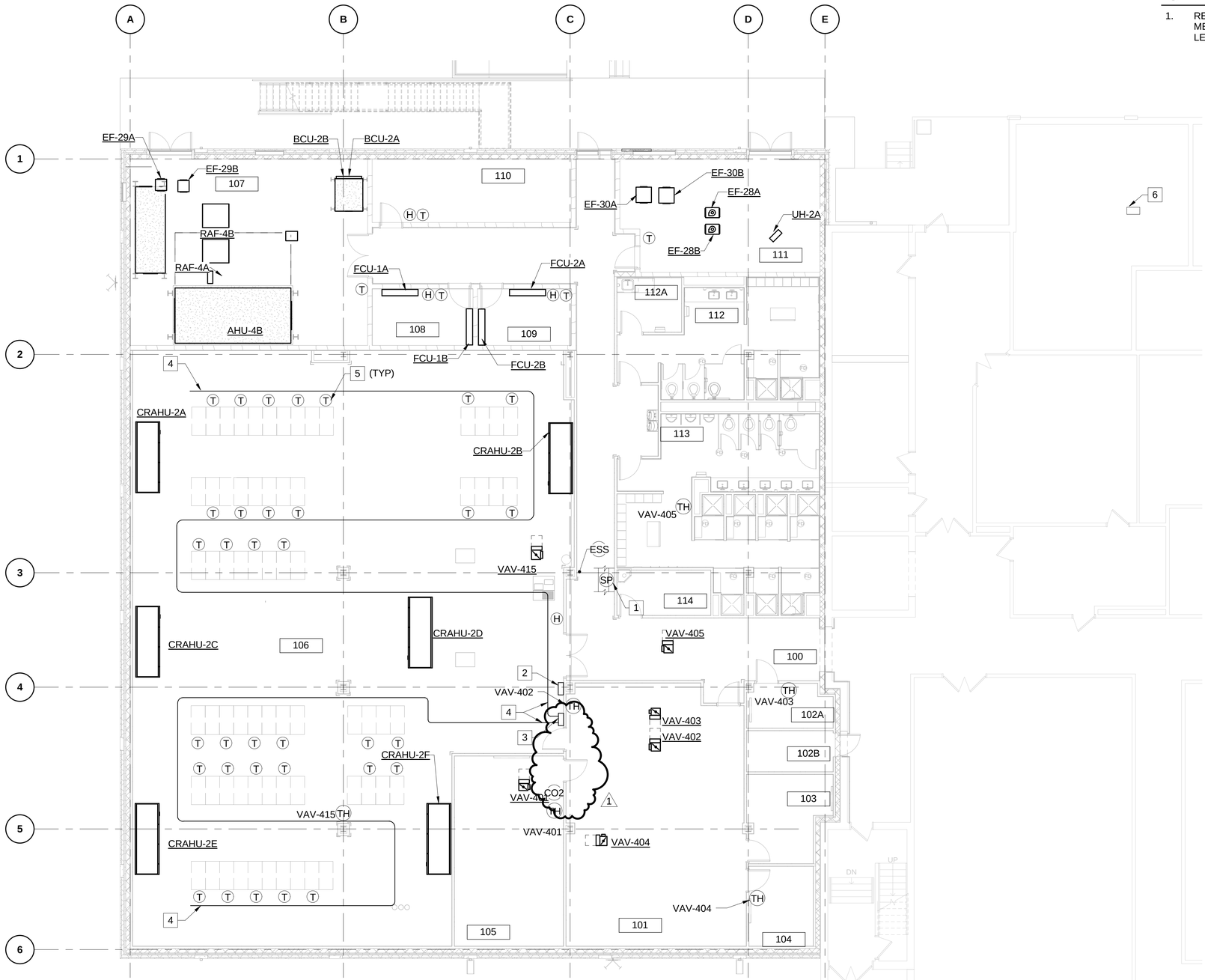


PLAN NORTH

P-603 - CONTROL AND INSTRUMENTATION - FIRST FLOOR

SCALE: 1/8" = 1'-0"

GENERAL NOTES:

1. REFER TO SHEET M-001 FOR MECHANICAL GENERAL NOTES, LEGEND, AND ABBREVIATIONS.

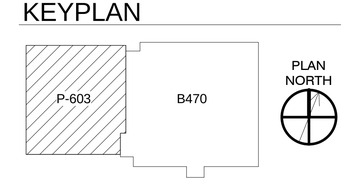
NEW WORK NOTES:

1. DUCT STATIC PRESSURE SENSOR (AHU-4A/4B)
2. COMPUTER ROOM UNIT MASTER CONTROL PANEL.
3. LEAK DETECTION PANEL.
4. PROVIDE LEAK DETECTION ROPE AS SHOWN. PROVIDE TWO INDEPENDENT CIRCUITS. PROVIDE PLAQUE ON WALL WITH FLOOR PLAN INDICATING GRADUATIONS IN 2' INCREMENTS TO CORRESPOND WITH LEAK DETECTION PANEL.
5. TEMPERATURE SENSORS MOUNTED TO SECOND FLOOR STRUCTURE. ENGAGE CRAHU MANUFACTURER TO PROVIDE INTEGRATION. SUSPEND TEMPERATURE SENSORS TO LOCATE THEM 3' +/-6" FROM RACKS.
6. INTEGRATE DDC CONTROL FOR B470 THROUGH ETHERNET HUB IN EXISTING PANEL. ROUTE NEW CAT 5e TO CENTRAL WORK STATION IN B469.

ROOM SCHEDULE

NUMBER	NAME
100	CORRIDOR
101	EMD OPEN OFFICE
102A	BUNK ROOM
102B	BUNK ROOM
103	OFFICE
104	OFFICE
105	TRAINING CLASSRM
106	EQUIPMENT SPACE
107	MECH
108	NMCI
109	COMM
110	UPS
111	ELECT
112	WOMEN'S RESTRM / SHOWER
112A	LACTATION
113	MEN'S RESTRM / SHOWER
114	JAN / STORAGE
119	UNPACKING ROOM
120	ELEV. EQUIP.
121	WOMEN'S SHOWER
122	LOADING DOCK
123	MECH EQUIPMENT ROOM
125	ELEC EQUIPTMENT ROOM
126	FAC SUPP
126A	GYM
127	FAC SUPP OFFICE
128	MENS
129	WOMENS

KEYPLAN



GRAPHIC SCALE:

1/8" =1'-0" 0' 4' 8' 16'

SYM	DESCRIPTION	DATE	APPR
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NAVAL STATION, NORFOLK
NAS OCEANA-DAM NECK ANNEX
VIRGINIA BEACH, VIRGINIA
P-603 MARITIME SURVEILLANCE SYSTEM FACILTY
P-603 - CONTROL AND INSTRUMENTATION - FIRST FLOOR

SCALE: AS NOTED
EPROJECT NO. 1344924
CONSTR. CONTR. NO. N40085-16-R-6119
NAVFAC DRAWING NO. 12712971
SHEET 205 OF 296
MI101

DRAWFORM REVISION: 10 MAY 2014

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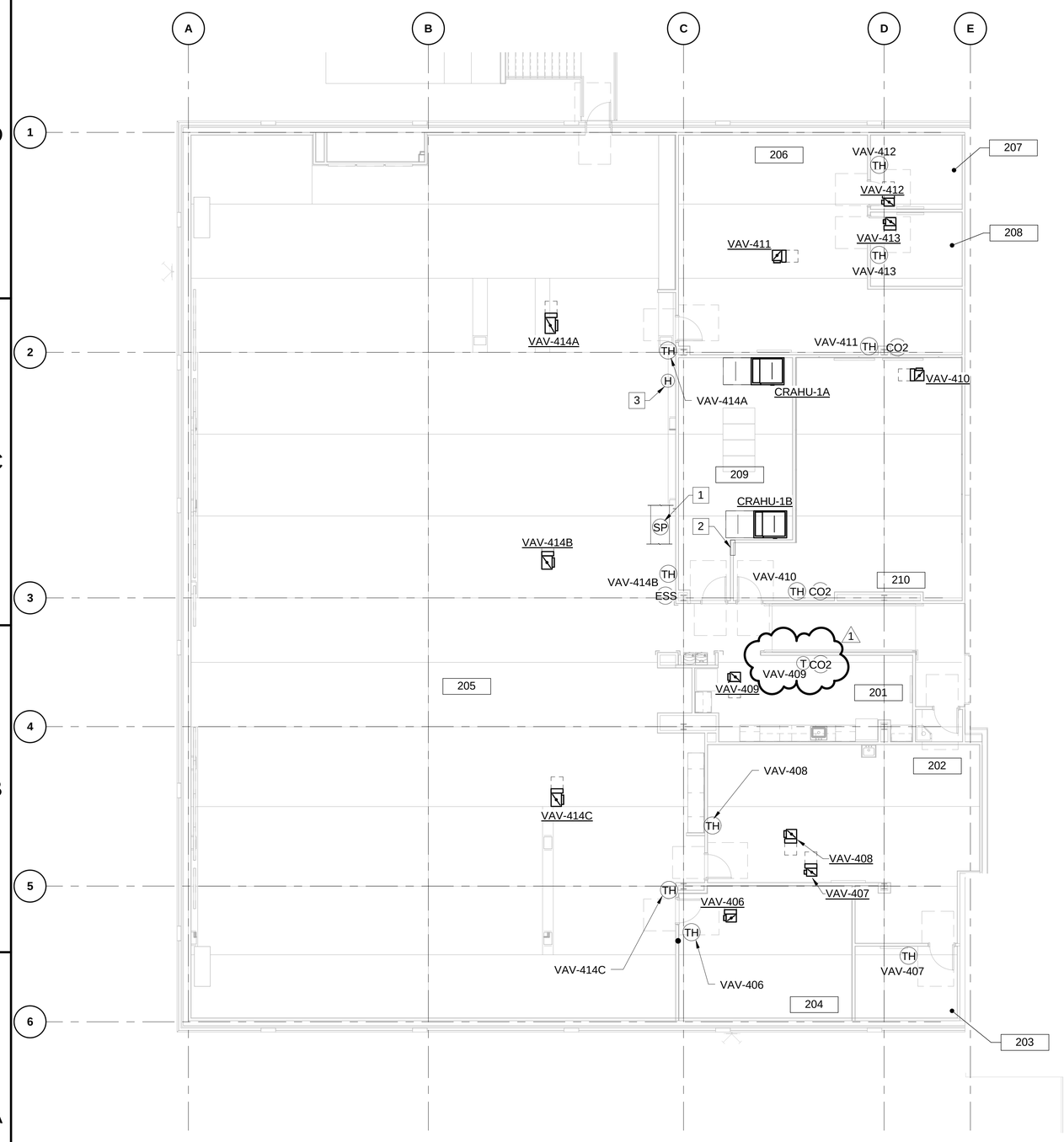


PLAN NORTH

P-603 - CONTROL AND INSTRUMENTATION - SECOND FLOOR

SCALE: 1/8" = 1'-0"

GENERAL NOTES:

1. REFER TO SHEET M-001 FOR MECHANICAL GENERAL NOTES, LEGEND, AND ABBREVIATIONS.

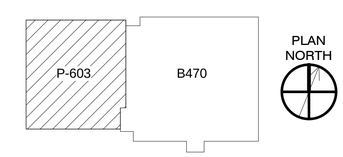
NEW WORK NOTES:

1. DUCT STATIC PRESSURE SENSOR (AHU-4A/4B). PROVIDE AN ACCESS PANEL IN HARD CEILING FOR SENSOR ACCESS.
2. ADDRESSABLE CRAH UNIT CONTROL PANEL.
3. DOAU SPACE HUMIDITY SENSOR

ROOM SCHEDULE

NUMBER	NAME
201	BREAK ROOM
202	TRAINING
203	T/O
204	US/UK SECURE ROOM
205	WATCH-FLOOR
206	OPS OPEN OFFICE
207	OPS
208	CUR OPS
209	DATA/EQUIP. ROOM
210	CONFERENCE ROOM
211	JAN

KEYPLAN



GRAPHIC SCALE:

1/8" =1'-0"

0' 4' 8' 16'

SYM	DESCRIPTION	DATE	APPR
1	AMENDMENT CHANGES	03/18/16	CMG

NAVFAC

COMMONWEALTH OF VIRGINIA
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APPROVED
FOR COMMANDER NAVFAC / B.L.T.L.
ACTIVITY
SATISFACTORY TO DATE
DES CMG | DRW JLL | CHK JPC
PROJECT MANAGER
IPT TECH. BRANCH HEAD
CHIEF ENG/ARCH

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
IPT-HAMPTON ROADS
NAVAL FACILITIES ENGINEERING COMMAND – MIDLANT
NAVAL STATION NORFOLK
NAS OCEANA-DAM NECK ANNEX
VIRGINIA BEACH, VIRGNIA
P-603 MARITIME SURVEILLANCE SYSTEM FACILTY
P-603 - CONTROL AND INSTRUMENTATION - SECOND FLOOR

SCALE: AS NOTED
EPROJECT NO. 1344924
CONSTR. CONTR. NO. N40085-16-R-6119
NAVFAC DRAWING NO. 12712972
SHEET 206 OF 296
MI102

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FILE NAME: C:\Revit_Projects\82327-P603MSSFacMod\ds\MEP\82327_M_603_pgrepony.rvt
REVDATE: 3/25/2016 10:34:53 AM

CONTROL SCHEMATIC SYMBOLS

- BOILER
- CHILLER
- COIL, COOLING (C)
- COIL, COOLING, DIRECT-EXPANSION (DX)
- COIL, HEATING (H)
- COIL, ELECTRIC HEATING
- COIL, PRECOOL (PC)
- COIL, REHEAT (RH)
- THERMOWELL IN PIPE
- VALVE, BALANCING
- PUMP
- DAMPER, PARALLEL BLADE NORMALLY OPEN OR CLOSED AS SHOWN (M)
- DAMPER, OPPOSED BLADE NORMALLY OPEN OR CLOSED AS SHOWN (M)
- CONTROL VALVE, TWO WAY, DDC NORMALLY OPEN OR CLOSED AS SHOWN (M)
- PRESSURE SENSOR, DIFFERENTIAL (DP)
- FAN
- FAN WITH AIR FLOW MEASURING STATION (AMS)
- RELAY (R)
- STARTER (S)
- VARIABLE FREQUENCY DRIVE (VFD)
- ELECTRONICALLY COMMUTATED MOTOR (ECM)
- CARBON DIOXIDE SENSOR (CO2) 1
- DISCONNECT
- FILTER
- POSITIVE POSITIONER SEE "ACTUATOR, PNEUMATIC" (PP)
- PRESSURE GAGE (P)
- TEMPERATURE GAGE (T)
- SMOKE DETECTOR, DUCT-MOUNTED (FACP)
- FLOW METER (FM)
- TEMPERATURE SENSOR
- SPACE THERMOSTAT WITH SPECIFIED IO FUNCTIONS (T)
- SPACE HUMIDITY SENSOR WITH SPECIFIED IO FUNCTIONS (H)
- TEMPERATURE AVERAGING SENSOR (T)
- TEMPERATURE LOW LIMIT / FREEZESTAT (FS)
- DUCT STATIC PRESSURE SENSOR (SP)
- DIFFERENTIAL PRESSURE SENSOR (DP)
- LEVEL SENSOR (LVL)
- REFRIGERANT CONCENTRATION SENSOR (RCS)
- HIGH DUCT STATIC PRESSURE SENSOR (HSP)
- AIR FLOW MEASURING STATION (AMS)
- EMERGENCY HVAC SHUTDOWN (ESS)
- BINARY INPUT (BI#)
- BINARY OUTPUT (BO#)
- ANALOG INPUT (AI#)
- ANALOG OUTPUT (AO#)

ABBREVIATIONS AND ACRONYMS

2P	TWO-POSITION (CONTROL SIGNAL)
ADJ	ADJUSTABLE
AFMA	AIRFLOW MEASUREMENT ARRAY
AI	ANALOG INPUT
ALM	ALARM
AMS	AIRFLOW MEASUREMENT STATION
AO	ANALOG OUTPUT
BA	BYPASS AIR
BD	BAROMETRIC BACK-DRAFT DAMPER
BLDG	BUILDING
BUT	BUTTON
C	COMMAND (MODULATING CONTROL SIGNAL)
CD	COLD DECK
CHLR	CHILLER
CLG	COOLING
CO2	CARBON DIOXIDE MONITOR
COM	COMMON
COMP	COMPARATOR
CP	CONFIGURATION PROPERTY
CWR	CONDENSER WATER RETURN
CWS	CONDENSER WATER SUPPLY
CT	CURRENT TRANSFORMER/SWITCH
CHWR	CHILLED WATER RETURN
CHWS	CHILLED WATER SUPPLY
D	DAMPER
DA	DISCHARGE AIR
DB	DEADBAND
DDC	DIRECT DIGITAL CONTROLLER
DI	DIGITAL INPUT
DO	DIGITAL OUTPUT
DIFF	DIFFERENCE
DIR	DIRECT (CONTROL ACTION)
DIS	DISABLE
DISP	DISPLAY
DT	DUAL TEMP
DTWR	DUAL TEMP WATER RETURN
DTWS	DUAL TEMP WATER SUPPLY
DX	DIRECT EXPANSION (UNIT)
EA	EXHAUST AIR
ECO	ECONOMIZER
EF	EXHAUST FAN
ECM	ELECTRONICALLY COMMUTATED MOTOR
ENA	ENABLE
EP	ELECTRIC TO PNEUMATIC TRANSDUCER
EPS	ELECTRIC TO PNEUMATIC SWITCH
ESS	EMERGENCY SHUTDOWN SWITCH
F	FLOW
FACP	FIRE ALARM CONTROL PANEL
FLT	FILTER
FS	FREEZE STAT
GUI	GRAPHICAL USER INTERFACE
H	HUMIDISTAT
HD	HOT DECK
HL	HIGH LIMIT
HTG	HEATING
HTHW	HIGH TEMPERATURE HOT WATER
HUM	HUMIDIFIER
HWR	HEATING HOT WATER RETURN
HWS	HEATING HOT WATER SUPPLY
HX	HEAT EXCHANGER
I/O	INPUT/OUTPUT
LDP	LOCAL DISPLAY PANEL
LL	LOW LIMIT
M&C	MONITORING & CONTROL (SOFTWARE)
MA	MIXED AIR
MINOA	MINIMUM OUTSIDE AIR
MS	MOTOR STARTER
MUA	MAKE UP AIR
N/A	NOT APPLICABLE
NC	NORMALLY CLOSED
NIC	NETWORK CONFIGURATION INPUT
NO	NORMALLY OPEN
OA	OUTSIDE AIR
OCC	OCCUPIED
ODT	ON DELAY TIMER
OWS	OPERATOR WORKSTATION
P	PRESSURE
PC	PRE-COOLING
PCW	PRIMARY CHILLER WATER
PCWR	PRIMARY CHILLER WATER RETURN
PCWS	PRIMARY CHILLER WATER SUPPLY
PH	PREHEAT
PMP	PUMP
PP	POSITIVE POSITIONER
R	RELAY
RA	RETURN AIR
REV	REVERSE (CONTROL ACTION)
RF	RETURN FAN
RH	RELATIVE HUMIDITY
RLA	RELIEF AIR
RM	ROOM
RST	RESET
RT	RATE
RTU	ROOF TOP UNIT
S	STATUS
SA	SUPPLY AIR
SEC	SECONDARY
SF	SUPPLY FAN
SMK	SMOKE
SNVT	STANDARD NETWORK VARIABLE TYPE
SOO	SEQUENCE OF OPERATION
SP	SETPOINT
SS	START/STOP COMMAND
STAT	THERMOSTAT
SYS	SYSTEM
SCHD	SCHEDULER
T	TEMPERATURE
TAP	TAP, PRESSURE
TH	THERMOSTAT
UNOCC	UNOCCUPIED
V	VALVE
VAV	VARIABLE AIR VOLUME
VFD	VARIABLE FREQUENCY DRIVE
WB	WET BULB (TEMPERATURE)
ZN	ZONE

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P-603 MARITIME SURVEILLANCE SYSTEM FACILTY
CONTROLS LEGEND AND ABBREVIATIONS

SCALE: AS NOTED
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CONSTR. CONTR. NO. N40085-16-R-6119
NAVFAC DRAWING NO. 12712974
SHEET 208 OF 296
MI700

DRAWFORM REVISION: 10 MAY 2014

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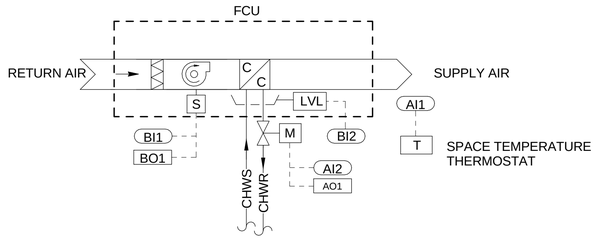


CHW FCU UNITS

GENERAL DESCRIPTION:
DUCTLESS CHW AIR CONDITIONING UNITS SHALL BE FURNISHED AND CONTROLLED BY THE MANUFACTURERS THERMOSTAT.

COOLING:
THE DDC SYSTEM SHALL MONITOR THE TEMPERATURE OF THE SPACE BEING SERVED BY THE UNIT AND THE FCU STATUS. WHEN THE SPACE TEMPERATURE EXCEEDS THE SETPOINT, THE UNIT SHALL ENGAGE.

MONITOR:
SPACE TEMPERATURE.

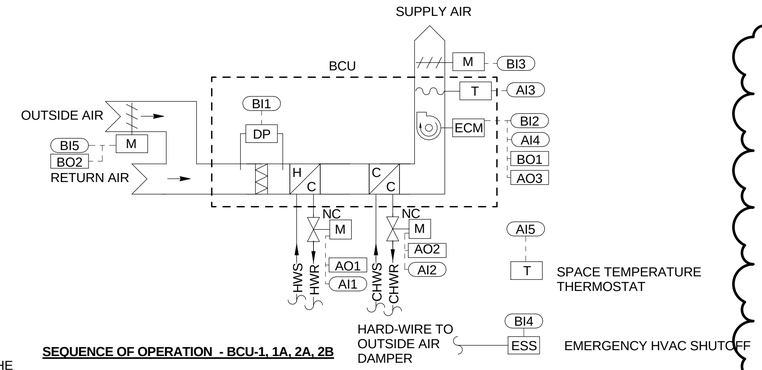
LEAD/LAG:
DDC SHALL CHANGE LEAD FCU AFTER EVERY 336 HOURS OF OPERATION.

UPON FAILURE OF LEAD UNIT, DDC SHALL ENABLE LAG UNIT AND DISABLE LEAD UNIT.

ALARM:
- SPACE TEMPERATURE EXCEEDS SETPOINT BY 3°F OR MORE
- ALARM AND DISABLE UNIT IF HIGH CONDENSATE LEVEL IS SENSED BY OVERFLOW SWITCH.
- UNIT FAILURE

SETPOINT:
INITIAL SETPOINT FOR COMMUNICATIONS ROOMS IS 72°F.

CHW FAN COIL UNIT - DDC POINTS SCHEDULE			
INPUTS		OUTPUTS	
AI1	SPACE TEMPERATURE	AO1	CHW VALVE CONTROL
AI2	CHW VALVE POSITION		
BI1	FCU STATUS	BO1	FAN (ON/OFF)
BI2	CONDENSATE HIGH LEVEL		



SEQUENCE OF OPERATION - BCU-1, 1A, 2A, 2B

GENERAL DESCRIPTION:
BCU SHALL BE ENABLED THROUGH THE FACILITY DDC ENERGY MANAGEMENT SYSTEM (EMS). BCU IS EXPECTED TO OPERATE CONTINUOUSLY, 24 HOURS PER DAY, 365 HOURS PER YEAR, DURING WHICH IT WILL OPERATE IN THE OCCUPIED MODE.

BCU SHALL HAVE A VARIABLE SPEED FAN, HEATING HOT WATER COIL, CHILLED WATER COOLING COIL, CONTROLLER, AND REQUIRED DAMPERS AND SENSORS. UNIT DISCHARGE DAMPER SHALL BE INTERLOCKED WITH FAN OPERATION. OUTSIDE AIR DAMPER SHALL BE OPEN WHEN THE FAN IS OPERATIONAL.

COOLING:
THE DDC SHALL MONITOR THE SPACE TEMPERATURE. WHEN THE SPACE TEMPERATURE RISES ABOVE THE COOLING SETPOINT, THE FAN SHALL BE ENERGIZED AND RAMP TO MINIMUM SPEED (30%) AND THE CHW VALVE SHALL MODULATE OPEN. IF CHW VALVE IS FULLY OPEN AND SPACE TEMPERATURE IS STILL ABOVE COOLING SETPOINT, FAN SHALL RAMP UNTIL LOAD IS MET. UPON REACHING THE COOLING SETPOINT, THE CHW VALVE SHALL MODULATE CLOSED AND THE FAN SHALL BE DE-ENERGIZED.

HEATING:
THE DDC SHALL MONITOR THE SPACE TEMPERATURE. WHEN THE SPACE TEMPERATURE FALLS BELOW THE HEATING SETPOINT, THE FAN SHALL BE ENERGIZED AND RAMP TO MINIMUM SPEED (30%) AND THE HHW VALVE SHALL MODULATE OPEN. IF HHW VALVE IS FULLY OPEN AND SPACE TEMPERATURE IS STILL BELOW HEATING SETPOINT, FAN SHALL RAMP UNTIL LOAD IS MET. UPON REACHING THE HEATING SETPOINT, THE HHW VALVE SHALL MODULATE CLOSED AND THE FAN SHALL BE DE-ENERGIZED.

LEAD/LAG:
DDC SHALL CHANGE LEAD BCU AFTER EVERY 336 HOURS OF OPERATION. UPON FAILURE OF LEAD UNIT, DDC SHALL ENABLE LAG UNIT AND DISABLE LEAD UNIT.

ATFP SHUTDOWN:
UPON RECEIVING A SHUTDOWN SIGNAL FROM ESS (EMERGENCY SHUTDOWN SWITCH) IN THE ASSOCIATED BUILDING, THE OUTSIDE DAMPER SHALL CLOSE. THE UNIT SHALL CONTINUE TO PROVIDE HEATING AND COOLING TO THE SPACE. ESS SHALL BE HARDWIRED TO OUTSIDE AIR DAMPER.

SETPOINTS:
- INITIAL COOLING SETPOINT IS 72°F (ADJUSTABLE)
- INITIAL HEATING SETPOINT IS 68°F (ADJUSTABLE)

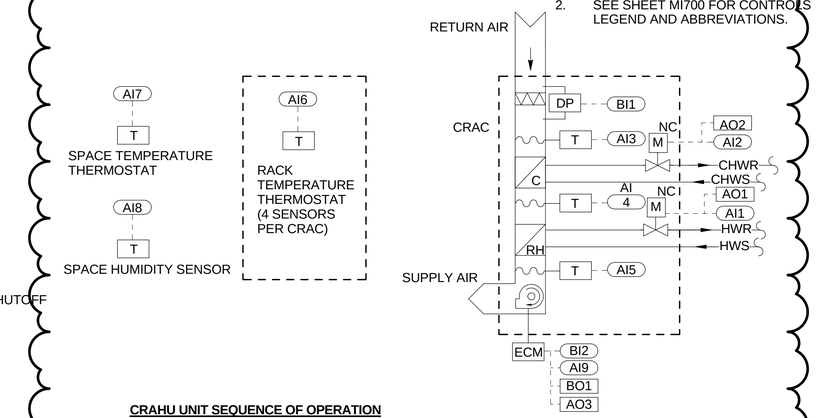
ALARMS:
AN ALARM WILL BE TRANSMITTED AS INDICATED FOR THE FOLLOWING CONDITIONS:

- SUPPLY FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF
- SUPPLY FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON
- DAMPER COMMAND FAILURE
- HIGH DISCHARGE TEMPERATURE
- LOW DISCHARGE AIR TEMPERATURE
- HIGH STATIC PRESSURE
- DIRTY FILTERS

REDUNDANT BLOWER COIL UNIT - DDC POINTS SCHEDULE			
INPUTS		OUTPUTS	
AI1	HHW VALVE POSITION	AO1	HHW VALVE CONTROL
AI2	CHW VALVE POSITION	AO2	CHW VALUE CONTROL
AI3	DISCHARGE TEMPERATURE	AO3	FAN SPEED CONTROL
AI4	FAN SPEED (FEEDBACK)		
AI5	SPACE TEMPERATURE		
BI1	DIRTY FILTER	BO1	FAN (ON /OFF)
BI2	FAN STATUS	BO2	OA DAMPER
BI3	SA DAMPER (OPEN/CLOSE)		
BI4	HVAC ESS		
BI5	OA DAMPER (OPEN/CLOSE)		

GENERAL NOTES:

1. REFER TO SHEET M-001 FOR MECHANICAL GENERAL NOTES, LEGEND, AND ABBREVIATIONS.
2. SEE SHEET MI700 FOR CONTROLS LEGEND AND ABBREVIATIONS.



CRAHU UNIT SEQUENCE OF OPERATION

GENERAL DESCRIPTION:
CRAC UNITS IN ROOM ARE TO BE CONTROLLED THROUGH LOCAL CONTROLLER. CONTROLLER SHALL UTILIZE "TEAM" MODE TO ALLOW MULTIPLE UNITS IN ROOM TO OPERATE AS ONE. EACH CONTROLLER SHALL CONNECT TO DDC SYSTEM. ONE CONTROLLER SHALL BE ASSIGNED AS THE MASTER CONTROLLER TO COORDINATE "TEAM" MODE. IF UNIT ASSIGNED AS MASTER FAILS, PASS THE MASTER CONTROLLER FUNCTION TO ANOTHER UNIT TEMPORARILY UNTIL THE MASTER UNIT IS RESTORED TO OPERATION.

COOLING:
LOCAL CONTROLLER SHALL SEQUENCE UNITS AND CHW VALVES TO MAINTAIN COOLING SETPOINT. RACK TEMPERATURE SHALL BE MAINTAINED BY MODULATING CHW VALVES AND FAN SPEED. CONTROLLER SHALL SEQUENCE UNITS TO ALLOW FANS TO OPERATE AT LOW SPEED TO SAVE FAN ENERGY.

DE-HUMIDIFICATION:
LOCAL CONTROLLER SHALL SEQUENCE UNITS, CHW VALVES, AND HHW VALVES TO KEEP SPACE HUMIDITY BELOW UPPER HUMIDITY LIMIT. "TEAM" MODE SHALL COORDINATE RESPONSES OF ALL UNITS TO THE SPACE HUMIDITY.

LEAD/LAG:
LOCAL CONTROLLER SHALL SEQUENCE UNITS TO MAINTAIN EQUAL RUN HOURS.

FAN CONTROL:
FAN SHALL BE UNDER CONTROL OF THE LOCAL CONTROLLER TO MAINTAIN COOLING SETPOINT WHEN UNIT IS OPERATIONAL. WHEN UNIT IS NON-OPERATIONAL, CONTROLLER SHALL OPERATE FAN AS A BACKDRAFT DAMPER TO NOT ALLOW REVERSE AIRFLOW THROUGH THE UNIT.

ALARM:
LOCAL CONTROLLER BY UNIT MANUFACTURER SHALL ALARM DDC ON:
- FAN FAILURE
- HIGH RACK TEMPERATURE
- HIGH SPACE TEMPERATURE
- HIGH SPACE HUMIDITY
- DIRTY FILTER

SET POINTS:
1. INITIAL COOLING SETPOINT IS 72°F (ADJ.)
2. UPPER HUMIDITY LIMIT IS 50% RH (ADJ.)

RACK TEMPERATURE SENSORS
EACH UNIT CONTROLLER SHALL BE CAPABLE OF DIRECTLY ACCEPTING UP TO 10 RACK TEMPERATURE SENSORS. AS PART OF THE TEAMWORK MODE CONTROLLERS SHALL BE ABLE TO SHARE SENSOR DATA AND USE TO CONTROL THE UNITS. SENSOR DATA SHALL BE USED TO CONTROL FAN SPEED BASED OFF OF EITHER A MINIMUM, MAXIMUM OR AVERAGE TEMPERATURE. SENSORS SHALL CONNECT TO CONTROLLER IN A DAISY CHAIN FASHION WITH CANBUS CABLE TO PROVIDE FOR ONE HOME RUN TO CONTROLLER.

CRAC UNIT - DDC POINTS SCHEDULE			
INPUTS		OUTPUTS	
AI1	HHW VALVE POSITION	AO1	HHW VALVE CONTROL
AI2	CHW VALVE POSITION	AO2	CHW VALUE CONTROL
AI3	RETURN AIR TEMPERATURE	AO3	ECM FAN SPEED CONTROL
AI4	CLG COIL DISCHARGE AIR TEMPERATURE		
AI5	REHEAT COIL DISCHARGE AIR TEMPERATURE		
AI6	RACK TEMPERATURE		
AI7	SPACE TEMPERATURE		
AI8	SPACE HUMIDITY		
AI9	FAN SPEED (FEEDBACK)		
BI1	DIRTY FILTER	BO1	FAN (ON /OFF)
BI2	FAN STATUS		

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HVAC CONTROLS AND SOO - MISC

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SHEET 212 OF 296
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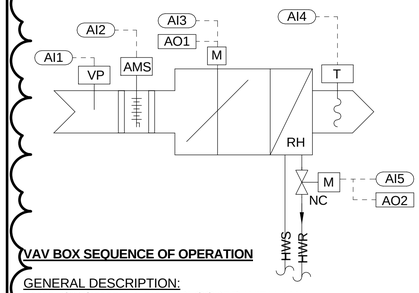
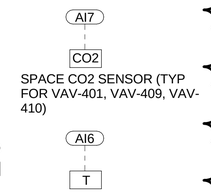




VAV BOX SEQUENCE OF OPERATION

GENERAL DESCRIPTION:
VAV BOX SHALL BE INTERLOCKED WITH AHU

HEATING MODE:
VAV BOX DAMPER SHALL MAINTAIN MINIMUM AIRFLOW. MODULATE HHW CONTROL VALVE TO MAINTAIN HEATING SETPOINT AS MEASURED BY SPACE THERMOSTAT. CLOSE HHW CONTROL VALVE ONCE SETPOINT IS ACHIEVED.

COOLING MODE:
VAV BOX DAMPER SHALL MODULATE TO MAINTAIN COOLING TEMPERATURE SETPOINT AS MEASURED BY SPACE THERMOSTAT.

CO2 SENSOR OPERATION:
UPON A RISE IN CO2 CONCENTRATION LAVEL ABOVE 800PPM (ADJ), THE VAV SHALL MODULATE DAMPER POSITION AS INDICATED BY TABLE BELOW:

CO2 CONCENTRATION LEVEL	DAMPER POSITION
<800 PPM	MINIMUM
800-899 PPM	40%
900-999 PPM	50%
>=1000 PPM	MAXIMUM

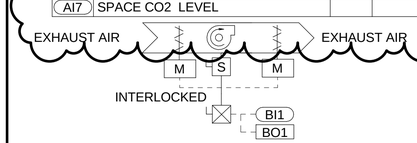
ALARMS:
- ALARM DDC WHEN TEMPERATURE SENSED BY SPACE THERMOSTAT IS 3 DEG F OUTSIDE OF HEATING - COOLING TEMPERATURE RANGE.
- ALARM DDC WHEN CO2 LEVEL EXCEEDS 880 PPM (ADJ) FOR 10 MINUTES (ADJ).

MONITOR:
- BOX INLET VELOCITY PRESSURE
- BOX DAMPER POSITION
- HHW VALVE POSITION
- DISCHARGE AIR TEMPERATURE

SET POINTS:
- INITIAL COOLING SETPOINT IS 72 DEG F (ADJUSTABLE)
- INITIAL HEATING SETPOINT IS 68 DEG F (ADJUSTABLE)

VAV BOX - DDC POINTS SCHEDULE

INPUTS		OUTPUTS	
AI1	BOX INLET VELOCITY PRESS	AO1	BOX DAMPER CONTROL
AI2	BOX INLET AIRFLOW	AO2	HHW VALVE CONTROL
AI3	BOX DAMPER POSITION		
AI4	DISCHARGE AIR TEMPERATURE		
AI5	HHW VALVE POSITION		
AI6	SPACE TEMPERATURE		
AI7	SPACE CO2 LEVEL		



BATHROOM EXHAUST FAN SEQUENCE OF OPERATION (P603)

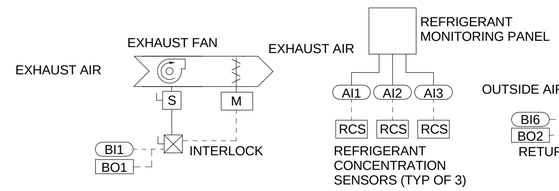
GENERAL DESCRIPTION:
EXHAUST FAN SERVING BATHROOMS SHALL BE OPERATE 24/7. DAMPERS UPSTREAM AND DOWNSTREAM SHALL BE INTERLOCKED WITH EXHAUST FAN.

LEAD/LAG:
- DDC SYSTEM SHALL SWITCH LEAD FAN AFTER EVERY 336 HRS OF OPERATION.
- UPON FAN FAILURE AS INDICATED BY FAN STATUS, FAILED FAN SHALL BE DE-ENERGIZED AND ASSOCIATED DAMPERS SHALL CLOSE. NEW LEAD FAN SHALL BE ENERGIZED AND ASSOCIATED DAMPERS SHALL OPEN. ALARM DDC PANEL ON FAN FAILURE.

ALARM:
- ALARM DDC UPON FAN FAILURE.

BATHROOM EXHAUST FAN - DDC POINTS SCHEDULE

INPUTS		OUTPUTS	
BI1	FAN STATUS	BO1	SUPPLY FAN START/STOP



CHILLER ROOM EXHAUST FAN SEQUENCE OF OPERATION

GENERAL DESCRIPTION:
CHILLER ROOM FAN IN ELECTRICAL EQUIPMENT ROOM SHALL BE CONTROLLED BY DDC. EXHAUST AIR DAMPER SHALL BE INTERLOCKED WITH FAN.

NORMAL MODE:
THE EXHAUST FAN SHALL BE ENABLED AND DISABLED BY THE SWITCH AT THE ENTRANCE TO B469.

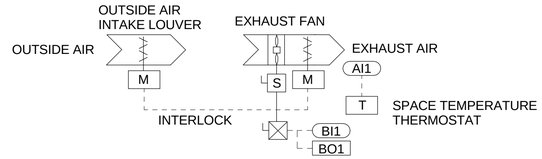
REFRIGERANT PURGE MODE:
WHEN ANY REFRIGERANT CONCENTRATION SENSOR INDICATES A HIGH REFRIGERANT LEVEL, THE FAN SHALL ENABLE AND OPERATE UNTIL REFRIGERANT CONCENTRATION DROPS.

ALARM:
- ALARM DDC PANEL ON FAN FAILURE.

SETPOINT:
- INITIAL REFRIGERANT SETPOINT TO BE DETERMINED BASED ON REFRIGERANT PROVIDED.

CHILLER ROOM EXHAUST FAN - DDC POINTS SCHEDULE

INPUTS		OUTPUTS	
AI1	REFRIGERANT CONCENTRATION		
AI2	REFRIGERANT CONCENTRATION		
AI3	REFRIGERANT CONCENTRATION		
BI1	EXHAUST FAN STATUS	BO1	EXHAUST FAN HIGH/LOW/OFF



ELEC/MECH EXHAUST FAN SEQUENCE OF OPERATION

GENERAL DESCRIPTION:
EXHAUST FAN IN ELECTRICAL EQUIPMENT ROOM SHALL BE CONTROLLED BY DDC. OUTSIDE AND EXHAUST AIR DAMPERS SHALL BE INTERLOCKED WITH FAN.

COOLING (VENTILATION):
UPON AN INCREASE IN SPACE TEMPERATURE ABOVE THE SETPOINT, THE FAN WILL BE ENERGIZED AND DAMPERS SHALL OPEN. WHEN THE SPACE TEMPERATURE SETPOINT HAS BEEN SATISFIED, THE FAN WILL DE-ENERGIZE AND DAMPERS SHALL CLOSE.

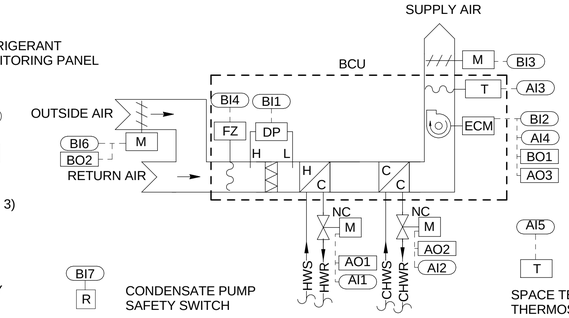
LEAD/LAG:
- DDC SYSTEM SHALL SWITCH LEAD FAN AFTER EVERY 336 HRS OF OPERATION.
- UPON FAN FAILURE AS INDICATED BY FAN STATUS, FAILED FAN SHALL BE DE-ENERGIZED AND ASSOCIATED DAMPERS SHALL CLOSE. NEW LEAD FAN SHALL BE ENERGIZED AND ASSOCIATED DAMPERS SHALL OPEN.

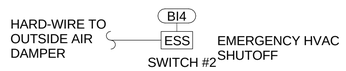
ALARM:
- FAN FAILURE.
- TEMPERATURE EXCEEDS SETPOINT BY MORE THAN 10°F.

SETPOINT:
- INITIAL SETPOINT IS 90 DEG F (ADJ).

ELEC/MECH EXHAUST FAN - DDC POINTS SCHEDULE

INPUTS		OUTPUTS	
AI1	SPACE TEMPERATURE		
BI1	EXHAUST FAN STATUS	BO1	EXHAUST FAN ON/OFF





SEQUENCE OF OPERATION - BCU-3

GENERAL DESCRIPTION:

BCU-3 SHALL BE ENABLED THROUGH THE FACILITY DDC ENERGY MANAGEMENT SYSTEM (EMS). BCU-3 IS EXPECTED TO OPERATE CONTINUOUSLY, 24 HOURS PER DAY, 365 DAYS PER YEAR, DURING WHICH IT WILL OPERATE IN THE OCCUPIED MODE.

BCU SHALL HAVE A VARIABLE SPEED FAN, HEATING HOT WATER COIL, CHILLED WATER COOLING COIL, CONTROLLER, AND REQUIRED DAMPERS AND SENSORS. UNIT DISCHARGE DAMPER SHALL BE INTERLOCKED WITH FAN OPERATION. OUTSIDE AIR DAMPER SHALL BE OPEN WHEN THE FAN IS OPERATIONAL.

OCCUPIED MODE:

THE DDC SYSTEM SHALL OPEN THE OUTSIDE AND RETURN AIR DAMPERS TO THEIR MINIMUM POSITIONS. THE SUPPLY AIR DAMPER SHALL BE OPENED. AFTER THE DAMPERS POSITIONS ARE CONFIRMED BY ACTUATOR FEEDBACK SIGNAL, THE SUPPLY FAN SHALL BE ENABLED. THE OUTSIDE AIR DAMPER SHALL BE MODULATED TO MAINTAIN MINIMUM REQUIRED OA FLOW. THE CHILLED WATER AND HOT WATER VALVES SHALL BE MODULATED TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. DISCHARGE AIR TEMPERATURE SHALL BE DYNAMICALLY RESET.

SUPPLY AIR RESET:
THE SUPPLY FAN SHALL MODULATE TO MAINTAIN ITS DISCHARGE AIR TEMPERATURE SETPOINT. AS COOLING LOAD DECREASES, THE FAN SHALL MODULATE DOWN TO MINIMUM SPEED (30%). AS THE SPACE TEMPERATURE CONTINUES TO FALL BELOW THE COOLING SETPOINT BY 1.0°F (ADJ.) AND THE FAN REMAINS AT MINIMUM SPEED FOR 10 MINUTES (ADJ.). ONCE SPACE TEMPERATURE IS 1.0°F BELOW COOLING SETPOINT FOR 10 MINUTES (ADJ.) THE UNIT SHALL BE IN RESET MODE. THE FAN WILL REMAIN AT MINIMUM SPEED AND SUPPLY AIR RESET SHALL BE ENABLED. AS THE SPACE TEMPERATURE CONTINUES TO DROP TOWARDS HEATING SETPOINT, THE DISCHARGE AIR SETPOINT IS RESET BETWEEN COOLING DISCHARGE AIR SETPOINT AND HEATING DISCHARGE AIR SETPOINT. THE DISCHARGE AIR SETPOINT SHALL BE CALCULATED AND CHANGED EVERY 10 MIN (ADJ.) WHILE THE UNIT IS IN RESET MODE. WHEN THE SPACE TEMPERATURE CONTINUES TO DROP BELOW HEATING SETPOINT, THE FAN SHALL RAMP TO 100% AND HEATING SHALL BE ENABLED. ONCE THE SPACE TEMPERATURE RISES ABOVE THE HEATING SETPOINT BY 1.0°F (ADJ.), HEAT WILL BE DISABLED AND FAN SHALL RAMP DOWN TO MINIMUM SPEED. RESET OF DISCHARGE AIR SETPOINT SHALL OCCUR EVERY 10 MINUTES (ADJ.). THE FAN WILL REMAIN LOW SPEED UNTIL THE SPACE TEMPERATURE RISES 1.0°F (ADJ.) ABOVE THE COOLING SETPOINT FOR AT LEAST 10 MIN (ADJ.). ONCE THE SPACE TEMPERATURE IS 1.0°F (ADJ.) FOR 10 MIN (ADJ.), THE DDC SHALL REVERT BACK TO ITS COOLING DISCHARGE AIR SETPOINT.

COOLING:
THE DDC SHALL MONITOR THE SPACE TEMPERATURE. WHEN THE SPACE TEMPERATURE RISES ABOVE THE COOLING SETPOINT, THE CHW VALVE SHALL MODULATE OPEN. UPON REACHING THE COOLING SETPOINT, THE CHW VALVE SHALL MODULATE CLOSED.

HEATING:
THE DDC SHALL MONITOR THE SPACE TEMPERATURE. WHEN THE SPACE TEMPERATURE FALLS BELOW THE HEATING SETPOINT, THE HHW VALVE SHALL MODULATE OPEN. UPON REACHING THE HEATING SETPOINT, THE HHW VALVE SHALL MODULATE CLOSED.

SETPOINTS:
- INITIAL COOLING SETPOINT IS 78 DEG F (ADJUSTABLE)
- INITIAL HEATING SETPOINT IS 68 DEG F (ADJUSTABLE)

ATFP SHUTDOWN:
UPON RECEIVING A SHUTDOWN SIGNAL FROM ESS (EMERGENCY SHUTDOWN SWITCH #2) THE OUTSIDE DAMPER SHALL CLOSE AND RETURN AIR DAMPER SHALL OPEN FULLY. THE UNIT SHALL CONTINUE TO PROVIDE HEATING AND COOLING TO THE SPACE.

SAFETY SHUTDOWN:
- IF THE MIXED AIR TEMPERATURE AS MEASURED BY FREEZE STAT FALLS BELOW 38°F (ADJUSTABLE) THE FAN SHALL BE DE-ENERGIZED, THE OUTSIDE AIR AND EXHAUST AIR DAMPERS SHALL CLOSE. AN ALARM SHALL BE SENT TO THE OPERATOR WORKSTATION.
- IF THE DUCT STATIC PRESSURE SENSOR DETECTS A STATIC PRESSURE HIGHER THAN 1.5 IN H20 (ADJUSTABLE), THE FAN SHALL STOP, THE DAMPERS WILL RETURN TO THE UNOCCUPIED POSITIONS AND AN ALARM SHALL BE SENT TO THE WORKSTATION. AFTER A 5 MINUTE PERIOD (ADJUSTABLE) THE SYSTEM SHALL RESTART.

ALARMS: AN ALARM WILL BE TRANSMITTED AS INDICATED FOR THE FOLLOWING CONDITIONS:

- SUPPLY FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF
- SUPPLY FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON
- DAMPER COMMAND FAILURE
- HIGH DISCHARGE TEMPERATURE
- LOW DISCHARGE AIR TEMPERATURE
- HIGH STATIC PRESSURE
- DIRTY FILTERS
- FREEZE CONDITIONS

GENERAL NOTES:

1. REFER TO SHEET M-001 FOR MECHANICAL GENERAL NOTES, LEGEND, AND ABBREVIATIONS.
2. SEE SHEET MI700 FOR CONTROLS LEGEND AND ABBREVIATIONS.

VERTICAL BLOWER COIL UNIT - DDC POINTS SCHEDULE

INPUTS		OUTPUTS	
AI1	HHW VALVE POSITION	AO1	HHW VALVE CONTROL
AI2	CHW VALVE POSITION	AO2	CHW VALUE CONTROL
AI3	DISCHARGE TEMPERATURE	AO3	FAN SPEED CONTROL
AI4	FAN SPEED (FEEDBACK)		
AI5	SPACE TEMPERATURE		
BI1	DIRTY FILTER	BO1	FAN (ON /OFF)
BI2	FAN STATUS	BO2	OA DAMPER
BI3	SA DAMPER (OPEN/CLOSE)		
BI4	FREEZE STAT		
BI5	HVAC ESS		
BI6	OA DAMPER (OPEN/CLOSE)		
BI7	CONDENSATE PUMP SWITCH		

SYM	DESCRIPTION	DATE	APPR
1	AMENDMENT CHANGES	03/18/16	CMG

NAVFAC

COMMONWEALTH OF VIRGINIA
CHRISTIAN M. GUERRA
Lic. No.047284
03/18/2016
PROFESSIONAL ENGINEER
SEAL

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757-548-2056
A/E INFO

APPROVED
FOR COMMANDER NAVFAC / B.L.T.L.
ACTIVITY
SATISFACTORY TO DATE
DES CWS DRW CWS CHK CG
PROJECT MANAGER
IPT TECH. BRANCH HEAD
CHIEF ENG/ARCH

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
IPT-HAMPTON ROADS
NAVAL FACILITIES ENGINEERING COMMAND ~ MIDLANT
NAVAL STATION, NORFOLK
NAS OCEANA-DAM NECK ANNEX
VIRGINIA BEACH, VIRGINIA
P-603 MARITIME SURVEILLANCE SYSTEM FACILTY
HVAC CONTROL AND SOO - MISC

SCALE: AS NOTED
EPROJECT NO. 1344924
CONSTR. CONTR. NO. N40085-16-R-6119
NAVFAC DRAWING NO. 12712979
SHEET 213 OF 296
MI705

DRAWFORM REVISION: 10 MAY 2014

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